# International Islamic University Chittagong

## Department of Electrical and Electronic Engineering

# Syllabus

***For 4 years B.Sc. Engineering Degree in Electrical & Electronic Engineering***

**Autumn-2021**

As per recommendations made in the meeting of the Syllabus and Course Offering Committee of the Department of EEE held on July 06, 2021.

As per recommendations made in the meeting of the Committee of Courses of the Department of EEE held on August 21, 2021.

As per recommendation made in the 141st meeting of Faculty of Science and Engineering Committee held on October 16, 2021.

As per recommendation of the 44th Academic Council meeting held on October 31,2021 and duly approved in the 239th Syndicate meeting held on November 04, 2021.

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# International Islamic University Chittagong
# Faculty of Science and Engineering
# Department of Electrical and Electronic Engineering

## 1. The Vision, Mission, Objectives and Motto of the International Islamic University Chittagong (IIUC)

**1.1 Introduction**: International Islamic University Chittagong (IIUC) is one of the top graded government-approved private universities in Bangladesh. Having fulfilled the requirements as laid down in the Private University Act of 1992, and after obtaining the necessary clearance from the University Grants Commission (UGC), and the permission of the Government of Bangladesh (GOB) through the Ministry of Education, **International Islamic University Chittagong (IIUC)** started functioning on **February 11, 1995**. The credit for the idea of establishing this University goes to Islamic University Chittagong Trust (IUCT).

IIUC framed its Statutes, Ordinances, and Regulations governing IIUC's key activities - academic, administrative, financial, student welfare, discipline, etc. as per the **Private University Act, 1992, 1998, and revised Act, 2010.** Most statutory bodies formed under the provisions of the Act have since then been functioning.

**1.2 The Visions of the University are:**

i. to offer nationally competitive & internationally recognized opportunities for learning to make IIUC as the Centre of Excellence in different areas of scholarship.
ii. to keep its door is open to the admission seekers from all over the world, regardless of race, region and religion.
iii. to cherishes the dream of becoming one of the highest seats of learning & creator of knowledge in the South East Asia.

1.3. **The Mission of the University**:

| Number of Missions | The **Missions of the International Islamic University Chittagong** (IIUCMS) are to |
|---|---|
| **IIUC MS-1** | produce through the pursuit of education properly trained up manpower to contribute to socio-economic development & moral upliftment of the society |
| **IIUC MS-2** | cultivate in students expertise as well as ethical sensitivity and intelligence, |
| **IIUC MS-3** | have an ability to think independently beyond their areas of study, so that they can sustain justice in all walks of life. |

**1.4 The objectives of the University are t**o

i. create a new generation of competent youths, who will be equipped with academic excellence, professional expertise and adorned with moral height.
ii. follow a policy of continued Modernization of Knowledge and academic curricula in different disciplines of education so that its students can imbibe the true spirit of religious value as an effective guiding principle in their profession and daily life.

**1.5 The Motto of IIUC** is to "**Combine Quality with Morality."**

## 2. Teaching Methods and Policy of IIUC:

**2.1 Methods:** *Outcome–based education (OBE) and Bi- Semester system of Continuous Quality Improvement (CQI) through self-examination and external review*. In this process, students are evaluated throughout a course rather than exclusively by examination at the end. It is multidimensional based on students (a) attendance in the Classes, (b) performance in Assignments and Class Tests, (c) Scores in the Mid-Term, and the Semester End Examination (d) Lab. Reports, (e) Thesis/ Project/ internship, (f) Seminar/Presentations (g) Viva-voce, (f) Industry visits (g) Co-Curricular and Extra-curricular activities.

**2.2 Policy:** The University is committed to the life-long success of students in its undergraduate and master's programs through high-quality instruction and learning experiences. IIUC has **an Integrated Education Policy**,

where a student achieves holistic learning through awareness of his surroundings and other relevant knowledge bases. IIUC emphasizes the diffusion of scientific, technical, and professional knowledge on the one hand, & building up of character in youth by making religion and ethics an integral part of education on the other. In this regard, there are some courses for the students of all Faculties at IIUC. These are not a part of the Departments' main curriculum, but those are named as **University Requirement Courses (URC).**

**2.3 Morality Development Program (MDP): IIUC** incorporates studies on the values of mutual respect & peaceful co-existence in the courses under the "**Morality Development Program (MDP),**" which includes all students of the university irrespective of caste, creed, or religion.

**2.4. Co-Curricular and Extra-curricular activities: IIUC** supports student participation in a broad array of *Co-Curricular and Extra-curricular activities* as an integral component of its commitment to student life and success. These programs mainly include leadership training, cultural, environmental, recreational, and social activities, debating & public speaking programs, intellectual discussions, games & sports, excursion, and study tours home & abroad to complement academic pursuits. Through these programs, students earn the capacity to express themselves properly, maintain the personality, and learn to respect people of other faiths through mutual understandings among various regions, religions, beliefs, and cultures. All Co and Extra-curricular activities are run by the clubs named after the Departments such as EEE club, Computer club, Business club, etc. under the close supervision and monitoring of the competent authority.

**2.5 Student Advisor:** IIUC provides Academic Guidance and Counseling Service by the Student Academic Advisor of a section of students each semester. The students' Academic Guidance and Counseling Service is an integral part of the academic program of IIUC students. Its objective is to guide students to obtain the best results, adapt to the university environment, and take advantage of their opportunities and solve individual problems through counseling. A special arrangement has been made for Academic Guidance and Counseling at the University, in each department of IIUC, to provide academic career and student welfare counseling by the Student Adviser of the respective section of students under each semester, i.e., section adviser is the Student Academic Advisor for Academic Guidance and Counseling (Ref: the 207th Syndicate Meeting held on 27.01.2018). The Academic Adviser shall specify at least two periods a week that will be displayed in their timetable and ensure that they are available at their offices in specific periods to enable them to meet their advisers. The student adviser shall maintain a file for the students advising record each semester.

Students Affairs Division (STAD) and Job Placement Centre (JPC) of IIUC also helps the students, which covers (a) group and individual counseling, (b) career and job placement, (c) preserving CVs of the graduates, (d) advising & helping students to solve their career-related problems, etc.

## 3. Names of the Degree, Faculty offering the program and Department offering the Program

3.1 **Name of the Degree**: Four years Bachelor Program of Bachelor of Science in Electrical and Engineering. Degree Program. The abbreviation of the degree is **B.Sc. (Engg) in EEE**. Graduates at this level will have advanced knowledge and skills for professional/highly skilled work and or further learning.

3.2 **Name of the Faculty offering the Program**: The Faculty of Science and Engineering **(FSE).**

3.3 **Name of the Department offering the Program**: The Department of **Electrical and Electronic Engineering (EEE).**

## 4. The Mission, Vision and Objectives of the Faculty of Science & Engineering

### 4.1. The Mission of the Faculty of Science and Engineering:

The mission of the Faculty of Science and Engineering (FSE) is to foster excellence in teaching, research, and learning within a systems approach to science and engineering education. Our goal is to produce engineering graduates with both a strong base of technical knowledge and the complementary skills needed to be successful professional engineers in the modern world.

### 4.2. The Vision of the Faculty of Science and Engineering:

The vision of the Faculty of Science and Engineering is to be a dynamic center of innovation and creativity dedicated to teaching, learning, professionalism, research, entrepreneurship, and partnership with local and global communities. The aims of the Faculty are to provide international standard quality programs of undergraduate and graduate education, be an active research unit advancing the knowledge of science and

engineering and serve the community and industry as an agent of technological and educational innovation and advancement.

### 4.3. The Objectives of the Faculty of Science and Engineering:

The Faculty plans to achieve its vision and mission through the pursuit of the following specific objectives. The objectives are

**F1:** To prepare graduates for personal and professional success with an awareness of and commitment to their ethical and social responsibilities, both as individuals and team environments.

**F2:** To enable graduates to keep on self- development throughout their careers.

**F3:** To produce graduates with the necessary background and technical skills to work professionally and fulfill the need of the industry.

**F4:** To organize, in collaboration with stakeholders, conferences, symposia, and workshops to upgrade technical levels in Science and Engineering.

**F5:** To carry out and publish academic knowledge.

**F6:** To initiate activities to promote research innovation, commercialization, and Entrepreneurship Increase.

## 5. Vision and Mission of the Department of Electrical and Electronic Engineering (EEE)

### 5.1 The Vision of the department

**The vision of the department is** to produce comprehensively trained, socially responsible, innovative electrical engineers and researchers of high quality who can contribute to national and global development.

### 5.2 Mission of the department:

The Dept. of EEE supports the mission of the International Islamic University Chittagong (IIUC) through an academic environment with a strong theoretical foundation, practical engineering skills, experience in interpersonal communication and team work along with an emphasis on ethics, professional conduct, and critical thinking. Further, the graduates will be trained to have successful engagement in research and development and entrepreneurship. The department invokes the desire and ability of lifelong learning in the students to pursue a successful career in engineering. In short, the departmental mission can be stated as follows:

**MS-1:** Strong theoretical foundation to have the life-long learning

**MS-2:** Practical engineering skill for successful career in engineering

**MS-3:** Experience in interpersonal communication

**MS-4:** Teamwork along with ethics, professional engagement and critical thinking

**MS-5:** Engagement in research, development and entrepreneurship.

**F-I: Mapping between Mission of the University and departmental Mission Statements (MSs)**

| Mission of the department | Institutional missions | | |
|---|---|---|---|
| | IIUC MS-1 | IIUC MS-2 | IIUC MS-3 |
| MS-1 | ✓ | - | - |
| MS-2 | - | ✓ | - |
| MS-3 | - | ✓ | - |
| MS-4 | ✓ | - | ✓ |
| MS-5 | ✓ | - | ✓ |

## 6. Description of the Programs

The B.Sc. (Engineering) program in the Electrical & Electronic Engineering department consists of 77 courses carrying **162 Credit Hours**. There are 9 University Requirement Courses (URC) with 13 credit hours, 4 Interdisciplinary Courses with 8 credit hours, 11 Basic Science Courses carrying 26 credit hours, 41 core courses carrying 86.5 credit hours, and 12 Elective Courses carrying 28.5 credit hours. A total of **162** credit hours has to be undertaken and completed by a student during 8 semesters. The duration of each semester is 6 months. Each course carries 100 marks. There are 50 marks for Continuous Internal Evaluation (CIE) and 50 marks for Semester End Examination (SEE). Assessment pattern for CIE and SEE are as follows:

**A. Assessment Pattern for theory courses:** A sample question assessment pattern for a theory course is given in Table 6.1to show the relationship among Bloom's category and CIE and SEE.

**Table 6.1:A Sample Question Assessment Pattern (Theory courses)**

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note: CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions, Power point Presentation etc.
ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term and Semester end examination , Project evaluation and Viva, etc.

**B. Assessment Pattern for Sessional Courses**: There are 100 marks for each Sessional course. Out of 100 marks, 50-60 marks are allotted for continuous assessment on Lab. activities, including 10 marks for attendance (**CIE**) and 40-50 marks is for a practical exam in the form of the viva, quiz, etc. at the end of Semester End examination (**SEE**).

## 7. Program Educational Objectives of B.Sc. in Electrical and Electronic Engineering

The Program Educational Objectives (PEOs) or goals are the statements that describe the expected achievements of graduates within the first few years of their graduation from the program. The program objectives are guided by global and local needs, the institution's vision, long-term goals, etc. The program objectives are expected to continuously evolve in agreement with local employers, industry, R & D advisors, and alumni. **Program Educational Objectives (PEOs)** of B. Sc in EEE at IIUC are as follows:

| | **Topics** | **Program Educational Objectives (PEOs)** |
|---|---|---|
| **PEO-1** | **Success in Electrical Engineering Fields** | To provide students with the knowledge of Basic Sciences in general and Electrical and Electronics Engineering, in particular, to acquire the necessary skills for analysis and synthesis of problems in electrical and electronic engineering. |
| **PEO-2** | **Industrial awareness &research** | To provide technical knowledge and skills to identify, comprehend, and solve complex industry and research tasks and inspire the students to become future researchers, scientists with innovative ideas. |
| **PEO-3** | **Successful employment & professional ethics** | To prepare the students for successful employment in various Industrial and Government organizations, both at the National and International level, with professional competence and ethical administrative acumen to handle critical situations and meet deadlines. |
| **PEO-4** | **Being a leader in professional & societal environment** | To train the students in basic human and technical communication skills to be good team members, leaders, and responsible citizens. |

These PEOs are quite broad by intention, as **Electrical and Electronic Engineering** graduates may seek further education or work in diverse areas. To make these PEOs meaningful, they will demonstrate the following performance, actions, or achievements.

- Following indicators are considered as a demonstration of **PEO-1:** Students will establish themselves with the knowledge of Basic Sciences in general and Electrical and Electronic Engineering, in particular, so as to acquire the necessary skills for analysis and synthesis of complex engineering problems that may be demonstrated by any of the following:
  a. Acceptance and satisfactory progress by students in a graduate degree program.
  b. Formulating and solving moderately complex electrical and electronics engineering problems.
  c. Making practical recommendations and skillful use of state-of-the-art tools for electrical and electronics engineering processes.
  d. Producing, publishing, and reviewing clear written electrical and electronics engineering documentation (papers, reports, and significant parts of proposals).
  e. Participating in the field through public speaking, activity in professional societies/technical associations, etc.
  f. Capability to handle societal, ethical (intellectual property rights), legal, business, and technical issues related to a project.

- Following indicators are considered as a demonstration of **PEO-2:**Students will establish themselves with the technical knowledge and skills to identify, comprehend and solve complex tasks in industry and research and inspire the students to become future researchers, scientists with innovative ideas that may be demonstrated by any of the following:

a. Leading or participating in a project, professional society, designed team, team sports, or coaching.
b. Delegating effectively.
c. Effectively handling a situation involving ethics and volunteering in a charitable organization.

- Following indicators are considered as a demonstration of **PEO-3:**Students will establish themselves for successful employment in various Industrial and Government organizations, both at the National and International level, with professional competence and ethical administrative acumen so as to handle critical situations and meet deadlines may be demonstrated by any of the following:

a. Skillfully using tools for project and configuration management, like resource planning systems, software source control systems, etc.
b. Show respect to others and conduct professional duties with high standards of ethics and rationality.
c. Communicating effectively in a group environment and resolving problems encountered in teamwork.
d. Estimating correctly the required resources (time, team, equipment etc.) for Electrical and Electronics Engineering projects.
e. Seeking assistance or elevating problems when necessary.

- Following indicators are considered as demonstration of **PEO-4:**Students will establish themselves for basic human and technical communication skills so that they may be good team-members, leaders and responsible citizen may be demonstrated by any of the following:

a. Successfully completing the graduate course and acquire self-learning capability with a new skill and tools and system.
b. Reading technical books, journals, conference papers, technical reports or standards
c. Engage in life-long learning through continuing education, research, attending a technical conference, symposium or workshop

**F-II: Mapping between Program Educational Objectives (PEOs) and departmental mission Statements (MSs)**

| PEOs | MS-1 | MS-2 | MS-3 | MS-4 | MS-5 |
|---|---|---|---|---|---|
| PEO-1 | ✓ | ✓ | ✓ | - | - |
| PEO-2 | ✓ | ✓ | - | - | ✓ |
| PEO-3 | - | - | - | ✓ | ✓ |
| PEO-4 | - | ✓ | ✓ | ✓ | ✓ |

**F-III: Mapping between Program Educational Objectives (PEOs) and IIUC missions**

| | Institutional Missions | | |
|---|---|---|---|
| | IIUC MS-1 | IIUC MS-2 | IIUC MS-3 |
| PEO-1 | ✓ | ✓ | - |
| PEO-2 | ✓ | ✓ | - |
| PEO-3 | - | - | ✓ |
| PEO-4 | - | ✓ | ✓ |

## 8. Program Learning Outcome of B.Sc. in Electrical and Electronic Engineering

It is the aim of the EEE program to educate engineers who are ready to work actively in the real-world, acquiring high ability in the Electrical and Electronics Engineering discipline. The first two years' basic classes give the students a concrete basis to be Electrical and Electronics Engineering. They begin their professional study from the second year and step up year by year to be highly educated engineers. All the EEE students obtain basic knowledge and basic skills in the Electrical and Electronics Engineering discipline with the undergraduate program's courses. These courses nurture highly educated engineers in power generation and transmission, which have deep knowledge and problem-solving skills in the relevant fields. Our graduates are expected to have a wide range of abilities, including professional knowledge and technical skills in electrical engineering.

**Program Learning Outcome or PLOs** are abilities that a graduate of Electrical and Electronic Engineering would be able to do at the time of graduation. Relation of Program Learning Outcome with Knowledge Profile (K1-K8), Complex Engineering Problem Solving (P1-P7) and complex Engineering Activities (A1-A5) are describe in the tables 10.1,10.2,10.3 and 10.4. A graduate of EEE will achieve the following PLOs.

**PLO-1: Engineering Knowledge**: an ability to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization as specified in K1 to K4 respectively to the solution of complex engineering problems.

*Performance Criteria Definitions:*

- Define/describe pertinent principles, concepts, theories, and/or formulas, as appropriate to complex engineering problems at the level of P1 and A1.
- Knowledge and understanding of scientific principles and methodology necessary to strengthen their education in their engineering discipline, to enable appreciation of its scientific and engineering context and to support their understanding of historical, current and future developments and technologies.
- Knowledge and understanding of mathematical principles necessary to underpin their education in their engineering discipline and to enable them to apply mathematical problems.
- Ability to apply and integrate knowledge and understanding of other engineering disciplines to support the study of their own engineering discipline.
- Express confidence in receiving positive rating from employers on this Program Learning Outcome.

**PLO-2: Problem Analysis:** an ability to identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences (K1 to K4).

*Performance Criteria Definitions*

Practical application of engineering skills through combining theory and experience, use of other relevant knowledge and skills in fulfilling this objective, including:

- Identify appropriate complex engineering problems at the level of P1-P7, and A1-A5.
- Understanding of contexts in which engineering knowledge can be applied (e.g. operations and management, technology development, etc.)
- Understanding the use of technical literature and other sources of information
- Awareness of quality issues
- Ability to work with technical uncertainty
- Understanding of engineering principles and ability to apply them to analyze key engineering processes.
- Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modeling techniques
- Ability to apply quantitative methods and computer software relevant to their engineering discipline, in order to solve complex engineering problems.

- Understanding ability to apply a systems approach to engineering problems
- Demonstrate confidence in problem solving while in employment in industry.

**PLO-3: Design / Development of Solutions:** an ability to Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations (K5).

*Performance Criteria Definitions*

Design is the creation and development of an economically viable product, processor system to meet a defined application. It involves significant technical and intellectual skills that can be used, to integrate all engineering understanding, knowledge for the solution of real problems. Graduates will therefore need the knowledge, understanding and skills to:

- Establish objectives of a complex design project specifying knowledge profile (K1-K8), complex problem solving (P1-P7), and complex activities (A1-A5).
- Design solutions for complex engineering problems.
- Manage the design process and evaluate outcomes.
- Knowledge of management techniques which may be used to achieve engineering objectives within that context.
- Understanding of the requirement for engineering activities to promote sustainable development.

**PLO-4: Conduct Investigations of Complex Problems:** an ability to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

*Performance Criteria Definitions*

Graduates will therefore need the knowledge, understanding and skills to:

- Identify problems or opportunity in engineering field
- Problem formulation and abstraction
- Information and data collection.
- Model translation.
- Implementation and documentation.
- Interpretation of results.

As the most engineers eventually learn, the problem-solving process is never complete. Therefore, a final element here is feedback and improvement.

**PLO-5: Modern Tool Usage:** an ability to create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations (K6).

*Performance Criteria Definitions*

Graduates will be expert in:

- Wide range of tools needed by engineering graduates in computer software, simulation packages, diagnostic equipment, use of technical library resources and literature search tools.
- Predicting and modeling to complex engineering activities.

**PLO-6: The Engineer and Society**: an ability to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice (K7).

*Performance Criteria Definitions*

The Graduates will

- Have the contextual knowledge of assessing the societal, health, safety, legal and cultural issues in engineering solutions.
- Consideration of non-technical such as societal, health, legal and cultural issues in developing the engineering solution.
- Demonstrate confidence in professional practice in employment and receive positive rating from employers on this Program Learning Outcome.

**PLO-7: Environment and sustainability:** an ability to understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development (K7).

*Performance Criteria Definitions*

- Focusing the knowledge and interpretation a socio economic, political and environmental issues.
- Obtaining in-depth knowledge on contemporary issue.
- Demonstrate confidence in professional practice in employment and receive positive rating from employers on this Program Learning Outcome.

**PLO-8: Ethics:** ability to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice (K7).

*Performance Criteria Definitions*

- Ability to make informed ethical choices and knowledge ability to of professional codes of ethics.
- Evaluates the ethical dimensions of professional practice and demonstrates ethical behavior.
- Achieve High degree of trust and integrity
- Demonstrate that they can respond positively on ethical and professional issues while in employment.

**PLO-9: Individual and Teamwork:** an ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

*Performance Criteria Definitions*

Graduates will therefore gain

- Maturity – requiring only the achievement of goals to drive their performance.
- Self-direction (take a vaguely defined problem and systematically work to resolution).
- Capability on effective teamwork and project.
- Ability to demonstrated and work with all levels of people in a team in organization.
- Demonstrate that they can respond positively on ethical and professional issues while in employment.

**PLO-10: Communication**: an ability to communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

*Performance Criteria Definitions*

Graduates will therefore gain the skill of

- Writing technical reports preparing assignments, homework etc.
- Prepare multi-media presentations, posters
- Delivery of oral presentations, participate in technical discussions
- Express confidence that they can communicate effectively while employed in industry.

**PLO-11: Project management and finance:** an ability to demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

*Performance Criteria Definitions*

- Knowledge of project management principles
- Define and planning of engineering project
- Demonstrate engineering /computing project development phases
- Consideration of economics and financial aspects of engineering projects

**PLO-12: Life-long learning and Successful Career**: an ability to recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change as well as ability to use the techniques and skills to face and succeed in competitive examinations like BCS, GRE, TOEFL etc.

*Performance Criteria Definitions*
Inspiring the students to further explore in his/her program to recognize the need for life-long Learning. Some aspects of life-long learning include:

- Understanding of the need for a high level of professional and ethical conduct in engineering
- Carry out research on computing topics by reading and reporting on papers in the technical literature.
- Involve oneself in professional activities (e.g. meeting, presentations, and workshops).
- Analyze and evaluate computing and engineering information and handle problems for which the required knowledge is not complete.

**F-IV: Mapping between Program Educational Objectives (PEOs) and Program learning Outcome (PLOs)**

| PEOs | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO10 | PLO11 | PLO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PEO-1 | ✓ | ✓ | ✓ | ✓ | ✓ | - | - | - | - | - | - | - |
| PEO-2 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | |
| PEO-3 | ✓ | - | - | - | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| PEO-4 | - | - | - | - | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

## 9. Attaining Complex Engineering Problem

The students can attain complex engineering problems in three different ways, such as:

a. Open-ended laboratory project
b. Complex engineering related assignment under any theory or laboratory course and
c. Capstone design project under the course of final year thesis/project (EEE-4860).

Thus, a student can attain at least one or more complex engineering problems through the process (a) and (b). In case any student fails to earn at least one complex engineering problem through the process (a) and (b), he must have to attain it through a capstone design project, as mentioned in process (c). Besides, industry visits for the students to be arranged regularly. The evaluation of the project/thesis is described below.

Marks distribution for projects/thesis is as follows:

| | |
|---|---|
| 1) Project/Thesis evaluation by Supervisor- | 35% |
| 2) External- | 30% |
| 3) Final Defense Board- | 35% |
| Total | 100% |

## 10. Graduate Profile, Teaching Activities and Assessment

The Graduate Profile is a description of the personal qualities, skills, and attributes a student is expected to obtain by the end of an undergraduate degree program at the University. These are descriptions of attributes, or knowledge, skills, and attitudes, which a university intends its graduates will develop through their study to equip them for their future education or employment. These descriptions are written at the institution and program level and are used to inform curriculum design as well as guide the up-gradation of course outcomes, teaching activities, and assessment at courses. Graduate profiles are alternatively known as Program Learning Outcomes (PLOs).

Program Learning Outcomes assessment should consider the Knowledge Profile, the range of Complex Engineering Problem Solving and the range of Complex Engineering Activities. Mapping of Program Learning Outcomes against Knowledge Profile, Complex Problem Solving, and Complex Activities is shown in Table 10.1

**Table 10.1:** Graduates Profiles as expected for the EEE program at IIUC as per BAETE.

| *Engineering Graduates shall attain the following POs (Program Learning Outcome) by the time of graduation as expected by BAETE (SA Report Manual 2017, BAETE) | | | | |
|---|---|---|---|---|
| Program Learning Outcome(POs) Graduate Profiles | Blooms Taxonomy Learning Domain | Knowledge Profile (K1-K8) | Complex Problems (P1-P7) | Complex Activities (A1-A5) |
| (a) Engineering Knowledge | Cognitive | K1-K4 | A combin-ation of P1-P7 | A combin-ation of A1 –A5 |
| (b) Problem Analysis | Cognitive | K1-K4 | | |
| (c) Design/ Development of Solutions | Cognitive, Affective | K1-K8 | | |
| (d) Investigation | Cognitive, Psychomotor | K8 | | |
| (e) Modern Tool Usage | Psychomotor, Cognitive | K6 | | |
| (f) The Engineer and Society | Affective | K7 | | |
| (g) Environment and Sustainability | Affective, Cognitive, | K7 | | |
| (h) Ethics | Affective | K7 | | |
| (i) Individual and Teamwork | Psychomotor, Affective | A combin-ation of K1-K8 | | |
| (j) Communication | Psychomotor, Affective | | | |
| (k) Project Management and Finance | Cognitive, Psychomotor | | | |
| (l) Life-Long Learning | Psychomotor, Affective | | | |

The engineering program of EEE that aims to develop the above-mentioned POs, which must ensure its curriculum encompasses all the attributes of the **Knowledge profile** (K1-K8) as presented in Table 10.2 and as included in the table 10.1. The range of Complex Problem solving (P1-P7) and Complex Engineering Activities (A1-A5) that should be addressed in the program are given in Table 10.3 and 10.4 respectively.

**Table 10.2: Knowledge Profile**

| **Knowledge Profile** | Possible Course and topics |
|---|---|
| K1 A systematic, theory-based understanding ofthe natural sciences applicable to the discipline. | Physics, Chemistry, Biology, Geology. Biochemistry |
| K2 Conceptually based mathematics, numericalanalysis, statistics and formal aspects of computerand information science to support analysis andmodeling applicable to the discipline. | Calculus of variation, Ordinary and partial differential equations, Advanced mathematics, numerical analysis, Statistics, Relevant aspects of computer and information science. |
| K3 A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline. | Engineering graphics, Mechanics, Electric and electronic circuits, Computing, Material Science, Thermodynamics and fluid mechanics. |
| K4 Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline. | Electives such as Automatic control, Power plant, Robotics, System dynamics, Energy systems |
| K5 Knowledge that supports engineering design in a practice area. | Design processes, Innovative methods, Codes, Standards, Techniques such as Taguchi methods, TRIZ and House of Quality. |
| K6 Knowledge of engineering practice (technology) in the practice areas in the engineering discipline. | Manufacturing, energy and Power production, Construction, Transportation, Communication |
| K7 Comprehension of the role of engineering in society and identified issues in engineering practice in the discipline: ethics and the professional responsibility of an engineer to public safety; the impacts of engineering activity: economic, social, cultural, environmental and sustainability. | Ethics and professional responsibility of an engineer to public safety; the impact of engineering activity; Economic, social, cultural, environmental and sustainability. |
| K8 Engagement with selected knowledge in the research literature of the discipline. | Studying and summarizing selected published research papers in the discipline. |

**Table 10.3: Range of Complex Engineering Problem[1] Solving**

| Attribute | Complex Engineering Problem solving (its characteristic P1 and some or all of P2 to P7) |
|---|---|
| Depth of Knowledge required | **P1**: Cannot be resolved without in-depth engineering knowledge at the level of one or more of K3, K5, K6 or K8 which allows a fundamental-based, first-principles analytical approach |
| Range of conflicting requirements | **P2:** Involve wide-ranging or conflicting technical, engineering, financial and other issue. |
| Depth of analysis required | **P3**: Have no obvious solution and require abstract thinking and originality in analysis to formulate suitable models. |
| Familiarity of issues | **P4:** Involve infrequently encountered issues |
| Extent of applicable codes | **P5:** Are outside problems encompassed by standards and codes of practice for professional engineering |
| Extent of stakeholder involvement & level of conflicting requirements | **P6:** Involve diverse groups of stakeholders with widely varying needs. |
| Interdependence | **P7:** Are high-level problems that include many component parts or sub-problems. It will include teamwork between diverse groups of experts in solving this class of problems. |
| [1]Engineering problems that cannot be resolved without in-depth engineering knowledge and have some or all of the characteristics mentioned in Table 9.3. | |

**Table 10.4: Range of Complex Engineering Activities**

| **Attribute** | **Complex activities mean (engineering activities or projects that have some or all of the following characteristics:** |
|---|---|
| Range of resources | **A1**: Involve the use of diverse resources (for this purpose, resources include people, money, equipment, materials, information and technologies) |
| Level of interaction | **A2**: Require resolution of significant problems arising from interactions between wide ranging or conflicting technical, engineering or other issues |
| Innovation | **A3**: Involve creative use of engineering principles and research-based knowledge in novel ways. |
| Consequences to society and the environment | **A4:** Have significant consequences in a range of contexts, characterized by difficulty of prediction and mitigation. |
| Familiarity | **A5:** Outside problems encompassed by standards and codes of practice for professional engineering. |

Graduate profiles, known as Program Learning Outcomes (POs), are mapped with both institutional missions and specific courses. Mapping Table F-V and Table F-VI are the basis for demonstrating the graduate profile.

Moreover, Table F-VI shows additional information that shows the teaching activities and assessment procedures of COs that collectively achieving the POs. The details of teaching activities and assessment procedures are to be found in the course file of individual course teachers.

Lastly, Table F-VI is a dummy template designed to provide guidance for academic staff and is intended to record and evaluate the achievement of constructive achievement of course outcomes, teaching activities, and assessment.

**F-V: Mapping between Institutional mission and Program Learning Outcome (PLOs)**

| Institutional Mission | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO10 | PLO11 | PLO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IIUC MS-1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | - | ✓ | ✓ | ✓ | - |
| IIUC MS-2 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| IIUC MS- | - | - | - | - | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | | | | | | | | | | | | |

**F-VI: Course level Graduate profile shows mapping of PLOs with course outcomes, teaching activities* and assessment** (A Template) *****

| PLOs | PLO1 | | | PLO2 | | | PLO3 | | | PLO4 | | | PLO5 | | | PLO6 | | | PLO7 | | | PLO8 | | | PLO9 | | | PLO10 | | | PLO11 | | | PLO12 | | | Unmapped COs if any |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Courses** | **Course Outcomes** | Teaching Activities | Assessment | **Course Outcomes** | Teaching Activities | Assessment | **Course Outcomes** | Teaching Activities | Assessment | **Course Outcomes** | Teaching Activities | Assessment | **Course Outcomes** | Teaching Activities | Assessment | **Course Outcomes** | Teaching Activities | Assessment | Course Outcomes | Teaching Activities | Assessment | **Course Outcomes** | Teaching Activities | Assessment | **Course Outcomes** | Teaching Activities | Assessment | **Course Outcomes** | Teaching Activities | Assessment | **Course Outcomes** | Teaching Activities | Assessment | **Course Outcomes** | Teaching Activities | Assessment | |
| **EEE1101** | 1 | 2, 3 | 1, 5 | 2 | 1, 3 | 1, 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **EEE1201** | 1, 2 | 1, 3, 5 | 1, 2 | | | | | | | | | | 2 | 1, 3 | 2, 3 | | | | | | | | | | | | | | | | | | | | | |
| … | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

**** Values inserted here are not real. They are inserted to get an idea about the template.*

| ***Teaching Activities** | ****Assessment** |
|---|---|
| 1. Lecture | 1. Bloom's Taxonomy and Rubric based |
| 2. White board writing | 2. Class test |
| 3. Question and Answer | 3. Midterm examination |
| 4. Power point presentation | 4. Semester end (Final) examination |
| 5. Analysis | 5. Presentation |
| 6. Feedback | 6. Assignment |
| 7. Example | 7. Quiz |
| 8. Problem Solving | 8. VIVA |
| 9. Homework | 9. Lab Report |
| 10. Group Work | 10. Lab Performance |
| 11. Group Discussion | 11. Project work |
| ***More can be added by a teacher*** | |

## 11. Admission Requirements

Admission at IIUC is purely on the basis of merit. Furthermore, admission to the available programs depends on the type and level of the program that a candidate wishes to pursue. Following are the general academic qualifications for admission in B.Sc. Engg. at IIUC.

i. For SSC/Dakhil, and HSC/Alim (Science Group) system the minimum shall be (SSC GPA) +(HSC GPA) = 6.50. (But score of less than GPA 3.0 in any individual examination is not acceptable). An applicant must submit his/her results during the application. Provisional admission for appeared students should not be allowed.

ii. For '0' level & 'A' level system an applicant must have completed 6 papers in '0' level and 6 papers in 'A' level, in the 'A' level the student must have completed at least 2 papers of Physics, 2 papers of Chemistry and 2 papers of Mathematics. Minimum average GPA of combined '0' level & 'A' level shall be 'C' an applicant must submit his results during the application. Provisional admission for appeared students should not be allowed. (iii) For applicants from foreign countries similar standard should be maintained. The applicant must have completed Physics, Chemistry and Mathematics in the 12th level.

## *12.* Medium of Instruction

English is the primary languages used as the medium of instruction in the University.

### 13. Attendance

In order to be eligible to appear, as a regular candidate, at the Semester End examinations, a student shall be required to have attended at least **70%** of the total number of periods of lectures/tutorials/laboratory classes offered during the semester in every **course.** A student whose attendance falls short of **70%** but not below **60%** in any **course** may be allowed to appear at the Semester End examinations **as non-collegiate student**. A student, appearing the examination under the benefit of this provision shall have to pay in addition to the fees, the requisite fee prescribed by the authority for the purpose. Students having **less than 60% attendance** in lecture/tutorial/ laboratory of any course **will be declared dis-collegiate. They will not be allowed to appear in that course** at the Semester End examinations of the semester. They will get 'F' grade in the semester result. The basis for awarding marks for attendance is as follows:

| Attendance | Awarding marks |
|---|---|
| 90% and above | 10 |
| 85% to less than 90% | 9 |
| 80% to less than 85% | 8 |
| 75% to less than 80% | 7 |
| 70% to less than 75% | 6 |
| 65% to less than 70% | 5 |
| 60% to less than 65% | 4 |
| less than 60% | 0 |

### 14. The Grading System

The Grading System for assessing the performance of a course of a student shall be as follows:

| Numerical grade Marks% | Letter Grade (LG) | Grade Point (GP/unit) | Remarks/Status |
|---|---|---|---|
| 80-100 | A+ (A plus) | 4.00 | Excellent |
| 75 to less than 80 | A (A regular) | 3.75 | Very good |
| 70 to less than 75 | A- (A minus) | 3.50 | |
| 65 to less than 70 | B+ (B plus) | 3.25 | Good |
| 60 to less than 65 | B (B regular) | 3.00 | |
| 55 to less than 60 | B- (B minus) | 2.75 | Satisfactory |
| 50 to less than 55 | C+ (C plus) | 2.50 | |
| 45 to less than 50 | C (C regular) | 2.25 | Pass |
| 40 to less than 45 | D | 2.00 | |
| 00 to less than 40 | F | 0.00 | Fail |

The performance of a student will be evaluated in terms of semester **grade point average (GPA)** and **cumulative grade point average** (**CGPA**) which is the grade average for all semesters. To have graduation degree a student **must obtain CGPA at least 2.5.**

**Grade Point Average (GPA):** The Grade Point Average (GPA) is computed by dividing the total grade points earned by the number of credit hours attempted in a given semester. The Cumulative Grade Point Average CGPA) is computed by dividing the total grade points earned by the total number of credit hours attempted at the University up to a particular semester.

**A Semester Grade Point Average (GPA)** shall be calculated for each semester as follows:

$$GPA = \frac{\sum_{i=1}^{n} C_i G_i}{\sum_{i=1}^{n} C_i}$$

where, n represents the number of courses offered during the semester, $C_i$ represents the number of credits allotted to a particular course and $G_i$ represents the grade point earned for that course.

**The Cumulative Grade Point Average (CGPA)** gives the cumulative performance of the students from the 1st Semester up to the end of the Semester to which it refers, and will be calculated as follows:

$$CGPA = \frac{\sum_{k=1}^{m} C_k G_k}{\sum_{k=1}^{m} C_k}$$

where, m represents the total number of semesters being considered, $C_k$ represents the total number of credits registered during a semester and $G_k$ represents the GPA of that particular Semester.

### 15. Earned Credit

The courses in which a student has obtained minimum 'D' in 'Theoretical courses', Laboratory courses & General Viva-voce' or higher grade will be counted as credits earned by the student. Any course in which a student has obtained 'F' grade will not be counted towards his/her earned credit. 'F' grade will not be counted for GPA calculation but will stay permanently on the Grade sheet and transcripts.

### 16. Category of Courses

The study program for the B. Sc. Engg. (EEE) shall carry a total of 162 credit hours. The c**ategory of courses is shown below.**

| **Category** | **Credit Hours** | | |
|---|---|---|---|
| | **Theory** | **Sessional** | **Total** |
| Language Courses | 4 | 0 | 4 |
| Social Science Courses | 4 | 0 | 4 |
| Humanities Courses | 5 | 0 | 5 |
| Non-Engineering Skills Courses | 8 | 0 | 8 |
| Mathematics | 14 | 0 | 14 |
| Basic Science Courses | 9 | 3 | 12 |
| Engineering Core Courses | 6 | 3 | 9 |
| EEE Core Courses | 73 | 33 | 106 |
| **Total** | **123** | **39** | **162** |

### 17. Semester Workload

Minimum Workload for a regular semester is **12** credit hours or its equivalent and maximum load is up to 28 credit hours. Since IIUC is following the **Open Credit Hour System**, a student may register the expected number of credits with the recommendation of his/ her respective **academic advisor** and the approval of the Chairman of the Department or the Dean of the Faculty or the Pro-Vice Chancellor as the case may be. But the semester workload must be consistent with the range of GPA. Advisable semester workload for the Faculty of Science and Engineering under Open Credit Hour System (OCHS) based on GPA is given below **(**Ref. FSEO article 5.4**):**

| **RANGE of GPA** | **Maximum Load Allowed** |
|---|---|
| 3.75-4.00 | 28Cr.Hrs. |
| 3.50-3.74 | 26Cr.Hrs. |
| 2.75-3.49 | 24Cr.Hrs. |
| 2.25-2.74 | 22Cr.Hrs. |
| 2.00-2.24 | 20Cr.Hrs. |
| 1.70-1.99 | 15Cr.Hrs. |
| Below 1.70 or Repeat Case (Due to very poor performance) | 12Cr.Hrs |

## 18. Rules for Promotion

### 18.1 Criteria for Semester Promotion

18.1.1 No semester fail status would exist under open credit hour system.

18.1.2 If any student earns '**D (Grade Point 2)**' or above grade for any course, the course should be credited.

18.1.3 The students must complete Pre-requisite Courses and previous incomplete or 'F' or 'W' grade courses before registration of advance courses.

18.1.4 Students who will not clear all prescribed courses of 1st& 2nd Semester within the 4th Semester he/she would not be allowed to get promoted/registered in the 5th Semester and students who will not clear all prescribed courses of 3rd& 4th Semester within the 6th Semester he/she would not be allowed to get promoted/registered in the 7th Semester. Student can go for internship in the 7th / 8th Semester.

### 18.2 Criteria for Failing in a Course

18.2.1 A student, who fails in a course within specific requirements of the Faculty and the curriculum of his/her program, may repeat the same course if the course is classified as "CORE" or "REQUIRED" course.

18.2.2 Or, the fail student may replace the course with another one if it is classified as "SUPPORTIVE" or "ELECTIVE" or "OPTIONAL" as determined by the department or the faculty as the case may be.

18.2.3 Notwithstanding any other provisions of these Regulations, a graduating student who obtains the minimum CGPA C+ (C plus, i.e. CGPA=2.5), but fails in any course, may be allowed to re-sit for that course subject to the examination rules and approval of the authority concerned.

### 18.3 Criteria for Improvement of Grade

18.3.1 The range of grade in that particular course should be "B-" (B minus).

18.3.2 That an application must be submitted to the Controller of Examination through the Chairman of the Department in order to repeat the course for the purpose of improvement at least two weeks prior to the deadline of registration and it has to be approved by the competent authority.

18.3.3 That the opportunity for improvement of grade shall be availed within two consecutive Semesters.

18.3.4 That payment shall be made in full amount for the course/s on credit hour basis.

### 18.4 Re-Evaluation of Examination Results

18.4.1 If the awarding grade is in order but the student wants his/her answer script to be reevaluated, then a prescribed Form (available at ACAD) shall have to be filled in and submitted by the student to the University Board of Appeals through the ACAD.

18.4.2 Per Course a fee (as determined by the University Board Examination) must be deposited along with the Form.

18.4.3 **An appeal may be made** on any or all of the following grounds:

18.4.3.1 If a student strongly believes that he/she deserves higher marks than he/she got in the course in question.

18.4.3.2 If a student reasonably believes that the evaluation has been conducted improperly or a portion of his/her marks has not been counted.

### 18.5 Adding and Dropping Courses

Students may add course/s to, or drop course/s from that they have already registered. To add and drop course/s, prescribed Add & Drop Form [available from the Controller of Examination (CoE) office] must be filled up and submitted to the respective Departmental office within first week of the current semester. These applications will be recommended by the academic advisor and approved by the Chairman of the Department. Departmental Chairman shall forward the Add/Drop applications to the concerned CoE office for necessary action. The total numbers of credit hours after add and drop exercise must be in adherence to the academic workload policy.

### 18.6 Withdrawal from Registered Courses

Students may apply for the withdrawal of courses that they have already registered for. The withdrawal exercise shall be done immediately after **Mid-Term** (i.e.9th to

10th week of the relevant Semester). The total number of credit hours after withdrawal must not fall below 12 credit hours, as specified above (article 16). A grade "W" is assigned to the courses that have been withdrawn. "W" is deleted from Final Transcript. Procedure of submission of application for Course-Withdrawal is same as 17.5.

**18.7 Dropping Semester/Leave of Absence**

A student may apply in a Prescribed Form (available at CoE) for Semester Drop or a leave of absence stating valid ground. The student must apply for Dropping the semester during the registration period. No fees will be imposed during such leave. A student who is suffering from a prolonged illness may request for a further period of leave of absence on medical ground by writing to CoE through Chairman of the Department. Drop duration will be calculated with the total duration of the Program ***i.e. for undergraduate program maximum 12 Semesters including drop period.***

If any student is found absent or unregistered without having permission for a whole semester, he/she has to bear the Semester fee for the respective Semester to continue his/her study. However, if any student is found absent or unregistered without permission, he/she will be considered as discontinued student. If such student wishes to continue the study, an appeal may be made to the authority through proper channel for re-admission.

## 19 Eligibility for Examination

19.1 No student shall be eligible to take part in any Semester End Examination unless:

19.1.1 He/she is officially registered in such a course; and

19.1.2 He/she has fulfilled the required percentage of attendance and other requirements.

19.2 B**arring from examination**:

19.2.1 A student may be barred from taking examination if he/she fails to meet any of the above requirements (article 21.1) for eligibility to sit for an Examination. In such a case, the student may be given the chance to appeal for exoneration.

19.2.2 Unless otherwise recognized, any student debarred from any examination shall automatically receive a grade "Y" which is equivalent to an "F" for that course irrespective of course performance

19.2.3 In addition, the scholarship or financial assistance of students who are barred from the Semester End Examination may be withdrawn or reduced by a certain amount as the University authority decides on case–by-case basis.

19.3 **Cheating in Examination**:

19.3.1 A student cheating in examination shall be deemed to have committed an offence and will be liable to disciplinary punishment.

19.3.2 Such punishment may be cancellation of the course in question, drop of the current semester, expulsion for an academic year or expulsion from the University, based on the weight and gravity of the offence.

19.3.3 Student receives the expulsion from the university for cheating in examination cannot be readmitted. In addition, the student will be deprived of any financial assistance in the following semester as the university authority decides on case-by-case basis.

## 20 Graduation Requirements

20.1 **Pre-Graduate Requirements:**

20.1.1 One Semester prior to graduation a student should submit a check list to Controller of Examination duly filled in.

20.1.2 Students intending for graduation should submit an application for graduation to Controller of Examination in the terminal semester in the University.

20.2 **Academic Requirements:**

20.2.1 Have passed all required and elective course as per program of curriculum.

20.2.2 Be an acceptable academic standing with a GPA of at least 2.50.

20.2.3 Be free from any negative report from the University authority in general and

academic Discipline Committee in particular.

20.2.4 Have fulfilled co-curricular activities.

20.2.5 Have fulfilled other University requirements

20.3 **Transcripts:**

20.3.1 Results of each semester are normally distributed to every student at the beginning of the following semester. The result is for student's reference only and not to be used for any official purposes. The result produces report including the grades of all courses for that semester, the GPA and CGPA.

20.3.2 **Official Transcripts** is issued before graduation and upon written request of a student who has paid up all fees. Partial transcripts may also be issued in the same manner to existing students. However, a fee is charged for partial transcript (or testimonial.) of each semester.

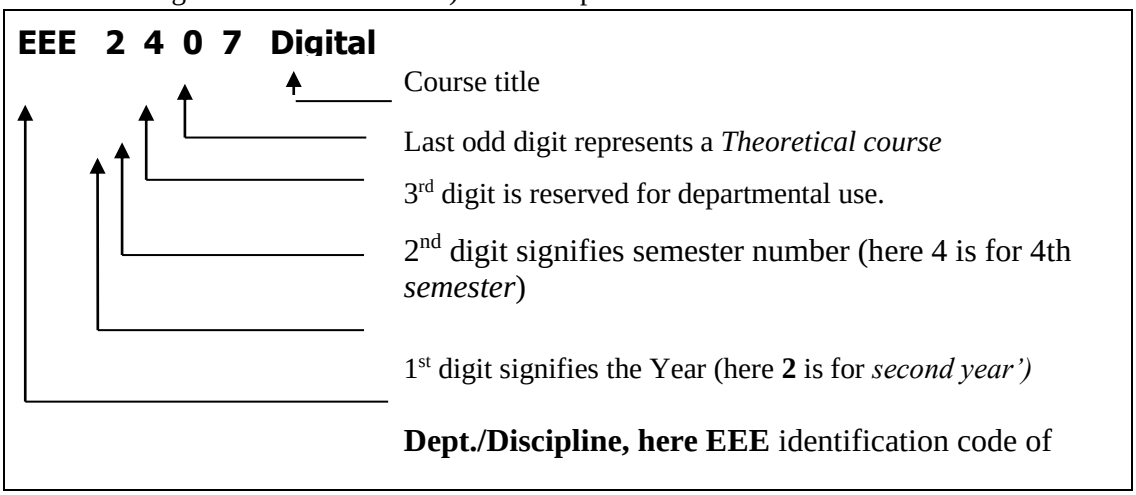
20.3.3 **Final Transcript and Provisional Certificat**e may be withdrawn on payment of fee. Besides, **Original certificate** may be issued on payment of fee only. Charges will be applied for the re-issue of duplicate certificate and transcript also.

20.4 **Release of Student's Record**:

Student's records are considered highly confidential. Therefore, a written consent from the student is needed before releasing information from his personal record to person outside the University. Information may be furnished to a student's parents or sponsor without such written consent. No information concerning a student's grades will be given over telephone.

## 21. Course Identification Plan (Dept./Discipline)

Following code plan has been adapted for course identification: First **digit** stands for Year, the **Second** digit stands for Semester, the **Third** digit is reserved for departmental use & the **Fourth** digit stands for the course number (odd number has been assigned to theory course and the even number has been assigned to seasonal course). An example of the above statement is as follows:




## 22 Descriptions of Courses

### 22.1 Summary of Courses of EEE department

| Category | Title of the Course | Credit Hours | | |
|---|---|---|---|---|
| | | **Theory** | **Sessional** | **Total** |
| **Arts & Humanities Courses** | Advanced English | 2 | 0 | 2 |
| | Bangla Language and Literature | 2 | 0 | 2 |
| | Sciences of Qur'an and Hadith | 1 | 0 | 1 |
| | *[1]Basic Principles of Islam | 2 | 0 | 2 |
| | *[2]A Survey of Islamic History and Culture | 1 | 0 | 1 |
| | *[3]Life and Teachings of the Prophet Muhammad (SAAS) | 1 | 0 | 1 |
| | **Comparative Religion instead of *[123]** | 4 | 0 | 4 |
| **Total Arts& Humanities Courses** | | **9** | 0 | **9** |
| **Social** | Text of Ethics and Morality | 1 | 0 | 1 |

| | | | | |
|---|---|---|---|---|
| **Sciences Courses** | Political Thoughts & Social Behavior | 1 | 0 | 1 |
| | History of the Emergence of Bangladesh | 2 | 0 | 2 |
| **Total Social Science Courses** | | **4** | **0** | **4** |
| **Non-Engineering Skills Courses** | Financial and Managerial Accounting | 2 | 0 | 2 |
| | Principles of Economics | 2 | 0 | 2 |
| | Industrial Management | 2 | 0 | 2 |
| | Professional Ethics and Environmental Protection Law | 2 | 0 | 2 |
| **Total Non-Engineering Skills Courses** | | **8** | **0** | **8** |
| **Mathematics** | Math (I+II+III+IV) and Statistics | 14 | 0 | 14 |
| **Basic Sciences Courses** | Physics | 6 | 1.5 | 7.5 |
| | Chemistry | 3 | 1.5 | 4.5 |
| **Total Mathematics & Basic Science Courses** | | **23** | **3** | **26** |
| **Engineering Core Courses** | Computer Programming | 4 | 2 | 6 |
| | Mechanical Engineering | 2 | 0 | 2 |
| | Engineering Drawing | 0 | 1 | 1 |
| **Total Engineering Core Courses** | | **6** | **3** | **9** |
| **EEE Core Courses** | EEE compulsory | 52 | 25.5 | 77.5 |
| | EEE elective | 21 | 7.5 | 28.5 |
| **Total EEE Core Courses** | | **73** | **33.0** | **106.0** |
| **Total** | | **123** | **39** | **162** |

### 22.2 Semester wise number of courses, credits & contact hours

| Semester | No. of Courses | Contact Hours/Week | | | Credit Hours | | |
|---|---|---|---|---|---|---|---|
| | | Theory | Lab | Total | Theory | Lab | Total |
| 1st | 6+2 | 16 | 5 | 21 | 14 | 2.5 | 16.5 |
| 2nd | 5+4 | 13 | 10 | 23 | 13 | 5 | 18 |
| 3rd | 7+3 | 18 | 8 | 26 | 17 | 4 | 21 |
| 4th | 7+3 | 19 | 9 | 28 | 19 | 4.5 | 23.5 |
| 5th | 6+3 | 16 | 8 | 24 | 15 | 4 | 19 |
| 6th | 7+4 | 18 | 10 | 28 | 17 | 5 | 22 |
| 7th | 6+4 | 16 | 13 | 29 | 15 | 6.5 | 21.5 |
| 8th | 5+4 | 13 | 15 | 28 | 13 | 7.5 | 20.5 |
| **Total** | **49+27** | **129** | **78** | **207** | **123** | **39** | **162** |

### 22.3 University Requirement Courses

| Category | Course Code. | Course Title | Contact Hours/Week | Credit Hours |
|---|---|---|---|---|
| | | | Theory | Theory |
| Language Course | UREL-1106 | Advanced English | 3 | 2 |
| | GEBL-2401 | Bangla Language and Literature | 2 | 2 |
| Social Sciences | UREM-1101 | Text of Ethics and Morality | 2 | 1 |
| | URED-3503 | Introduction to Political Thoughts and Social Behavior | 2 | 1 |
| | GEHE-3601 | History of the Emergence of Bangladesh | 2 | 2 |
| Humanities | *[1]URED-1201 | Basic Principles of Islam | 2 | 2 |
| | *[2]URED-2302 | Sciences of Qur'an and Hadith | 2 | 1 |
| | *[3]URED-3604 | Life and Teachings of the Prophet Muhammad (*SAAS*) | 2 | 1 |
| | URED-2305 | *Comparative Religion instead of *[123] | 3 | 3 |
| | URIH-4701 | A Survey of Islamic History and Culture | 2 | 1 |
| | **Total** | | **20** | **13** |

### 22.4 List of Non-Engineering Skills Courses

| Category | Course Code | Course Title | Contact Hours/Week | Credit Hours |
|---|---|---|---|---|
| Non-Engineering Skills | ACC-2401 | Financial and Managerial Accounting | 2 | 2 |
| | ECON-3501 | Principles of Economics | 2 | 2 |
| | MGT-3601 | Industrial Management | 2 | 2 |
| | XXX-47XX | to be taken from Interdisciplinary optional courses in section **22.9** | 2 | 2 |
| | **Total** | | **8** | **8** |

### 22.5 Mathematics Courses

| SL. No. | Course Code | Course Title | Contact Hours/Week | | Credit Hours | | Prerequisite Courses |
|---|---|---|---|---|---|---|---|
| | | | Theory | Practical | Theory | Practical | |
| 1 | MATH-1107 | Mathematics -I (Differential & Integral Calculus) | 3 | - | 3 | - | - |
| 2 | MATH-1207 | Mathematics-II (Differential Equation & Coordinate Geometry) | 3 | - | 3 | - | MATH -1107 |
| 3 | STAT-2303 | Probability & Statistics | 2 | - | 2 | - | - |
| 4 | MATH-2309 | Mathematics III (Linear Algebra, Matrices and Vector Analysis) | 3 | - | 3 | - | MATH-1207 |
| 5 | MATH-2409 | Mathematics IV (Complex Variable, Lap laces and Fourier Analysis, Z-transform) | 3 | - | 3 | - | MATH-2309 |
| | Total | | **14** | **2** | **14** | **0** | **= 14 CH** |

### 22.6 Basic Science Courses

| SL. No. | Course Code | Course Title | Contact Hours/Week | | Credit Hours | | Prerequisite Courses |
|---|---|---|---|---|---|---|---|
| | | | Theory | Practical | Theory | Practical | |
| 1 | PHY-1101 | Physics I | 3 | - | 3 | - | - |
| 2 | PHY-1201 | Physics II | 3 | - | 3 | - | PHY-1101 |
| 3 | PHY-1204 | Physics Sessional | - | 3 | - | 1.5 | - |
| 4 | CHEM-2301 | Chemistry | 3 | - | 3 | - | - |
| 5 | CHEM-2304 | Chemistry Sessional | - | 3 | - | 1.5 | - |
| | Total | | **9** | **6** | **9** | **3** | **= 12 CH** |

### 22.7 Engineering Core Courses

| Sl. No | Course Code | Course Title | Contact Hours/Week | | Credit Hours | | Prerequisite Courses |
|---|---|---|---|---|---|---|---|
| | | | Theory | Practical | Theory | Practical | |
| 1. | CSE-1105 | Computer Programming I | 2 | | 2 | | - |
| 2. | CSE-1106 | Computer Programming I Sessional | | 2 | | 1 | - |
| 3. | CSE-1205 | Computer Programming II | 2 | - | 2 | - | CSE-1105 |
| 4. | CSE-1206 | Computer Programming II Sessional | - | 2 | - | 1 | - |
| 5. | ME-2301 | Fundamentals of Mechanical Engineering | 2 | - | 2 | - | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 6. | CE-1204 | Engineering Drawing Sessional | | 2 | | 1 | |
| | **Total** | | **6** | **6** | **6** | **3** | **= 9 CH** |

**22.8 EEE Core Courses**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. | EEE-1101 | Electrical Circuits I | 3 | - | 3 | - | - |
| 2. | EEE-1102 | Electrical Circuits I Sessional | | 3 | - | 1.5 | - |
| 3. | EEE-1201 | Electrical Circuits II | 3 | - | 3 | - | EEE-1101 |
| 4. | EEE-1202 | Electrical Circuits II Sessional & Electrical Workshop | | 3 | | 1.5 | |
| 5. | EEE-2301 | Electronics I | 3 | - | 3 | - | EEE-1201 |
| 6. | EEE-2302 | Electronics I Sessional | - | 3 | | 1.5 | |
| 7. | EEE-2303 | Electrical Machine I | 3 | - | 3 | - | EEE-1201 |
| 8. | EEE-2306 | Numerical Technique Sessional | - | 2 | - | 1 | |
| 9. | EEE-2401 | Electrical Machine II | 3 | - | 3 | - | EEE-2303 |
| 10. | EEE-2402 | Electrical Machine Sessional | - | 3 | - | 1.5 | |
| 11. | EEE-2407 | Digital Electronics | 3 | - | 3 | - | EEE-2301 |
| 12. | EEE-2408 | Digital Electronics Sessional | - | 3 | | 1.5 | |
| 13. | EEE-2411 | Electronics II | 3 | - | 3 | - | EEE-2301 |
| 14. | EEE-2412 | Electronics II Sessional and Electronics Workshop | - | 3 | | 1.5 | |
| 15. | EEE-2415 | Transmission & Distribution of Electrical Power | 3 | - | 3 | - | EEE-1201 |
| 16. | EEE-3501 | Continuous Signals and Linear Systems | 3 | - | 3 | - | MATH-2409 |
| 17. | EEE-3505 | Microprocessor and Interfacing | 3 | - | 3 | - | EEE-2407 |
| 18. | EEE-3506 | Microprocessor and Interfacing Sessional | - | 3 | | 1.5 | |
| 19. | EEE-3508 | Circuit Simulation Sessional | - | 2 | | 1 | EEE-2301 |
| 20. | EEE-3515 | Electrical Properties of Materials | 3 | - | 3 | - | EEE-2301 |
| 21. | EEE-3519 | Power System Analysis | 3 | - | 3 | | EEE-2415 |
| 22. | EEE-3520 | Power System Analysis Sessional | - | 3 | | 1.5 | - |
| 23. | EEE-3601 | Communication Theory | 3 | - | 3 | - | EEE-3501 |
| 24. | EEE-3602 | Communication Theory Sessional | - | 3 | | 1.5 | |
| 25. | EEE-3603 | Digital Signal Processing I | 3 | - | 3 | - | EEE-3501 |
| 26. | EEE-3604 | Digital Signal Processing I Sessional | - | 3 | | 1.5 | - |
| 27. | EEE-3607 | Solid State Devices | 3 | - | 3 | - | EEE-3515 |
| 28. | EEE-3608 | Research Methodology and Seminar | | 2 | | 1 | |
| 29. | EEE-3612 | Electrical Service Design Sessional | - | 2 | - | 1 | |
| 30. | EEE-3621 | Engineering Electromagnetism | 3 | - | 3 | | EEE-1201 |
| 31. | EEE-4701 | Control System I | 3 | - | 3 | - | EEE-3501 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 32. | EEE-4702 | Control System I Sessional | - | 3 | | 1.5 | |
| 33. | EEE-4804 | Industrial Attachment | | 2 | | 1 | |
| 34. | EEE-4822 | General viva-voce | 1 | | 1 | | |
| 35. | EEE-4860 | Project/Thesis | - | 8 | - | 4 | |
| | **Total** | | **52** | **49** | 52 | **25.5** | **=77.5 CH** |

### 22.9 Non-Engineering Skills Courses (one course to be taken)

| Sl. No. | Course No. | Course Title | Contact Hours/Week | Credit Hours |
|---|---|---|---|---|
| 1. | FIN-4701 | Finance and Marketing for Engineers | 2 | 2 |
| 2. | SCO-4703 | Sociology | 2 | 2 |
| 3. | PSY-4705 | Psychology | 2 | 2 |
| 4. | GOV-4709 | Government | 2 | 2 |
| 5. | LAW-4725 | Professional Ethics and Environmental Protection Law | 2 | 2 |

### 22.10 EEE Elective Courses

| SL. No. | Course Code | Course Title | Contact Hours/Week | | Credit Hours | | Prerequisite Courses |
|---|---|---|---|---|---|---|---|
| | | | Theory | Practical | Theory | Practical | |
| 1. | EEE-47xx | Major-I | 3 | - | 3 | - | |
| 2. | EEE-47xx | Major -I Sessional | - | 3 | - | 1.5 | |
| 3. | EEE-47xx | Major-II | 3 | - | 3 | - | |
| 4. | EEE-47xx | Minor-I | 3 | - | 3 | - | |
| 5. | EEE-47xx | Minor-I Sessional | | 3 | | 1.5 | |
| 6. | EEE-48xx | Major-III | 3 | - | 3 | - | |
| 7. | EEE-48xx | Major-III Sessional | - | 3 | - | 1.5 | |
| 8. | EEE-48xx | Major-IV | 3 | | 3 | | |
| 9. | EEE-48xx | Interdisciplinary-I | 3 | - | 3 | | |
| 10. | EEE-48xx | Interdisciplinary-I Sessional | - | 3 | | 1.5 | |
| 11. | EEE-48xx | Interdisciplinary -II | 3 | - | 3 | | |
| 12. | EEE-48xx | Interdisciplinary -II Sessional | | 3 | | 1.5 | |
| | Total | (7+5) Courses | 21 | 15 | 21 | 7.5 | =28.5 CH |

### 22.11 Major in Electrical and Electronic Engineering

There are **three** majors in EEE. Students obtain the degree in EEE taking any one of the following majors (subject to the offering of major).

1. Major in Power Systems Engineering (PSE)
2. Major in Electronic Engineering (EE)
3. Major in Communication Engineering (CE)

In order to achieve a degree in Electrical and Electronic Engineering from IIUC, a student will have to complete 12 elective courses (5 lab courses and 7 theory courses) of 28.5 credit hours from the following five disciplines or specialized area:

i. Power systems Engineering
ii. Electronics Engineering
iii. Communication Engineering
iv. Interdisciplinary Field

A student has to take 2 lab courses and 4 theory courses from one group as major; 1 theory course and 1 lab course from other groups as minor and 2 theory courses and 2 lab courses from interdisciplinary group (total 12 courses i.e. 5 lab courses and 7 theory courses). Any lab course must be followed with the corresponding theory course and vice versa (if any).

### 22.12 Elective Courses

### 22.12.1 Power Systems Engineering

| SL. No. | Course Code | Course Title | Contact Hours/Week | | Credit Hours | | Prerequisite Courses |
|---|---|---|---|---|---|---|---|
| | | | Theory | Practical | Theory | Practical | |
| 1. | EEE-4705 | Power Electronics | 3 | - | 3 | - | EEE-2411 |
| | EEE-4706 | Power Electronics Sessional | - | 3 | - | 1.5 | |
| 2. | EEE-4707 | Power Plant Engineering | 3 | - | 3 | - | - |
| 3. | EEE-4801 | Power System Protection | 3 | - | 3 | - | EEE-3519 |
| | EEE-4802 | Power System Protection Sessional | - | 3 | - | 1.5 | |
| 4. | EEE-4805 | Power System Operation & Control | 3 | - | 3 | - | EEE-3503 |
| 5. | EEE-4807 | High Voltage Engineering | 3 | - | 3 | - | EEE-3503 |

### 22.12.2 Electronic Engineering

| SL. No. | Course Code | Course Title | Contact Hours/Week | | Credit Hours | | Prerequisite Courses |
|---|---|---|---|---|---|---|---|
| | | | Theory | Practical | Theory | Practical | |
| 1. | EEE-4753 | VLSI I | 3 | - | 3 | - | EEE-3607 |
| | EEE-4754 | VLSI I Sessional | | 3 | | 1.5 | |
| 2. | EEE-4713 | Compound Semiconductor & Heterojunction Devices | 3 | - | 3 | - | |
| 3. | EEE-4809 | VLSI II | 3 | - | 3 | - | EEE-4753 |
| | EEE-4810 | VLSI II Sessional | | 3 | | 1.5 | |
| 4. | EEE-4811 | Opto-Electronics | 3 | - | 3 | - | EEE-2411 |
| 5. | EEE-4813 | Semiconductor Device Theory | 3 | - | 3 | | EEE-3607 |

### 22.12.3 Communication Engineering

| SL. No. | Course Code | Course Title | Contact Hours/Week | | Credit Hours | | Prerequisite Courses |
|---|---|---|---|---|---|---|---|
| | | | Theory | Practical | Theory | Practical | |
| 1. | EEE-4723 | Microwave Engineering | 3 | - | 3 | | EEE-3501 |
| | EEE-4724 | Microwave Engineering Sessional | - | 3 | | 1.5 | |
| 2. | EEE-4715 | Digital Signal Processing II | 3 | - | 3 | - | EEE-3601 |
| | EEE-4833 | Digital Communication | 3 | - | 3 | - | |
| 3. | EEE-4834 | Digital Communication Sessional | | 3 | | 1.5 | EEE-3601 |
| 4. | EEE-4835 | Mobile Cellular Communication | 3 | - | 3 | - | EEE-3601 |
| 5. | EEE-4837 | Telecommunication Engineering | 3 | - | 3 | - | EEE-3601 |

### 22.12.4 Interdisciplinary Fields

| **SL. No.** | **Course Code** | **Course Title** | **Contact Hours/Week** | | **Credit Hours** | | **Prerequisite Courses** |
|---|---|---|---|---|---|---|---|
| | | | **Theory** | **Practical** | **Theory** | **Practical** | |
| 1. | EEE-4825 | Biomedical Instrumentation | 3 | - | 3 | - | EEE-2411 |
| | EEE-4826 | Biomedical Instrumentation Sessional | - | 3 | - | 1.5 | |
| 2. | EEE-4827 | Measurement and | 3 | - | 3 | - | EEE-2411 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Instrumentation | | | | | |
| | EEE-4828 | Measurement and Instrumentation Sessional | | 3 | | 1.5 | |
| 3. | EEE-4841 | Antenna & Propagation | 3 | - | 3 | - | EEE-3601 |
| | EEE-4842 | Antenna & Propagation Sessional | | 3 | | 1.5 | |
| 4. | EEE-4843 | Renewable Energy System | 3 | - | 3 | | |
| | EEE-4844 | Renewable Energy System Sessional | | 3 | | 1.5 | |
| 5. | EEE-4845 | Embedded System | 3 | | 3 | | EEE-3505 |
| | EEE-4846 | Embedded System Sessional | | 3 | | 1.5 | |
| 6. | EEE-4847 | Optical Fiber Communication | 3 | - | 3 | - | EEE-3601 |
| | EEE-4848 | Optical Fiber Communication Sessional | | 3 | | 1.5 | |

## 23 A. Semester wise Course Distribution:

### I. FIRST SEMESTER: B.Sc. (Engg.) in EEE

| SL.No | Course Code | Course Title | Contact Hours | | Credit Hours | | Prerequisite Courses | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th | Pr | Th | Pr | | CIE | SEE | Total |
| **1** | EEE-1101 | Electrical Circuits I | **3** | **0** | **3** | **0** | **--** | **50** | **50** | **100** |
| **2** | EEE-1102 | Electrical Circuits I Sessional | **-** | **3** | **-** | **1.5** | **-** | **50-60** | **40-50** | **100** |
| **3** | CSE-1105 | Computer Programming I | **2** | **-** | **2** | **-** | **-** | **50** | **50** | **100** |
| **4** | CSE-1106 | Computer Programming I Sessional | | **2** | | **1** | **-** | **50-60** | **40-50** | **100** |
| **5** | MATH-1107 | Mathematics -I (Differential & Integral Calculus) | **3** | **-** | **3** | **-** | **-** | **50** | **50** | **100** |
| **6** | PHY-1101 | Physics I | **3** | **-** | **3** | **-** | **-** | **50** | **50** | **100** |
| **7** | UREL-1106 | Advanced English | **3** | | **2** | **-** | **-** | **50** | **50** | **100** |
| **8** | UREM-1101 | Text of Ethics and Morality | **2** | **-** | **1** | **-** | **-** | **50** | **50** | **100** |
| | Total | (6+2) Courses | **16** | **5** | **14** | **2.5** | Total= **16.5CH** | | | |
| | | | | | | | | | | |

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50;**
**SEE= Semester End Exam= 50 marks**

### II. SECOND SEMESTER: B.Sc. (Engg) in EEE

| SL.No | Course Code | Course Title | Contact Hours | | Credit Hours | | Prerequisite Courses | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th | Pr | Th | Pr | | CIE | SEE | Total |
| 1 | EEE-1201 | Electrical Circuits II | **3** | **-** | **3** | **-** | EEE-1101 | **50** | **50** | **100** |
| 2 | EEE-1202 | Electrical Circuits II Sessional & Electrical Workshop | **-** | **3** | **-** | **1.5** | - | **50-60** | **40-50** | **100** |
| 3 | CSE-1205 | Computer Programming II | **2** | **-** | **2** | **-** | CSE-1105 | **50** | **50** | **100** |
| 4 | CSE-1206 | Computer Programming II Sessional | **-** | **2** | **-** | **1** | - | **50-60** | **40-50** | **100** |
| 5 | PHY-1201 | Physics II | **3** | **-** | **3** | **-** | PHY-1101 | **50** | **50** | **100** |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 6 | PHY-1204 | Physics Sessional | - | 3 | - | 1.5 | - | 50-60 | 40-50 | 100 |
| 7 | MATH-1207 | Mathematics-II (Differential Equation and Coordinate Geometry) | 3 | - | 3 | - | MATH-1107 | 50 | 50 | 100 |
| 8 | CE-1204 | Engineering Drawing Sessional | - | 2 | - | 1 | - | 50-60 | 40-50 | 100 |
| 9 | URED-1201 | Basic Principles of Islam | 2 | - | 2 | - | - | 50 | 50 | 100 |
| Total | | (5+4) Courses | 13 | 10 | 13 | 5 | Total=18CH | | | |

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

## III. THIRD SEMESTER: B.Sc. (Engg) in EEE

| SL.No | Course Code | Course Title | Contact Hours | | Credit Hours | | Prerequisite Courses | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th | Pr | Th | Pr | | CIE | SEE | Total |
| 1 | EEE-2301 | Electronics I | 3 | - | 3 | - | EEE-1201 | 50 | 50 | 100 |
| 2 | EEE-2302 | Electronics I Sessional | - | 3 | - | 1.5 | | 50-60 | 40-50 | 100 |
| 3 | EEE-2303 | Electrical Machine I | 3 | - | 3 | - | EEE-1201 | 50 | 50 | 100 |
| 4 | EEE-2306 | Numerical Technique Sessional | - | 2 | - | 1 | | 50-60 | 40-50 | 100 |
| 5 | MATH-2309 | Mathematics III (Linear Algebra, Matrices and Vector Analysis) | 3 | - | 3 | - | MATH-1207 | 50 | 50 | 100 |
| 6 | STAT-2303 | Probability & Statistics | 2 | - | 2 | - | - | 50 | 50 | 100 |
| 7 | ME-2301 | Fundamentals of Mechanical Engineering | 2 | - | 2 | - | - | 50 | 50 | 100 |
| 8 | CHEM-2301 | Chemistry | 3 | - | 3 | - | - | 50 | 50 | 100 |
| 9 | CHEM-2304 | Chemistry Sessional | - | 3 | - | 1.5 | - | 50-60 | 40-50 | 100 |
| 10 | URED-2302 | Sciences of Qur'an and Hadith | 2 | - | 1 | - | - | | | |
| 11 | Total | (7+3) Courses | 18 | 8 | 17 | 4 | Total = 21 CH | | | |

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

## IV. FOURTH SEMESTER: B.Sc. (Engg) in EEE

| SL.No | Course Code | Course Title | Contact Hours | | Credit Hours | | Prerequisite Courses | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th | Pr | Th | Pr | | CIE | SEE | Total |
| 1 | EEE-2401 | Electrical Machine II | 3 | - | 3 | - | EEE-2303 | 50 | 50 | 100 |
| 2 | EEE-2402 | Electrical Machine Sessional | - | 3 | - | 1.5 | - | 50-60 | 40-50 | 100 |
| 3 | EEE-2407 | Digital Electronics | 3 | - | 3 | - | EEE-2301 | 50 | 50 | 100 |
| 4 | EEE-2408 | Digital Electronics Sessional | - | 3 | - | 1.5 | - | 50-60 | 40-50 | 100 |
| 5 | EEE-2411 | Electronics II | 3 | - | 3 | | EEE-2301 | 50 | 50 | 100 |
| 6 | EEE-2412 | Electronics II Sessional and Electronics Workshop | - | 3 | - | 1.5 | - | 50-60 | 40-50 | 100 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 7 | EEE-2415 | Transmission & Distribution of Electrical Power | 3 | - | 3 | - | EEE-1201 | **50** | **50** | **100** |
| 8 | MATH-2409 | Mathematics IV (Complex Variable, Lap laces and Fourier Analysis, Z-transform) | 3 | - | 3 | - | MATH-2309 | **50** | **50** | **100** |
| 9 | ACC-2401 | Financial and Managerial Accounting | 2 | - | 2 | - | - | **50** | **50** | **100** |
| 10 | GEBL-2401 | Bangla Language and Literature | 2 | - | 2 | - | | | | |
| 11 | Total | (7+3) Courses | **19** | **9** | **19** | **4.5** | Total 23.5CH | | | |

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

## V. FIFTH SEMESTER: B.Sc. (Engg) in EEE

| SL.No | Course Code | Course Title | Contact Hours | | Credit Hours | | Prerequisite Courses | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th | Pr | Th | Pr | | CIE | SEE | Total |
| 1 | EEE-3501 | Continuous Signals and Linear Systems | 3 | - | 3 | - | MATH-2409 | **50** | **50** | **100** |
| 2 | EEE-3505 | Microprocessor and Interfacing | 3 | - | 3 | - | EEE-2407 | **50** | **50** | **100** |
| 3 | EEE-3506 | Microprocessor & Interfacing Sessional | - | 3 | - | 1.5 | - | **50-60** | **40-50** | **100** |
| 4 | EEE-3508 | Circuit Simulation Sessional | - | 2 | - | 1 | EEE-2301 | **50-60** | **40-50** | **100** |
| 5 | EEE-3515 | Electrical Properties of Materials | 3 | - | 3 | - | EEE-2301 | **50** | **50** | **100** |
| 6 | EEE-3519 | Power System Analysis | 3 | - | 3 | | EEE-2415 | **50** | **50** | **100** |
| 7 | EEE-3520 | Power System Analysis Sessional | - | 3 | - | 1.5 | EEE-2415 | **50-60** | **40-50** | **100** |
| 8 | ECON-3501 | Principles of Economics | 2 | - | 2 | - | - | **50** | **50** | **100** |
| 9 | URED-3503 | Introduction to Political Thoughts and Social Behavior | 2 | - | 1 | - | - | **50** | **50** | **100** |
| | Total | (6+ 3) Courses | 16 | 8 | 15 | 4 | Total=**19CH** | | | |

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

## VI. SIXTH SEMESTER: B.Sc. (Engg) in EEE

| SL.No | Course Code | Course Title | Contact Hours | | Credit Hours | | Prerequisite Courses | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th | Pr | Th | Pr | | CIE | SEE | Total |
| 1 | EEE-3601 | Communication Theory | 3 | - | 3 | - | EEE-3501 | **50** | **50** | **100** |
| 2 | EEE-3602 | Communication Theory Sessional | - | 3 | - | 1.5 | - | **50-60** | **40-50** | **100** |
| 3 | EEE-3603 | Digital Signal Processing I | 3 | - | 3 | - | EEE-3501 | **50** | **50** | **100** |
| 4 | EEE-3604 | Digital Signal Processing I Sessional | - | 3 | - | 1.5 | - | **50-60** | **40-50** | **100** |
| 5 | EEE-3607 | Solid State Devices | 3 | - | 3 | - | - | **50** | **50** | **100** |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 6 | EEE-3608 | Research Methodology and Seminar | - | 2 | - | 1 | | **50-60** | **40-50** | **100** |
| 7 | EEE-3612 | Electrical Service Design Sessional | - | 2 | - | 1 | - | **50-60** | **40-50** | **100** |
| 8 | EEE-3621 | Engineering Electromagnetism | 3 | - | 3 | | MATH-3505 | **50** | **50** | **100** |
| 9 | MGT-3601 | Industrial Management | 2 | - | 2 | - | - | **50** | **50** | **100** |
| 10 | URED-3604 | Life and Teachings of the Prophet Muhammad (saas) | 2 | - | 1 | - | - | **50** | **50** | **100** |
| 11 | GEHE-3601 | History of the Emergence of Bangladesh | 2 | - | 2 | - | | 50 | 50 | 100 |
| | Total | (7+ 4) Courses | **18** | **10** | **17** | **5** | Total=**22CH** | | | |

****Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

## VII. SEVENTH SEMESTER: B.Sc. (Engg) in EEE

| SL.No | Course Code | Course Title | Contact Hours | | Credit Hours | | Prerequisite Courses | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th | Pr | Th | Pr | | CIE | SEE | Total |
| 1 | EEE-4860 | Project/Thesis | - | 4 | - | 2 | | **50-60** | **40-50** | **100** |
| 2 | EEE-4701 | Control System I | 3 | - | 3 | - | EEE-3501 | **50** | **50** | **100** |
| 3 | EEE-4702 | Control System I Sessional | - | 3 | - | 1.5 | - | **50-60** | **40-50** | **100** |
| 4 | EEE-47xx | Major-I | 3 | - | 3 | - | | **50** | **50** | **100** |
| 5 | EEE-47xx | Major-I Sessional | - | 3 | - | 1.5 | | **50-60** | **40-50** | **100** |
| 6 | EEE-47xx | Major-II | 3 | - | 3 | - | | **50** | **50** | **100** |
| 7 | EEE-47xx | Minor-I | 3 | - | 3 | - | | **50** | **50** | **100** |
| 8 | EEE-47xx | Minor-I Sessional | - | 3 | - | 1.5 | | **50-60** | **40-50** | **100** |
| 9 | URIH-4701 | A Survey of Islamic History and Culture | 2 | - | 1 | - | - | **50** | **50** | **100** |
| 10 | LAW-4725 | Professional Ethics and Environmental Protection Law | 2 | - | 2 | - | | **50** | **50** | **100** |
| | Total | (6+4) Courses | **16** | **13** | **15** | **6.5** | **Total=21.5 CH** | | | |

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

## VIII. EIGHT SEMESTER: B.Sc. (Engg) in EEE

| SL.No | Course Code | Course Title | Contact Hours | | Credit Hours | | Prerequisite Courses | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th | Pr | Th | Pr | | CIE | SEE | Total |
| 1 | EEE-4860 | Project / Thesis | - | 4 | - | 2 | | **50-60** | **40-50** | **100** |
| 2 | EEE-4804 | Industrial Attachment | - | 2 | - | 1 | | **50-60** | **40-50** | **100** |
| 3 | EEE-48xx | Major-III | 3 | - | 3 | - | | **50** | **50** | **100** |
| 4 | EEE-48xx | Major-III Sessional | - | 3 | - | 1.5 | | **50-60** | **40-50** | **100** |
| 5 | EEE-48xx | Major-IV | 3 | - | 3 | - | | **50** | **50** | **100** |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 6 | EEE-48xx | Interdisciplinary-I | 3 | - | 3 | - | | **50** | **50** | **100** |
| 7 | EEE-48xx | Interdisciplinary-I Sessional | - | 3 | - | 1.5 | | **50-60** | **40-50** | **100** |
| 8 | EEE-48xx | Interdisciplinary -II | 3 | - | 3 | - | | **50** | **50** | **100** |
| 9 | EEE-48xx | Interdisciplinary -II Sessional | - | 3 | - | 1.5 | | **50-60** | **40-50** | **100** |
| 10 | EEE-4822 | General viva-voce | 1 | - | 1 | - | | **50** | **50** | **100** |
| | Total | (6+4) Courses | **13** | **15** | **13** | **7.5** | **Total=20.5CH** | | | |

****Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

**Grand Total = 162 CH**

## B. Semester wise Elective Courses

**Major-I & Major-I Sessional: B.Sc. (Engg) in EEE**

| SL.No | Course Code | Course Title | Contact Hours | | Credit Hours | | Discipline | Prerequisite Courses | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th | Pr | Th | Pr | | | CIE | SEE | Total |
| 1 | EEE-4705 | Power Electronics | 3 | - | 3 | - | PSE | EEE-2411 | **50** | **50** | **100** |
| 2 | EEE-4706 | Power Electronics Sessional | - | 3 | - | 1.5 | PSE | - | **50-60** | **40-50** | **100** |
| 3 | EEE-4723 | Microwave Engineering | 3 | - | 3 | | CE | EEE-3601 | **50** | **50** | **100** |
| 4 | EEE-4724 | Microwave Engineering Sessional | - | 3 | - | 1.5 | CE | - | **50** | **50** | **100** |
| 5 | EEE-4753 | VLSI I | 3 | - | 3 | - | EE | EEE-3607 | **50** | **50** | **100** |
| 6 | EEE-4754 | VLSI I Sessional | - | 3 | - | 1.5 | EE | - | **50** | **50** | **100** |

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

**Major-II: B.Sc. (Engg) in EEE**

| SL.No. | Course Code | Course Title | Contact Hours | | Credit Hours | | Discipline | Prerequisite Courses | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th | Pr | Th | Pr | | | CIE | SEE | Total |
| 1 | EEE-4707 | Power Plant Engineering | 3 | - | 3 | - | PSE | EEE-2401 | **50** | **50** | **100** |
| 2 | EEE-4713 | Compound Semiconductor & Heterojunction Devices | 3 | - | 3 | - | EE | EEE-3607 | **50** | **50** | **100** |
| 3 | EEE-4715 | Digital Signal Processing II | 3 | - | 3 | - | CE | EEE-3603 | **50** | **50** | **100** |

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

**Minor-III & Minor-III Sessional: B.Sc. (Engg) in EEE**

| SL. No. | Course Code | Course Title | Contact Hours | Credit Hours | Discipline | Prerequisite Courses | Marks |
|---|---|---|---|---|---|---|---|

| | | | Th | Pr | Th | Pr | | | CIE | SEE | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | EEE-4801 | Power System Protection | 3 | - | 3 | - | PSE | EEE-3519 | **50** | **50** | **100** |
| 2 | EEE-4802 | Power System Protection Sessional | - | 3 | - | 1.5 | PSE | | **50-60** | **40-50** | **100** |
| 3 | EEE-4833 | Digital Communication | 3 | - | 3 | - | CE | EEE-3601 | **50** | **50** | **100** |
| 4 | EEE-4834 | Digital Communication Sessional | - | 3 | - | 1.5 | CE | | **50-60** | **40-50** | **100** |
| 5 | EEE-4809 | VLSI II | 3 | - | 3 | - | EE | EEE-4753 | **50** | **50** | **100** |
| 6 | EEE-4810 | VLSI II Sessional | - | 3 | - | 1.5 | EE | | **50-60** | **40-50** | **100** |

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

**Major-IV: B.Sc. (Engg) in EEE**

| SL.No | Course Code | Course Title | Contact Hours | | Credit Hours | | Discipline | Prerequisite Courses | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th | Pr | Th | Pr | | | CIE | SEE | Total |
| 1 | EEE-4807 | High Voltage Engineering | 3 | - | 3 | - | PSE | EEE-3519 | **50** | **50** | **100** |
| 2 | EEE-4837 | Telecommunication Engineering | 3 | - | 3 | - | CE | EEE-3601 | **50** | **50** | **100** |
| 3 | EEE-4811 | Opto-Electronics | 3 | - | 3 | - | EE | EEE-2411 | **50** | **50** | **100** |

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

**Interdisciplinary-I & Interdisciplinary-I Sessional**

| SL.No | Course Code | Course Title | Contact Hours | | Credit Hours | | Prerequisite Courses | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th | Pr | Th | Pr | | CIE | SEE | Total |
| 1 | EEE-4827 | Measurement and Instrumentation | 3 | - | 3 | - | EEE-2411 | **50** | **50** | **100** |
| 2 | EEE-4828 | Measurement and Instrumentation | - | 3 | - | 1.5 | - | **50-60** | **40-50** | **100** |
| 3 | EEE-4825 | Biomedical Instrumentation | 3 | - | 3 | - | EEE-4701 | **50** | **50** | **100** |
| 4 | EEE-4826 | Biomedical Instrumentation Sessional | - | 3 | - | 1.5 | - | **50-60** | **40-50** | **100** |
| 5 | EEE-4841 | Antenna & Propagation | 3 | - | 3 | - | EEE- | **50** | **50** | **100** |
| 6 | EEE-4842 | Antenna & Propagation Sessional | - | 3 | - | 1.5 | - | **50-60** | **40-50** | **100** |

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

**Interdisciplinary-II & Interdisciplinary-II Sessional**

| SL.No | Course Code | Course Title | Contact Hours | | Credit Hours | | Prerequisite Courses | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th | Pr | Th | Pr | | CIE | SEE | Total |
| 1 | EEE-4843 | Renewable Energy System | 3 | - | 3 | | - | **50** | **50** | **100** |
| 2 | EEE- | Renewable Energy | - | 3 | - | 1.5 | - | **50-60** | **40-50** | **100** |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 4844 | System Sessional | | | | | | | | |
| 3 | EEE-4845 | Embedded System | 3 | | 3 | | EEE-3505 | **50** | **50** | **100** |
| 4 | EEE-4846 | Embedded System Sessional | | 3 | | 1.5 | - | **50-60** | **40-50** | **100** |
| 5 | EEE-4847 | Optical Fiber Communication | 3 | - | 3 | - | EEE-3601 | **50** | **50** | **100** |
| 6 | EEE-4848 | Optical Fiber Communication Sessional | - | 3 | - | 1.5 | - | **50-60** | **40-50** | **100** |

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

## Mapping between CLOs and PLOs

EEE graduates could be able to achieve the Program Learning Outcomes after the completion of the courses for the bachelor's degree in EEE. Each of the courses has individual course learning outcomes (CLOs), described in the synopsis of the courses under section 25, for its specific course content to attain some of the PLOs. Hence, PLOs are served through the CLOs of all courses. The program learning outcomes of the program are assessed based on selected courses. For attaining program learning outcomes according to the selected course outcomes the benchmark is usually set by the academic committee of the department.

The mapping between the CLOs and the PLOs of all offered courses are shown in Table 24.1, 24.2, 24.3. In the table, '**1'** means there is a correlation between the CLOs and PLOs.

**Table 24.1 Mapping between CLOs and PLOs of Non-Engineering Skill Courses**

| SL No | Course Code | CLOs | Program Learning Outcomes (PLOs) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | PLO-1 | PLO-2 | PLO-3 | PLO-4 | PLO-5 | PLO-6 | PLO-7 | PLO-8 | PLO-9 | PLO-10 | PLO-11 | PLO-12 |
| 1 | ACC-2401 | CLO-1 | | | | | | | | | | | **1** | |
| | | CLO-2 | | | | | | | | | | | **1** | |
| | | CLO-3 | | | | | | | | | | | **1** | |
| | | CLO-4 | | | | | | | | | | | **1** | |
| 2 | ECON-3501 | CLO-1 | | | | | | | | | | | **1** | |
| | | CLO-2 | | | | | | | | | | | **1** | |
| | | CLO-3 | | | | | | | | | | | **1** | |
| 3 | MGT-3601 | CLO-1 | | | | | | | | | | | **1** | |
| | | CLO-2 | | | | | | | | | | | **1** | |
| | | CLO-3 | | | | | | **1** | | | | | | |
| 4 | LAW-4725 | CLO-1 | | 1 | | | | | | | | | | |
| | | CLO-2 | | | | | | | 1 | | | | | |
| | | CLO-3 | | | | | | | | 1 | | | | |
| | | CLO-4 | | | | | | | | | | 1 | | |
| Total no of CLOs under each PLO | | | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 9 | 0 |

**Table 24.2 Mapping between CLOs and PLOs of the Coursesof Mathematic and Basic Sciences**

| SL No | Course Code | CLOs | ProgramLearning Outcomes | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | PLO-1 | PLO-2 | PLO-3 | PLO-4 | PLO-5 | PLO-6 | PLO-7 | PLO-8 | PLO-9 | PLO-10 | PLO-11 | PLO-12 |
| 1 | STAT-2311 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| | | CLO-3 | 1 | | | | | | | | | | | |
| | | CLO-4 | | | | 1 | | | | | | | | |
| 2 | MATH-1107 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| 3 | MATH-1207 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| 4 | MATH-2309 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| 5 | MATH-2409 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| 6 | PHY-1101 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| 7 | PHY-1201 | CLO-1 | | 1 | | | | | | | | | | |
| | | CLO-2 | | | 1 | | | | | | | | | |
| 8 | PHY-1204 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| | | CLO-3 | | | | 1 | | | | | | | | |
| 9 | CHEM-2301 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| 10 | CHEM-2304 | CLO-1 | | 1 | | | | | | | | | | |
| | | CLO-2 | | | | 1 | | | | | | | | |
| | | CLO-3 | | | | | | | | | | 1 | | |
| Total no of CLOs under each PLO for this section | | | 8 | 10 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |

**Table 24.3 Mapping between CLOs and PLOs of the Engineering Core Courses and EEE Core Courses**

| SL | Course | CLOs | Program Learning Outcomes |
|---|---|---|---|

| No | Code | | PLO-1 | PLO-2 | PLO-3 | PLO-4 | PLO-5 | PLO-6 | PLO-7 | PLO-8 | PLO-9 | PLO-10 | PLO-11 | PLO-12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CSE-1105 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | | 1 | | | | | | | | | |
| | | CLO-3 | | | 1 | | | | | | | | | |
| 2 | CSE-1106 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | | 1 | | | | | | | | | |
| | | CLO-3 | | | 1 | | | | | | | | | |
| 3 | CSE-1205 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| | | CLO-3 | | 1 | | | | | | | | | | |
| 4 | CSE-1206 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | | 1 | | | | | | | | | |
| | | CLO-3 | | **1** | | | | | | | | | | |
| 5 | ME-2301 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| | | CLO-3 | | | 1 | | | | | | | | | |
| 6 | CE-1204 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | | 1 | | | | | | | | | |
| | | CLO-3 | | 1 | | | | | | | | | | |
| | | CLO-4 | | | | 1 | | | | | | | | |
| 7 | EEE-1101 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| 8 | EEE-1102 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| | | CLO-3 | | | | | | | | | | 1 | | |
| 9 | EEE-1201 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| | | CLO-3 | | | 1 | | | | | | | | | |
| 10 | EEE-1202 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| | | CLO-3 | | | | | | | | | | 1 | | |
| 11 | EEE-2301 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| | | CLO-3 | | | 1 | | | | | | | | | |
| 12 | EEE-2302 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| | | CLO-3 | | | | | | | | | | 1 | | |
| | | | | | | | | | | | | | | |
| 13 | EEE-2303 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| | | CLO-3 | 1 | | | | | | | | | | | |
| | EEE- | CLO-1 | 1 | | | | | | | | | | | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | 2306 | CO-2 | | 1 | | | | | | | | | | |
| 15 | EEE-2401 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| | | CLO-3 | | | 1 | | | | | | | | | |
| 16 | EEE-2402 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | | | **1** | | | | | | | | |
| | | CLO-3 | | | | | | | | | | 1 | | |
| 17 | EEE-2407 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| | | CLO-3 | | | 1 | | | | | | | | | |
| 18 | EEE-2408 | CLO-1 | | 1 | | | | | | | | | | |
| | | CLO-2 | | | 1 | | | | | | | | | |
| | | CLO-3 | | | | | 1 | | | | | | | |
| | | | | | | | | | | | | | | |
| 19 | EEE-2411 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| | | CLO-3 | | | 1 | | | | | | | | | |
| 20 | EEE-2412 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | | 1 | | | | | | | | | |
| | | CLO-3 | | | | | | | | | | 1 | | |
| | | CLO-4 | | | | | | | | | **1** | | | |
| 21 | EEE-2415 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| | | CLO-3 | | | 1 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| 22 | EEE-3501 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| 23 | EEE-3505 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| | | CLO-3 | | | 1 | | | | | | | | | |
| 24 | EEE-3506 | CLO-1 | | 1 | | | | | | | | | | |
| | | CLO-2 | | | 1 | | | | | | | | | |
| | | CLO-3 | | | | | 1 | | | | | | | |
| | | CLO-4 | | | | | | | | | | 1 | | |
| 25 | EEE-3508 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | | | | **1** | | | | | | | |
| | | CLO-3 | | | 1 | | | | | | | | | |
| 26 | EEE-3515 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | 1 | | | | | | | | | | | |
| | | CLO-3 | | | | | | | | | | | | |
| 27 | EEE-3519 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | 1 | | | | | | | | | | | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CLO-3 | | 1 | | | | | | | | | | |
| 28 | EEE-3520 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | | 1 | | | | | | | | | |
| | | CLO-3 | | | | | | | | | | 1 | | |
| 29 | EEE-3601 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| | | CLO-3 | | | 1 | | | | | | | | | |
| 30 | EEE-3602 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| | | CLO-3 | | | 1 | | | | | | | | | |
| 31 | EEE-3603 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | | | 1 | | | | | | | | |
| | | CLO-3 | | | 1 | | | | | | | | | |
| 32 | EEE-3604 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | | 1 | | | | | | | | | |
| | | CLO-3 | | | | | 1 | | | | | | | |
| | | CLO-4 | | | | | | | | 1 | | | | |
| 33 | EEE-3607 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | | 1 | | | | | | | | | |
| | | CLO-3 | | | | 1 | | | | | | | | |
| 34 | EEE-3608 | CLO-1 | | | | | | | | | | | | 1 |
| | | CLO-2 | | | | | | | | | | 1 | | |
| | | CLO-3 | | | | | | | | 1 | | | | |
| 35 | EEE-3612 | CLO-2 | | | **1** | | | | | | | | | |
| | | CLO-3 | | | | | 1 | | | | | | | |
| | | CLO-4 | | | | | | | | | 1 | | | |
| | | CLO-5 | | | | | | | | | | | | 1 |
| 36 | EEE-3621 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | 1 | | | | | | | | | | | |
| | | CLO-3 | | 1 | | | | | | | | | | |
| 37 | EEE-4701 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | | |
| | | CLO-3 | | | 1 | | | | | | | | | |
| 38 | EEE-4702 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | | | | 1 | | | | | | | |
| | | CLO-3 | | | 1 | | | | | | | | | |
| 39 | EEE-4804 | CLO-1 | 1 | | | | | | | | | | | |
| | | CLO-2 | | | | | 1 | | | | | | | |
| | | CLO-3 | | | | | | | | | 1 | | | |
| | | CLO-4 | | | | | | | | | | 1 | | |
| | | CLO-5 | | | | | | | | | | | | 1 |
| | EEE- | CLO-1 | 1 | | | | | | | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 40 | 4860 | CLO-2 | | | | | | | | | | | 1 |
| | | CLO-3 | | | | | | | | | 1 | | |
| | | CLO-4 | | | | | | | | 1 | | | |
| | | CLO-5 | | | | | | | **1** | | | | |
| | | CLO-6 | | | | **1** | | | | | | | |
| 41 | EEE-4822 | CLO-1 | 1 | | | | | | | | | | |
| | | CLO-2 | | | | | | | | | 1 | | |
| | | CLO-3 | | | | | | | | | | | 1 |
| 42 | EEE-4705 | CLO-1 | 1 | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | |
| | | CLO-3 | | | 1 | | | | | | | | |
| 43 | EEE-4706 | CLO-1 | 1 | | | | | | | | | | |
| | | CLO-2 | | | 1 | | | | | | | | |
| | | CLO-3 | | | | | | | | | 1 | | |
| 44 | EEE-4707 | CLO-1 | 1 | | | | | | | | | | |
| | | CLO-2 | | | | | | | **1** | | | | |
| | | CLO-3 | | 1 | | | | | | | | | |
| 45 | EEE-4801 | CLO-1 | 1 | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | |
| | | CLO-3 | | | 1 | | | | | | | | |
| 46 | EEE-4802 | CLO-1 | 1 | | | | | | | | | | |
| | | CLO-2 | | | | | | **1** | | | | | |
| | | CO-3 | | | 1 | | | | | | | | |
| 47 | EEE-4807 | CLO-1 | 1 | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | |
| | | CLO-3 | | | 1 | | | | | | | | |
| 48 | EEE-4753 | CLO-1 | 1 | | | | | | | | | | |
| | | CLO-2 | | 1 | | | | | | | | | |
| | | CLO-3 | | | 1 | | | | | | | | |
| 49 | EEE-4754 | CLO-1 | 1 | | | | | | | | | | |
| | | CLO-2 | | | | | 1 | | | | | | |
| | | CLO-3 | | | | | | | | | 1 | | |
| 50 | EEE-4827 | CLO-1 | 1 | | | | | | | | | | |
| | | CLO-2 | | | 1 | | | | | | | | |
| | | CLO-3 | | 1 | | | | | | | | | |
| 51 | EEE-4828 | CLO-1 | | | | | 1 | | | | | | |
| | | CLO-2 | | | **1** | | | | | | | | |
| | | CLO-3 | | | | | | **1** | | | | | |
| 52 | EEE-4843 | CLO-1 | | | | | | | **1** | | | | |
| | | CLO-2 | | | | | | **1** | | | | | |
| | | CLO-3 | | | 1 | | | | | | | | |
| 53 | EEE- | CLO-1 | 1 | | | | | | | | | | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4844 | CLO-2 | | | 1 | | | | | | | | | |
| | | CLO-3 | | | | | 1 | | | | | | | |
| Total no of CLOs Under each PLO for this Section | | | 51 | 32 | 38 | **4** | 10 | 3 | 2 | 3 | 4 | 13 | 1 | 5 |

The Table-24.4and Fig. 24.1, shows the summary of CLOs to PLOs mapping from all the courses to depict how the EEE department is providing PLOs to the graduates by the well-structured courses to meet the demand of the fast-developing society.

**Table 24.4 Summary of the mapping between COs and POs that the number of COs from all of the courses that map with the PLO**

| Program Learning Outcomes | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PLOs-→** | **PLO-1** | **PLO-2** | **PLO-3** | **PLO-4** | **PLO-5** | **PLO-6** | **PLO-7** | **PLO-8** | **PLO-9** | **PLO-10** | **PLO-11** | **PLO-12** |
| **The summation of CLOs from the tables 24.1,24,2 and 24.3** | **59** | **43** | **39** | **6** | **10** | **4** | **3** | **4** | **4** | **15** | **10** | **5** |

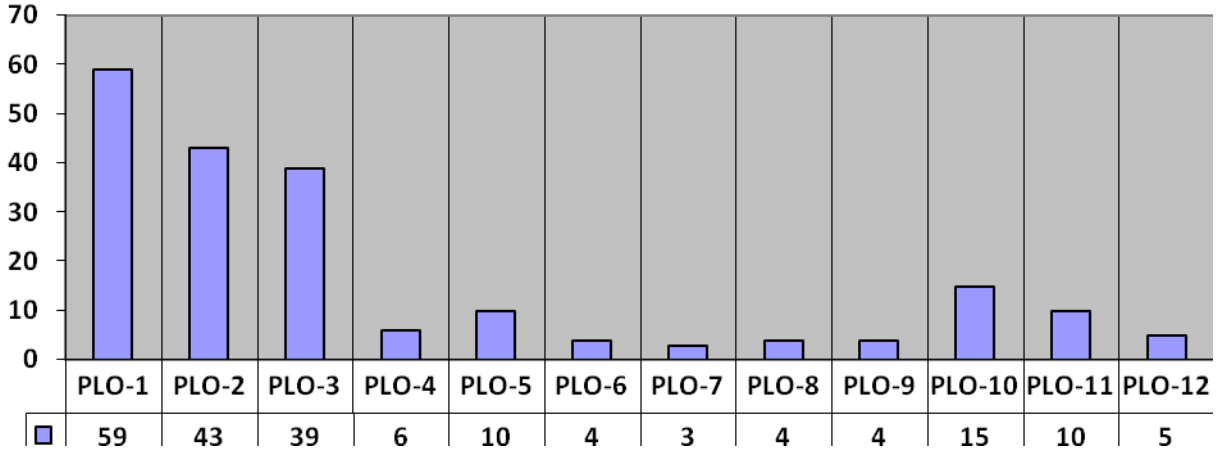



**Fig. 24.1: Individual PLO map with the total number of CLOs of all courses**

**25. Template of the synopsis**

**A. Template of the synopsis of a theoretical course**

Course Code: Course Title:
Credit Hours: Contact Hours:

1: Introduction

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives**

2: Objectives

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-$X_1$ | | PLO-$Y_1$ | |
| CLO-$X_2$ | | PLO-$Y_2$ | |
| CLO-$X_N$ | | PLO$Y_N$ | |

3: CLO-PLO

****Detail Course content to CLO mapping is provided in lesson plan of the respective course.**

**Section-A (Mid-term: 30 Marks)**

1. First Segment.
2. Second Segment
3. Third Segment

**Section-B (SEE: 50 Marks)**
**Group-A (20 Marks)**

4. Fourth Segment
5. Fifth Segment

**Group-B (30 Marks)**

6. Sixth Segment
7. Seventh Segment
8. Eight Segment

4: Course Contents

**Reference Books**

5: References

**A Sample Question Assessment Pattern (Theory courses):**

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If | | | | |

| | |
|---|---|
| | necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Semester end examination. Project evaluation & Viva

## B. Template of the synopsis of a sessional course

Course Code: Course Title:
Contact Hours: Credit Hours:

1: Introduction

**Objectives**

2: Objectives

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-$X_1$ | | PLO-$Y_1$ | |
| CLO-$X_2$ | | PLO-$Y_2$ | |
| CLO-$X_N$ | | PLO$Y_N$ | |

3: CLO-PLO

***List of the Experiment is shown in laboratory manual of the department.***

**Reference Books:**

4: References

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of Semester End examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

# 26. Synopsis of the Courses

## A. Mathematics Courses

**Course Code: MATH-1107** **Course Title: Mathematics I (Differential and Integral Calculus)**
**Credit Hours: 3** **Contact ours: 3 per Week**

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** The objective of this course is to provide the students with an understanding of how to find out the rate of change of various functions, and to determine the area and volume of different types of objects. This course aims to introduce the student with the various techniques of differentiation and integration.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | For complex Engineering problems, it is essential to get Knowledge of the limit, continuity, and differentiability, power series, Rolle's Theorem, Mean value theorem, Taylor, and McLaurin series. Also, the need concept of the partial derivative and Integration. | PLO-1 | Cognitive/ Understanding |
| CLO-2 | By using the above mentioned foundational mathematical information; One can implement it to solve the mathematical problems, which is expressing engineering principles. | PLO-2 | Cognitive/Applying |

**Section-A (Mid-term: 30 Marks)**

1. **Functions**, Limit, Continuity and Differentiability, Physical meaning of derivative of a function, Indeterminate Forms.
2. **Differentiation**, Successive differentiation and Leibniz theorem
3. **General Theorems** and Expansions: Rolle's Theorem, Mean Value Theorem, Taylor's Theorem and McLaurin's Theorem.

**Section-B (SEE: 50 Marks)**
**Group-A (20 Marks)**

4. **Partial Differentiation**, Euler's formula, Maxima and minima
5. **Indefinite integral**: Physical meaning of integration of a function, method of Substitution, Integration by parts, special trigonometric functions and rational and partial fractions, different techniques of integration.

**Group-B (30 Marks)**

6. **Definite integral**: Fundamental theorem, general properties, and evaluations of definite integral and reduction formula, definite integral as the limit of a sum, Integration by method of successive reduction, Gamma and Beta Function.
7. **Multiple Integral**: Jacobian theorem, Double Integral, Change of order of integration, triple Integral, Physical Application of double and triple integral. Quadrature, Determination of length of curves, Finding Area of a region,
8. **Integration by Revolution**: Areas of surfaces of revolution, Volumes of solids of revolution. Solving Real world problems through calculus.

**Recommended Reference:**


1. George B. Thomas Jr., Ross L. Finney, ***Calculus and Analytic Geometry***, 12th ed., USA, Pearson Education, 27 September 2019
2. Howard Anton, ***Calculus A New Horizon***,6th ed,USA, Wiley,1 November 1997

3. B.C.Das, B.N.Mukherjee, ***Differential Calculus***,54th ed,India,U.N.Dhur & Sons Private Ltd, July 2008
4. B.C.Das, B.N.Mukherjee, ***Integral Calculus***,54th ed,India,U.N.Dhur & Sons Private Ltd, July 2008
5. Michael D. Greenberg, ***Advanced Engineering Mathematics***, 2nd ed., Dorling Kindersley Pvt Ltd, December 1, 2006
6. Prof Glyn James, David Burley & Dick Clements, ***Advanced Modern Engineering Mathematics***, 7th ed., Pearson Education, 30 July 2018


**A Sample Question Assessment Pattern (Theory courses):**

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:** **CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: MATH-1207 Course Title: Mathematics-II (Geometry & Differential Equations)**
**Credit Hours: 3 Contact Hours: 3 per Week**
[Prerequisite: MATH-1107]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives**: Geometry deals with space and shapes. The objective of this course is to develop an understanding of the visual ability, to enable the students to make the design of solving problems, and to improve the skills of reasoning. Through this course student will learn how to solve different types of differential equations.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Demonstrate the basic idea of vector spaces, subspaces, Linear dependence and independence of vectors, Linear mappings, Inner product spaces and be able to find the eigenvalues and eigenvectors of a square matrix using the | PLO-1 | Cognitive/ Understanding |

| | | | |
|---|---|---|---|
| | characteristic polynomial and will know how to diagonalize a matrix. Applying these to solve the linear algebra in electric network. | | |
| CLO -2 | Get the basic understanding about scalar and vectors, dot Product, cross product derivative of vectors, vector integration. Analyze complex engineering problems be able to know gradient, divergence, curl and their physical significance and to learn the Greens, Gauss & Stocks theorem and their applications and be familiar with vector components in spherical and cylindrical systems. | PLO-2 | Cognitive/ Understanding |

**Section-A (Mid-term: 30 Marks)**

1. **Two-Dimensional Geometry**: Change of Axes**,** Pair of straight lines. General equation of second degree presents a pair of straight lines, Properties of Pair of straight lines, System of circles.
2. **Three-dimensional Geometry**: Rectangular co-ordinate System, Direction cosines, Direction ratios, Projections, Equation of planes, Different forms of planes.
3. **Straight lines in three-dimension**, Angle between two lines, Angle between a lines and a plane, coplanar lines and Shortest distance, Spheres.

**Section-B (SEE: 50 Marks)**

**Group-A (20 Marks)**

4. **First order differential equation:** Definition, solution of first order and first-degree differential equation with initial conditions, Solution of Linear Differential Equation, Separable Equations, homogeneous equations, Bernoulli Equation, Exact Differential equations, Integrating Factors, Boundary Value Problems.
5. **Higher order Differential equations with constant coefficients**: Solution of higher order homogeneous differential equations, Solution of non-homogeneous differential equations, Auxiliary Equations, Complementary function and particular integral

**Group-B (30 Marks)**

6. **Bessel's functions**, Legendre's polynomials and their properties, Linear differential Equation of second-degree using Method of variation of parameter & Method of Undetermined coefficients.
7. **Linear & Non-Linear Partial Differential Equations:** Elimination of arbitrary constants and functions, Lagrange's method, Charpit's method. Solving linear partial differential equations with constant coefficients, Complementary function and particular integrals, Short method.
8. **Physical Applications:** Solution of Practical (Real world) problems using differential equations such as Growth and Decay Problems, Temperature Problems, Falling Body Problems, Dilution Problems, Electrical Circuits problems, Orthogonal Trajectories, Spring Problems, Buoyancy Problems, Classifying Solutions etc.

**Recommended Reference:**


1. JT bell, ***Coordinate Geometry***,6th ed, Macmillan,12 October 2018
2. M.L. Khanna, ***Solid Geometry***,19th ed, Jai Prakash Nath & CO, 2003
3. Stroud K., ***Further Engineering Mathematics: Programs and Problems***,4th ed., Industrial Press Inc. New York, 1992
4. H.K. Dass, ***Advanced Engineering Mathematics***, 8th ed., S Chand, 1 December 2007.
5. Frank Ayres, ***Theory and Problems of Differential Equations***,4th ed, McGraw-Hill Education, 9 December 2011
6. Michael D. Greenberg, ***Advanced Engineering Mathematics***, 2nd ed., Dorling Kindersley Pvt Ltd, December 1, 2006

## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term&Semester end examination . Project evaluation & Viva

**Course Code : MATH-2309Course Title : Mathematics III (Linear Algebra, Matrices and Vector Analysis)**

**Credit Hours: 3** **Contact Hours: 3 per Week**

[Prerequisite: MATH-1207]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Mathematics' in regard to vector spaces and subspaces, basis and dimension and linear mappings, inner product spaces, matrix and linear system of equations, characteristic equation and diagonalization, vector analysis, del operator, vector integration and vector's theorem.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Demonstrate the basic idea of vector spaces, subspaces, Linear dependence and independence of vectors, Linear mappings, Inner product spaces and be able to find the eigenvalues and eigenvectors of a square matrix using the characteristic polynomial and will know how to diagonalize a matrix. Applying these to solve the linear algebra in electric network. | PLO-1 | Cognitive/ Applying &Analyzing |
| CLO-2 | Get the basic understanding about scalar and vectors, dot Product, cross product derivative of vectors, vector integration. Analyze complex engineering problems be able to know gradient, divergence, curl and their physical significance and to learn the Greens, Gauss & Stocks theorem and their applications and be familiar with vector components in spherical and cylindrical systems. | PLO-2 | Cognitive/ Applying |

**Section-A**

**(Mid-term Exam: 30 Marks)**

1. **Vector Spaces and Subspaces:** Definition of vector spaces, subspaces, basic theorem, Linear combinations of vectors, spanning set, Linear dependence and independence of vectors.
2. **Basis and Dimension and Linear Mappings:** Basis and Dimensions of Vector spaces, Sums and Direct sums of subspaces. Mappings, Linear mappings, Kernel and image of a linear mapping, Singular and non-singular mappings, Linear mapping and systems of linear equations.
3. **Inner Product Spaces:** Inner product spaces, Cauchy-Schwarz inequality, Orthonormal sets, Gram-Schmidt orthogonalization process, Application of Linear algebra in electric network.

**Section-B (SEE: 50 Marks)**

**Group-A (20 Marks)**

4. **Matrix and Linear System of Equations:** Vector presentation by matrix, different types of matrices, algebraic operations on matrices, adjoint and inverse of a matrix, augmented matrix, row operation method, rank of Matrices, some problems, Normal Vector, Ortho normal Vectors, Orthogonality, Echelon form, consistency and inconsistency, solution of homogeneous and non- homogeneous linear system of equations.
5. **Characteristic equation and Diagonalization:** Eigen values and eigenvectors, characteristic polynomial, Caley-Hamilton theorem, Diagonalization of matrices and symmetric matrices, Characteristics roots.

**Group-B (30 Marks)**

6. **Vector analysis:** Scalar and vectors, operation of vectors, vector addition and multiplication - their applications, Scalar Field, Vector Field, Dot Product, Cross product, Triple Product, Derivative of vectors and problems.
7. **Del operator and Vector Integration:** Del operator, gradient, divergence and curl and their physical significance, Line Integrals, physical significance of Vector integration and Problems.
8. **Vector's Theorem:** Greens, Gauss & Stocks theorem and their applications, Vector components in spherical and cylindrical systems.

**Recommended Reference:**


1. Seymour Lipschutz & Marc Lipson, ***Schaum's Outlines of Linear Algebra***, 5th ed., McGraw-Hill Education, 2012.
2. Richard Bronson, ***Linear Algebra: An Introduction,*** 4th ed., Academic Press, 1995.
3. Murray Spiegel, Seymour Lipschutz & Dennis Spellman, ***Vector Analysis,*** 2nd ed., McGraw-Hill Education, May 4, 2009.
4. P.N.Chatterjee, ***Matrices***, 5th ed., Anu Books, 1 January 2019.
5. Jr. Frank Ayres, ***Theory and Problems of Matrices: Including 340 Solved Problems, Completely Solved in Detail (Schaum's Outline Series)***, 1st ed., Schaum's Outline, June 1, 1967


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:** **CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination. Project evaluation & Viva

**Course Code: MATH-2409** **Course Title: Mathematics IV (Complex Variable, Lap laces and Fourier Analysis, Z-transform)**

**Credit Hours: 3** **Contact Hours: 3 per Week**

[Prerequisite: MATH-2309]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Mathematics' in regards to complex variable, complex transformations, complex integration, residue and contour integration, Laplace transforms, convolution, Fourier series and transform**.**

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Strengthen the understanding of complex Variables, Fourier Series, and then the idea of function transformation by the help of Laplace, Fourier, and Z-transformation method to solve complex engineering problem. | PLO-1 | Cognitive / understanding |
| CLO-2 | The advancement of the knowledge of Complex variables, Convolution integral, Laplace, Fourier Series, and Z-transformation methods, are implemented in various complex engineering problem interpretation and applicability by using the mathematical formulations. | PLO-2 | Cognitive/ Applying |

**Section-A**

**(Mid-term Exam: 30 Marks)**

1. **Complex variable:** Complex numbers and their properties, functions of a complex variable, DeMoivre's Theorem and its applications**,** Limit, Continuity and differentiability, Differentiation of a complex function, Analytic function, Necessary and sufficient condition to analytic, Cauchy-Riemann Equation.
2. **Complex Transformations:** Orthogonal curves, Harmonic functions, Method of finding conjugate functions, Milne Thomson method, Transformations, Conformal transformations, Bilinear transformations.
3. **Complex Integration:** Complex Integration, Cauchy's integral theorem, Cauchy integral formula, Liouville's theorem, Taylor's theorem.

**Section-B (SEE: 50 Marks)**

**Group-A (20 Marks)**

4. **Residue and Contour Integration:** Singular point, Residue, Method of finding residue, Residue theorem, Contour integration.
5. **Laplace transforms**: Definition, Laplace transforms of different functions, inverse Laplace transforms, shifting and change of scale property, Laplace transforms of derivatives.

**Group-B (30 Marks)**

6. **Convolution:** Unit Step Function, Impulse Function, Periodic functions, Ramp Function, Sketch Waveform, convolution theorem.
7. **Fourier series**: Fourier series, Trigonometric form and Complex form of Fourier series and Fourier Integral, Physical Application of Fourier Series.
8. **Transform:** Fourier transforms, Z transforms.

**Recommended Reference:**

1. Prof Glyn James, David Burley & Dick Clements, ***Advanced Modern Engineering Mathematics***, 7th ed., Pearson Education, 30 July 2018.

2. Michael D. Greenberg, ***Advanced Engineering Mathematics,*** 2nd ed., Dorling Kindersley Pvt Ltd, December 1, 2006.
3. Stroud K., ***Further Engineering Mathematics: Programs and Problems,***4th ed., Industrial Press Inc. New York, 1992.
4. H.K Dass, ***Advanced Engineering Mathematics***, 8th ed., S Chand, 1 December 2007.
5. M.R. Spiegel, ***Complex Variables*** 4th ed., Schaum's Outline, January 1, 1980
6. Murray R. Spiegel, ***Schaum's Outline Series: Theory and Problems of Laplace Transforms***, 4th ed., Schaum's Outline, January 1, 1965.


**A Sample Question Assessment Pattern (Theory courses):**

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: STAT-2311Course Title:** Probability and Statistics
**Contact Hours: 2 lecture hours per week** **Type: Core, B.SC Engineering**
**Prerequisite: STAT-1201(Statistics)**

| Course Assessments | **CIE**: Continuous Internal Evaluation | Attendance | 10 Marks |
|---|---|---|---|
| | | Class test/ Assignment/ Quizzes | 10 Marks |
| | | Mid-term | 30Marks |
| | **SEE**: Semester End Examination | | 50 Marks |

**1. Course Rationale / Summary:**

This course is to provide an understanding for the engineering student on statistical concepts to include measurements of location and dispersion, probability, probability distributions, hypothesis testing, regression, and correlation analysis.

2. **Course Objective:**

a. Demonstrate understanding of descriptive statistics by practical application of quantitative reasoning and to the solution of engineering problems withdata visualization.
b. Be able to compute and interpret the results of correlation and regression.
c. Probability and its distributions to various engineering problems.
d. Perform hypothesis testing using statistical methods and estimation.

## 3. Mapping of CLO to PLO:

| S/N | Description of Course Learning Outcome (CLO): Upon successful completion of this course, students will be able to: | PLOs | Bloom's Taxonomy Domain/Level |
|---|---|---|---|
| CLO1 | Demonstrate understanding of descriptive statistics by practical application of quantitative reasoning and to the solution of engineering problems with data visualization. | PLO1 | Cognitive/ understanding |
| CLO2 | Will Be able to compute and interpret the results of correlation and regression. | PLO2 | Cognitive/ Evaluating |
| CLO3 | Demonstrate probability and its related distributions to the solution of engineering problems. | PLO1 | Cognitive/ Applying |
| CLO4 | Create hypothesis for data analysis | PLO4 | Cognitive/Creating |

## 4. Course Content:

| Chapter | Section-A (Midterm Exam: 30 Marks) | Lecture | CLO |
|---|---|---|---|
| 1 | **Preliminary idea of Statistics:** Origin, History and Development Statistics, Definition of Statistics, Characteristics, Function, Limitations, Necessity & importance of Statistics, The role of Statistics in Engineering, Population and Sample, Variable and Constants, Different types of variables, Parameter, Statistic, Scale of measurement, Statistical data, collecting engineering data, Preparation of Questionnaire and Schedule, Presentation and Classification of Data, Construction of Frequency distribution, Graphical presentation of Frequency distribution. | 5 | **CLO1** |
| 2 | **Measures of Central Tendency:** Different types of mean with their properties and relationship, Quintiles with their graphical presentation, Application of different measures of central tendency. | 3 | **CLO1** |
| 3 | **. Measures of Dispersion of a Series of Data:** Range, Standard Deviation, Mean Deviation, Quartile Deviation, Variance and Standard Deviation, Coefficient of Variation and their uses, Properties and applications of different measures of dispersion,moments, skewness and kurtosis. | 4 | **CLO1** |
| | **Section-B (Semester end examination : 50 Marks)**<br>**Group-A (20 Marks)** | | |
| 4 | **Correlation Theory and Regression Analysis:**Simple Correlation and its measure, Scatter Diagram, propertiesof simple correlation coefficient, Spearman's Rank correlation coefficient, Simple linear regression, propertiesof regression coefficient, regression curve, regression equation, Least-square method of curve fittings, Co-efficient of determination, Theorems & Problems. | 4 | **CLO2** |
| 5 | **Basic concepts of probability:**History, meaning and Scope of probability, Approaches of defining probability: Classical, Empirical, Subjective and Axiomatic probability, Experiment, random experiment, Sample Space, Event, different types of events, Tree diagram, Conditional probability and independence, some elementary theorems on probability, and conditional probability, Laws of Probability – Additive and Multiplicative Law, Prior probability, Posterior probability, total probabilities & Bayes' theorem and their applications. | 4 | **CLO3** |
| | **Group-B (30 Marks** | | |
| 6 | **Random Variables and Mathematical Expectation:**Discrete and continuous random variables, Probability mass function and density function, Distribution function and their properties, Mathematical expectation and variance of a random variables. Theorems & Problems | 3 | **CLO1**<br>**CLO3** |
| 7 | **Probability Distributions:** Binomial distribution, Poisson distribution and Normal distribution – Their properties, uses, Theorems & Problems | 4 | **CLO1**<br>**CLO3** |
| 8 | **Test of hypothesis and Estimation:**Preliminary ideas of statistical | 3 | **CLO4** |

| | | | |
|---|---|---|---|
| | hypothesis test, level of significance, one tailed and two tailed test, p-value, Test of significance, Test regarding single mean, test of equality of two mean, test of equality of several means (Analysis of variance), test regarding proportion. General concepts of Estimation. | | |

## 5. Resources:

### Text Books


1. Montgomery Douglas C & Runger George C, "*Applied Statistics and Probability for Engineers",* John Wiley and Sons, Inc. Fifth Edition, (2011). ISBN: 978-0-470-05304-1
2. Walpole R.E, Myers R.H, Myers S.L, & Ye K.Y, *"Probability and Statistics for Engineers and Scientist",* Prentice Hall, 9th ed. (2012). ISBN 978-0-321-62911-1
3. R.N. Shill & S.C. Debnath, "*An introduction to the theory of Statistics*", STAR Publication, 4th Edition (2016).


**Reference Books**


1. L-Garcia, A. "Probability, Statistics and Random Processes for Electrical Engineering" , 1st Cambridge University Press, Third Edition ( 2014). ISBN-13: 978-0131471221
2. Keshava & Reddy E. "Probability and Statistics". Pearson Education India, 5th Edition (2015). ISBN: 9789332558229


**Online Resources:**https://www.khanacademy.org/math/statistics-probability

## 6. Course Assessment Pattern (Theory courses):

| **Bloom's Category** | | **Evaluations out of 100 marks** | | | |
|---|---|---|---|---|---|
| | | **CIE (50 marks)** | | | **SEE (50marks)** |
| Cognitive learning | Affective Learning | Mid-term: (30) | Assignment/ Class Test: (10) | Attendance Marks (:10) | Written Exam: (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note: CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

A. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions, Power point Presentation,

B. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment.
Mid-Term & SEE. Project evaluation & Viva

# B. Basic Science Courses

**Course Code: PHY-1101 Course Title: Physics I (Mechanics, Waves and Thermodynamics)**
**Credit Hours: 3 Contact Hours: 3 per Week**

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Physics' in regard to the dynamics of rigid body, gravity and gravitation, elasticity, surface tension, fluid dynamics and viscosity, waves and oscillations, thermodynamics and optics.

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Understand some fundamental laws and theorem of physics. | PLO-1 | Cognitive/Understand |
| CLO-2 | Apply mathematical knowledge to formulate and solve engineering problems. | PLO-2 | Cognitive/Apply |

**Section –A (Mid-term Exam: 30 Marks)**

1. **Dynamics of Rigid Body:** Linear motion of a body as function of time, position and velocity, momentum, conservation theorem of momentum and energy, collision and torque, center of mass of rigid body, rotational kinetic energy, fly wheel, axes theorems and their applications.
2. **Gravity and Gravitation:** Definitions, compound pendulum, gravitational potentials and fields and relation between them, potential due to spherical shell, escape velocity and Kepler's law of planetary motion.
3. **Elasticity:** Hooke's law, relation between different elastic constants, bending of beams, cantilever, determination of Young's modulus and its engineering applications.

**Section- B (SEE: 50 Marks)**

**Group- A (20-Marks)**

4. **Surface Tension:** Definitions, cohesion, adhesion and molecular range, molecular theory of surface tension, capillarity, angle of contact, expression for surface tension, relation between surface energy and surface tension.
5. **Fluid Dynamics and Viscosity:** Streamline and turbulent motion, equation of continuity, energy of a liquid in motion, Bernoulli's theorem, viscosity, coefficient of viscosity, Stoke's law.

**Group-B (30 Marks)**

6. **Waves and Oscillations:** Waves in elastic media, standing waves, Sound waves, beats and Doppler's effect in sound, simple harmonic motions, total energy and average energy, damped and forced vibration, resonance.
7. **Thermodynamics:** Thermodynamic system, first and second law of thermodynamics and their applications, the thermodynamic temperature scale, Carnot's heat engine, the efficiency of engine, combined first and second law of thermodynamics, entropy and refrigerator.
8. **Optics:** Theories of light, interference of light, Young's double slit experiment, Fresnel and Fraunhoffer diffraction, diffraction of single slit, polarization of light, Production and analysis of polarized light, Brewster's law, Malu's law.

**Recommended Reference:**


1. R. Resnick and D. Halliday, K. S. Krane, ***Physics (Volume I)***, *5th edition*, New Delhi: Wiley Eastern Private Ltd., 2014, p. 546.
2. Brij Lal & Subrahmanyam, ***Properties of matter***, 15th edition, Eurasia publishing house (Pvt.) Ltd, New Delhi, 2007, p. 574.
3. Brij Lal & Subrahmanyam, ***Heat and Thermodynamics***, 9th edition, S. Chand & Company Ltd, New Delhi, 2007, p. 453.
4. Brij Lal & Subrahmanyam, ***A text book of Optics***, 11th edition, S. Chand & Company Ltd, New Delhi, 2003, p. 668.
5. D.S Mathur, ***Elements of Properties of matter***, 27th edition. Shyamlal Charitable Trust, New Delhi, 2009, p.413.
6. Dr. G. Ahmed, ***Physics for Engineers-I***, 1st ed. Dhaka: Hafiz Book Centre, 2009, p. 910.

## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination. Project evaluation & Viva

**Course Code: PHY-1201** **Course Title: Physics II (Electromagnetism, Optics and Modern Physics)**

**Credit Hours:3** **Contact Hours**: **3 per Week**

[Pre requisite: PHY-1101]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Physics' in regards to charge and electric potential, magnetic field, electromagnetic induction, current and resistance, structure of matter, relativity, modern physics and radioactivity

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO -1 | Identify the basic knowledge of different areas of physics as well as engineering aspect. | PLO-2 | Cognitive/ Analyzing, |
| CLO -2 | Design solution for physics problems that meet the specified needs for public health and safety, societal and environmental concerns. | PLO-3 | Cognitive/ Evaluating |

**Section –A (Mid-term Exam: 30 Marks)**

1. **Charge and Electric Potential**: Electric charge, conductors and insulators, Coulomb's law, electric field, Electric field strength, Gauss's law and its applications, electric potential and potential function, electric dipole, dielectrics in Gauss' law.
2. **Magnetic Field:** The definition of magnetic field **B,** magnetic force on charge and current, Ampere's law, Biot-Savart law and their application, Lorentz force and its application in CRT.
3. **Electromagnetic Induction:** Faraday's law of electro-magnetic induction, Lenz's law, self and mutual induction, energy density in the magnetic field.

**Section- B (SEE: 50 Marks)**

**Group- A (20-Marks)**

4. **Current and Resistance:** Current and current density, Ohm's law, potential difference, RC circuits, generation of alternating current and e.m.f.
5. **Structure of Matter:** Crystalline and non-crystalline solid, single crystal and polycrystalline solids, unit cell, bonds in solids, inter atomic distances, calculation of cohesive and bonding energy.

**Group-B (30 Marks)**

6. **Relativity:** Postulates of special theory of relativity, Lorentz transformation, time dilation and length contraction, relativity of mass, energy-mass relation, energy- momentum relation**.**
7. **Modern Physics**: Bohr"s atomic model, radius and energy of Hydrogen atom, atomic nucleus and binding energy, photo-electric effect, Compton effect, De-Broglie waves, X-ray diffraction, atomic spectra and Zeeman effect.
8. **Radioactivity:** Definition, radioactive decay laws, half-life, mean life, alpha decay, beta decay, gamma decay, cross section, nuclear fission & fusion.

**Recommended Reference:**


1. M.C.Saxena, V.P. Arora, and S. Prakash, ***Electricity and Magnetism***, 15th ed. Meerut: Progoti Prokashon, 1972.
2. A.K. Rafiqullah, M.S. Huq, and A. K. Roy, ***Concept of Electricity and Magnetism***, Dacca: Student's Publications, 1969
3. B. Lal and N. Subrahmanyam, ***Atomic and Nuclear Physics***, New Delhi: S. Chand and Company Ltd., 1984.
4. B. Lal and N. Subrahmanyam, ***A text book of Optics***, New Delhi: S. Chand and CompanyLtd., 1966.
5. R. Resnick and D. Halliday, ***Physics (Part II)***, New Delhi: Wiley Eastern Private Ltd., 1960, p. 1214.
6. A. Beiser, ***Concepts of Modern Physics***, 6thed. New Delhi: TATA Mc.GR-HILL EDITION, 1963.
7. B.L Theraja, **Modern *Physics***, New Delhi: S. Chand and Company Ltd., 1985.
8. G. Ahmed, ***Physics for Engineers-II***, 1st ed. Dhaka: Hafiz Book Centre, 2009.
9. S. Prakash, ***Relativistic Mechanics***, Meerut: Pragati, Prakashan, 2000.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination. Project evaluation & Viva

**Course Code: PHY-1204** **Course Title: Physics Sessional**
**Credit Hours: 1.5** **Contact Hours: 3 Contact hours per Week**

**Objectives**: In this, students will perform experiments to verify practically the theories and concepts develop in PHY1201.

| S/N | **Course Learning Outcomes (COs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Demonstrate an ability to make physical measurements and report writing | PLO-1 | Cognitive/ Applying |
| CLO-2 | Demonstrate the ability to use experimental statistics to determine the precision of a series of measurements. | PLO-2, | Cognitive/ Analyzing, |
| CLO-3 | Conductexperiments on resistivity measurement and report writing | PLLO-4 | Psychomotor/ Manipulation |

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: CHEM-2301** **Course Title: Chemistry**
**Credit Hours:3** **Contact Hours: 3 per Week**

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** The objective of this course is

1. Toclassify matter by its state and bonding behavior using the Periodic Table as a reference.
2. Tomake predictions about the atomic structure and chemical properties of the elements based in their position in the periodic table.
3. To identify the patterns in bonding, molecular geometry, and chemical reactions.
4. Tounderstand the principles of kinetics and thermodynamics as applied to the rates and equilibrium positions of chemical reactions.
5. Touse quantitative measures of solution concentration in describing colligative, acid-base, solubility, and electrochemical principles of aqueous solutions.
6. To apply quantitative reasoning skills to determine quantities of matter and energy involved in physical and chemical changes.
7. To explain the physical properties of solids, liquids, gases, and solutions.

| S/N | **Course Outcomes (COs):** Upon the successful completion of the course, students will be able to | Corresponding POs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CO-1 | Develop the chemical engineering idea and understanding of the chemical behavior, physical properties of the common substances. | PLO-1 | Cognitive/ Understanding |
| CO-2 | Demonstrate the basic proficiency to solve the chemical problems and discussing the interactions between matter and energy at the atomic and molecular levels. | PLO-2 | Cognitive/ Analyzing |

**Section –A (Mid-term Exam: 30 Marks)**

1. **Periodic Classification of Elements:** Modern periodic table, Periodic law, Periodic system, Correlation ofAtomic structure with periodic properties of elements, Ionization potential, Electron affinity, Electronegativity, Atomic and ionic radii, Properties of oxides.
2. **Electronic Theory of Elements:** Different types of bonds, ionic, covalent, co-ordinate and hybridization of atomic orbitals, bonding in simple molecules, Elementary idea about MOT.
3. **Chemistry of Transition Elements, Lanthanides and Actinides:** Definitions, Electronic configurations, general properties.

**Section-B (SEE -50 Marks)**

**Group-A (20 Marks)**

**4. Electrochemistry:** Electrolytic dissociation, Theory of electrolytic conductance. Ionic mobility and transference number, Simple ideas about electrode potential and reversible cells.

5. **Types and properties of solutions:** Units of concentration, ideal and real solutions, Henry's Law, Distribution of solids between two immiscible liquids, Distribution law, Partition coefficient and solvent extraction, Properties of dilute solutions.

**Group-B (30 Marks)**

**6. Chemical Equilibrium:** Law of mass action, Determination of equilibrium constant, heterogeneous and homogeneous equilibrium, Le Chateilar principle and Van Hoff equation.

**7. Chemical Kinetics:** Order and molecularity kinetics of first and second order reaction, Determination of order of reactions, Arrhenius equation and energy of activation,

**8. Surface Chemistry and Colloids:** Adsorption, Langmuir and Gibbs adsorption isotherm, Colloids, Definitions of terms, Electrodialysis, Classification, Preparation and properties of colloids, Elementary idea about emulsions and gels. Importance of colloids,

**Recommended Reference:**


1. R. D. Madan, ***Modern Inorganic Chemistry***, Rev. ed., India: New Delhi, S. Chand Publications, 2014.
2. S. Z. Haider, ***Introduction to Modern Inorganic Chemistry***, 3 rd ed., Bangladesh: Dhaka, EdexcelPublications, 2008.
3. Arun Bhal, B. S. Bhal & G. D Tuli***, Essentials of Physical Chemistry***, India: New Delhi, S. ChandPublications, 2010.
4. M. Mahbubul Hoque & M. Ali Nawab, ***Principles of Physical Chemistry***, Fully Rev. ed., Bangladesh:Dhaka, Nawab Publications, 2005.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution,

Mid-Term &Semester end examination. Project evaluation & Viva

**Course Code: CHEM-2304** **Course Title: Chemistry Sessional**
**Credit Hours: 1.5** **Contact Hours: 3 per Week**
**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. Activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **( SEE)**

**Objectives:**

1. Describe processes and procedures used in the scientific method.
2. Differentiate terms such as observation, hypothesis, data, conclusion, theory, precision and accuracy.
3. Balance simple chemical reactions.
4. Perform basic stoichiometric calculations to determine the quantity of products given various quantities of reactants.
5. Use quantitative measures of solution in different units of concentration.
6. Apply quantitative reasoning skills to determine quantities of matter and energy involved in physical and chemical changes.
7. Explain the physical properties of solids, liquids, gases, and solutions.

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Developing the knowledge in effective laboratory procedures such as transfer of solids, weighing of solids, pouring of liquids and measurement of liquid volume and solving the quantitative problems (stoichiometric involving chemical formulas and equations. | PLO-2 | Cognitive/ Analyzing, |
| CLO-2 | Investigate complex problems related to molarity normality to Calculate the different units of concentration of solution such as molarity, normality, molality etc. and summarize the results of experimental observations and data. | PLO-4 | Cognitive/ Analyzing |
| CLO-3 | Communicate effectively about experiment, write effective reports and make effective presentation in the lab classes. | PLO-10 | Affective/ Responding |

**Recommended Reference:**


1. John Mendham & Arthur Vogel, ***Vogel's Textbook of Quantitative Chemical Analysis***, Harlow: Prentice Hall, 2000. [Online]. Available: worldcat.org.
2. Robert De. Levie, ***Principles of Quantitative Chemical Analysis***, Rev. ed., America: New York, McGraw-Hill, 1997.
3. S. K. S. Hazari, ***Principles Qualitative and Quantitative Chemical Analysis***, Rev. ed., Bangladesh: Dhaka, Brothers Publications, 2010.


**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination**(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

# C. Engineering Core Courses

**Course Code: CSE-1105** **Course Title: Computer Programming I**
**Credit Hours:2** **Contact Hours: 2 per Week**

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:**

1. To gain experience about structured programming
2. To help students to understand the implementation of C language
3. To understand various features in C

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Demonstrate an understanding of basic programming in C, Programming style, variables and data types. | PLO-1 | Cognitive/ understanding |
| CLO-2 | Apply basic programming laws and rules to complex cases like; Logical expressions and control constructs: if-else, switch, arithmetic. | PLO-3 | Cognitive/ Applying |
| CLO-3 | Analyze basic terms like: Sorting, Searching and Geometric. | PLO-3 | Cognitive/Analyzing |

**Section-A (Mid-term Exam: 30 Marks)**

1. **Introduction to digital Computers:** Basic organization and functional units of computer – Input, Output, Memory and Central Processing Unit; Different number systems & their conversion; Basic concepts of logic gates, truth table.
2. **Computer Programming**: Definition of software, its classification; Problem solving steps; Flow charts; **Introduction of C**: history and Characteristics of C, Identifiers and keywords, data types, constants, variables, statements, symbolic constant
3. **Operators**: arithmetic, unary, relational, logical, assignment, conditional operators; precedence of operators, expressions, type conversions, bitwise operations.
   **Input and Output**: Managing data input (scanf, getchar, gets etc), Managing data output (printf, putchar, puts etc), formatted input and output

**Section-B (SEE: 50 Marks)**

**Group-A (20 Marks)**

4. **Control statements:** Branching- *If* and *if… else* statements, nested if, *switch statement*; Looping- *while*, *do…while* and *for* looping statements, Jumps in loops, g*oto* statement, *break* and *continue statement.*
5. **Function:** defining a function, accessing a function, function prototypes, passing arguments to a function, Recursions, Storage class

**Group-B (30 Marks)**

6. **Array:** defining an array, processing an array, passing arrays to functions, Multidimensional array, String, Array of Strings;
7. **Structure**: defining a structure, processing a structure, structure and pointers, passing structures to functions, self-referential structure, Union, Enumeration
8. **Pointers**: pointer declarations, operations on pointers, Pointers and arrays, Pointers and functions, Dynamic memory allocation
   **File**: opening and closing a file, creating a file, processing a file

**Recommended Reference:**

1. Gottfried, B, ***Schaum's Outline of theory and problems of programming with C***, 4th ed, New York: McGraw-Hill, 2007.

2. Kernighan, B. and Ritchie, D, ***The C programming language***,4th ed, United States, Englewood Cliffs, N.J.: Prentice-Hall,1988.
3. Schildt, H, ***Turbo C/C++***, 3rd ed, United States, Berkeley: McGraw-Hill, 1992.
4. Balagurusamy, E, ***Programming in ANSI C***,6th ed, India, Tata McGraw-Hill Education, 2002.
5. Schildt, H., ***Teach Yourself C***, 3rd ed, United States, Tata McGraw-Hill Education, 1998.
6. Lafore, R, ***C Programming using Turbo C++,*** 4th ed, United States, Sam's Publication, 1993.


**A Sample Question Assessment Pattern (Theory courses):**

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:** **CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: CSE-1106** **Course Title: Computer Programming I Sessional**
**Credit Hour**:**1** **Contact Hour: 2 per week**
**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. Activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE)**

**Objectives**: In this course students will learn programming using basic "C programming software" and perform the applications of the theories learned in CSE-1105 course.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | **Apply** the fundamental Basic essential concepts, programming style, rules of data types etc. in practical engineering. | PLO1 | Cognitive/ Applying |
| CLO-2 | **Design** and conduct algorithm, as well as to analyze and Logical expressions. | PLO3 | Cognitive/ Creating |
| CLO-3 | Enhance programming **skills** and understanding of techniques for engineering career. | PLO3 | Psychomotor / Manipulation |

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance

**(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination**(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: CSE-1205** **Course Title: Computer Programming II**
**Credit Hours: 2** **Contact Hours: 2 per Week**
[Prerequisite: CSE-1105]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Course Objectives:**

1. Be familiar with basic techniques of algorithm analysis.
2. Be familiar with writing recursive methods.
3. Master the implementation of linked data structures such as linked lists and binary trees.
4. Be familiar with advanced data structures such as balanced search trees, hash tables, priority queues and the disjoint set union/find data structure.
5. Be familiar with several sub-quadratic sorting algorithms including quicksort, merge sort and heapsort.
6. Be familiar with some graph algorithms such as shortest path and minimum spanning tree.
7. Master analyzing problems and writing program solutions to problems using the above techniques

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding POLs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Demonstrate an **understanding** of Basic object-oriented programming. | PLO-1 | Cognitive/ Understanding |
| CLO-2 | **Apply** basic object-oriented programming laws and rules to complex cases like; Logical expressions and control constructs. | PLO-2 | Cognitive/ Applying |
| CLO-3 | **Analyze** basic terms like: Sorting, Searching and Geometric. | PLO-2 | Cognitive/ Analyzing |

**Section-A (Mid-term: 30 Marks)**

**1. Introduction:**Definition of OOP, Introduction to Classes and Objects, Basic concept of Object Oriented Programming, Difference between Structured Programming and Object Oriented Programming, Benefits of OOP, Characteristics of Object Oriented Programming and Application of Object Oriented Programming.

2. **Class & Object:**Constructor and Destructor, Constructors with parameters, In-line functions, Automatic in-line functions, passing objects to functions, Returning objects from function, Friend functions.

3. **Function Overloading:** Overloading function, Constructor Overloading, copy constructor, Default arguments, Overloading ambiguity

**Section-B (SEE: 50 Marks)**
**Group-A (20 Marks)**

4. **Operator Overloading**: Binary operator overloading, Unary operator overloading, Operator overloading using friend functions, Limitations of operator overloading.

5. **Inheritance:**Defining derived classes, Single inheritance, multiple inheritance, multilevel inheritance, Hierarchical inheritance, Virtual base classes.

**Group-B (30 Marks)**

6. **C++ I/O System:**Streams, Unformatted I/O, formatted I/O, I/O manipulators, File I/O streams, Opening and closing files.

7. **Virtual Functions:**Applying Polymorphism using virtual functions, Pure Virtual functions, Abstract classes, early binding, and late binding.

**8. Template, Exception Handling and Standard Template Library:**Generic functions, Generic classes, Exception handling, Structure of STL, Generic Containers (C++ string class, vector, deque, list, stack, queue, priority queue, pair, map etc.), Generic Algorithms (find, binary search, sort etc.).

**Recommended Reference:**


1. Schildt,H, ***Turbo C++,***3rd ed, United States, Berkeley: McGraw-Hill, 2012.
2. Balagurusamy, E, ***Object-Oriented Programming with C++,*** 3rd ed, India, Tata McGraw-Hill Education, 2013.
3. Schildt, H, ***Teach Yourself C++***,3rd ed, United States, Tata McGraw-Hill Education, 2008.
4. Lafore, R, ***Object Oriented Programming in C++,***3rd ed, United States, Sam's Publication, 2002.


**A Sample Question Assessment Pattern (Theory courses):**

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: CSE-1206** **Course Title: Computer Programming II Sessional**
**Credit Hours: 1** **Contact Hours: 2per week**

**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE)**

**Objective:** In this course students will learn programming using advance programming software and perform the use of the concepts learned in CSE-1205 course.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | **Apply** the fundamental basics of object-oriented programming essential concepts, programming style, rules of data types etc. in practical engineering program. | PLO-1 | Cognitive/ Applying |
| CLO-2 | **Design** algorithm to analyze logical expressions. | PLO-3 | Cognitive/ Creating |
| CLO-3 | Enhance programming **skills** to solve engineering problems. | PLO-2 | Psychomotor / Manipulation |

**Recommended Reference:**


1. Schildt,H, ***Turbo C++,***3rd ed, United States, Berkeley: McGraw-Hill, 2012.
2. Balagurusamy, E, ***Object-Oriented Programming with C++***, 3rd ed, India, Tata McGraw-Hill Education, 2013.
3. Schildt, H, ***Teach Yourself C++***,3rd ed, United States, Tata McGraw-Hill Education, 2008.
4. Lafore, R, ***Object Oriented Programming in C++***,3rd ed, United States, Sam's Publication, 2002.


**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: ME-2301** **Course Title: Fundamental of Mechanical Engineering**
**Credit Hours:2** **Contact Hours: 2 per Week**

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:**

1. To familiarize with fluid properties and measuring the loss of head flowing through pipes.
2. To understand the application of Bernoulli's equation.
3. Introducing different parts and types of IC engine along with maintenance factors.
4. To learn the basic terms of thermodynamics.
5. To familiar and design Refrigeration & Air conditioning System with applications.
6. To learn different Turbines functions and principles.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|

| | | | |
|---|---|---|---|
| CLO -1 | Achieve current **knowledge**, ideas and the conceptual framework of Mechanical engineering. | PLO-1 | Cognitive/ Understanding |
| CLO -2 | Demonstrate proficiency in solving basic mechanical Engine design problems. | PLO-2 | Cognitive/ Evaluating |
| CLO -3 | Design of basic Mechanical Engine for application specific troubleshooting, identifying problem and providing solution for the sustainable development of the society. | PLO-3 | Cognitive/ Analyzing |

**Section –A (Mid-term Exam: 30 Marks)**

1. **Properties of fluid:** Specific weight, Newton's law of viscosity, Compressibility and bulk modulus.
2. **Fluid Statics and Fluid kinematics:** Equilibrium of Floating Bodies, Forces on submerged planes impulse momentum principals, Types of Fluid Flow, Types of Flow Lines,Continuity Equation.
3. **Fluid Pressure and its Measurement:** Pascal's law, Manometer, Mechanical gauge. **Bernoulli's Equation:** Energy of a Liquid Motion, Practical Applications of Bernoulli's Equation. **Fluid Flow in Pipes:** Darcy's Formula, Chezy's Formula

**Section-B (SEE -50 Marks)**

**Group-A (20 Marks)**

4. **Power plant:** Vapor compression cycle, Rankine cycle,Brayton cycle Turbine, Boiler
5. **Thermodynamics basics:** Thermodynamics 1st and 2nd law, Entropy, Carnot cycle

**Group-B (30 Marks)**

6. **Refrigeration and air conditioning with their application:** Refrigeration system and cycle, heat exchanger and split type AC.
7. **Study of SI and CI engines:** Structure and analysis of SI & CI Engine, Cycle analysis
8. **Heat transfer:** Conduction, Convection, Radiation

**Recommended Reference:**


1. R. K. Rajput, ***Fluid Mechanics. And. Hydraulic Machines. (In S.I. Units)***, 4th ed., India, S. Chand & Company Ltd, 2012.
2. Michael A. Boles and Yungus A. Cengel, ***Thermodynamics: An Engineering Approach,*** 6th ed, USA, McGraw-Hill Education, 2009.
3. YUNUS A. ÇENGEL, ***Heat and Mass Transfer: Fundamentals and Applications,*** 6th ed, USA, McGraw-Hill Education, 2020.
4. R.S. Khurmi and J.K Gupta., ***A Textbook of Refrigeration and Air Conditioning,*** 12th ed, India, S. Chand & Company Ltd, 2006.
5. P. K. Nag, ***Power Plant Engineering,*** 4th ed, India, McGraw-Hill Education, 2015


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: CE-1204** **Course Title: Engineering Drawing Sessional**
**Credit Hours: 1** **Contact Hours: 2 per We**

**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **( SEE).**

**Objectives:** In this course student will learn to sketch (technical) the different view of an object and also learn CAD.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Understand the importance of ISO Standards in Engineering Drawing, lettering and Dimensioning. | PLO-1 | Cognitive/ Understanding |
| CLO-2 | Perform basic sketching techniques (2D & 3D) will improve through exercises in Orthographic Projection, isometric, sectional, and perspective drawing. | PLO-3 | Psychomotor / Manipulation |
| CLO-3 | Use extracts information from drawings and geometric models to solve Engineering Drawing problems. | PLO-2 | Psychomotor / Manipulation |
| CLO-4 | Investigate and extract the information from sketching and technical drawings. | PLO-4 | Cognitive/ Analyzing |

1. **Introduction orthographic projection**: Scale drawing, Sectional view, Top and side view Isometric views, Missing line, Auxiliary view, Pictorial views.
2. **Drawing standard and practices:** Interpenetrating of surface, Development of surfaces, Machine drawings, and Technical sketching.
3. **Introduction to Computer Aided Design (CAD):** Project on Engineering Drawing and CAD using Contemporary packages in engineering drawing.

**Recommended Reference:**

1. K. Venkata Reddy,**Textbook of Engineering Drawing**, 2nd ed., India: BS Publications, 2009.
2. Amalesh Chandra Mandal, Md. Quamrul Islam., **Mechanical engineering drawing**, 1st ed., Bangladesh, Associates Printing press, 2007.

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

# D. EEE Core Courses

**Course Code: EEE-1101** **Course Title: Electrical Circuits I**
**Credit Hours: 3** **Contact Hours: 3 per Week**

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Electrical Circuit' in regard to comprehensive idea of circuit variables and elements, simple resistive circuits, techniques of circuit analysis, network theorems, maximum power theorem, energy storage elements, magnetic quantities and magnetic circuits.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Reflect a basic understanding on current, voltage, energy, power, sources, and circuit element in a dc circuit, various network theorems, dc responses reactive circuit elements and magnetic circuits. | PLO-1 | Cognitive/ Understanding |
| CLO-2 | Apply various circuital laws, network theorems for solving dc circuits. They will also be able to solve problems related to dc response of reactive elements and magnetic circuits. | PLO-2 | Cognitive/ Applying |

**Section-A (Mid-term Exam: 30 Marks)**

1. **Circuit variables and elements:** Voltage, current, power, energy, independent and dependent sources, and resistance., Kirchhoff‟s current and voltage laws. Ammeter, voltmeter & other meters.
2. **Simple resistive circuits**: Series and parallel circuits, voltage and current division, wye-delta transformation.
3. **Techniques of circuit analysis**: Mesh and node circuit analysis including super node and super mesh. Reduction of complicated networks.

**Section-B (SEE: 50 Marks)**

**Group-A (20-Marks)**

4. **Network theorems I:** Source transformation and superposition theorem with applications in circuits having independent and dependent sources. Millman‟s theorem and reciprocity theorem.
5. **Network theorems II:** Thevenin's theorem and Norton's theorem with applications in circuits having independent and dependent sources. Maximum power transfer theorem.

**Group-B (30-Marks)**

6. **Energy storage elements**: Inductors and capacitors, series parallel combination of inductors and capacitors. Transient responses of R-L and R-C circuits.
7. **Magnetic quantities and variables**: Flux, permeability and reluctance, magnetic field strength, magnetic potential, flux density, magnetization curve.
8. **Magnetic circuits**: Laws in magnetic circuits: Ohm's law and Ampere's circuital law. Series, Parallel and series-parallel circuits analysis.

**Recommended Reference:**


1. James W. Nilsson, Susan A. Riedel, Electric Circuits, 10th ed., USA, Prentice Hall, 2015
2. Charles K. Alexander, Matthew N. O. Sadiku., Fundamental of Electric Circuits, 4th ed., McGraw Hill, 2004
3. Robert L. Boylestad, Introductory circuit analysis, Prentice Hall, 10th ed, 2002
4. Theraja, B. L., and A. K. Theraja., ***A textbook of Electrical Technology in SI Units***., S. Chand and Co., 2006.

## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note: CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination. Project evaluation & Viva

**Course Code: EEE-1102** **Course Title: Electrical Circuit I Sessional**
**Credit Hours: 1.5** **Contact Hours: 3 per Week**

**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. Activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **( SEE)**

**Objective**: In this course students will perform experiments to verify practically about the theories learned in the course **EEE-1101**.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Understand series-parallel circuit connection in a bread board and able to measure voltage, current, and resistance of the circuit elements using multi-meter. | PLO-1 | Cognitive/ Understanding |
| CLO-2 | Verify various network theorems and apply those theorems for solving complicated networks. | PLO-2 | Cognitive/ Evaluating, |
| CLO-3 | Develop writing and communication skill. | PLO-10 | Affective/ Responding |

**Recommended Reference:**


1. James W. Nilsson, Susan A. Riedel, Electric Circuits, 10th ed., USA, Prentice Hall, 2015
2. Charles K. Alexander, Matthew N. O. Sadiku., Fundamental of Electric Circuits, 4th ed., McGraw Hill, 2004
3. Robert L. Boylestad, Introductory circuit analysis, Prentice Hall, 10th ed, 2002


**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,
B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: EEE-1201** **Course Title: Electrical Circuits II**
**Credit Hours: 3** **Contact Hours: 3 per Week**
[Prerequisite: EEE-1101]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Electric Circuit' in regards to comprehensive idea about alternating current, magnetically coupled circuits, three phases balanced and unbalanced load, resonance, filter, a.c. transients and two port analysis

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Reflect a basic understanding of alternating current waveforms, phase shifting, impedance, power factor, impedance and phasor diagram, circuit theorems for solving series-parallel circuits, poly phase system, magnetic coupling, resonance, and two port networks. | PLO-1 | Cognitive'/ Understanding |
| CLO-2 | Apply complex variable, various circuit rules and theorems for solving complex series parallel networks. | PLO-2 | Cognitive/ Analyzing |
| CLO-3 | Design various series-parallel resonant circuits, passive filters, and two port networks. | PLO-3 | Cognitive/ Creating |

**Section-A (Mid-term Exam: 30 Marks)**

1. **Sinusoidal functions**: AC theory, instantaneous current, voltage, power, effective current and voltage, average power, Use of complex quantities in AC circuits
2. **Phasors and complex quantities**: Impedance, real and reactive power, power factor, Vector diagram.
3. **Analysis of single-phase AC circuits:** Series and parallel RL and RC circuits. nodal and mesh analysis, application of network theorems.

**Section-B (SEE: 50 Marks)**

**Group-A (20-Marks)**

4. **Resonance and Passive filters**: Series and parallel RLC resonance circuits'-value and band width, Properties of Symmetrical networks, Filter fundamentals, Low, High, Band pass and Band stop Filters. Band width and cut-off frequency, Double tuned filter, Design conditions and Uses. Bode plots.
5. **Magnetically coupled circuits:** Conductive, Capacitive and Magnetic Coupling, Coefficient of Coupling.

**Group-B (30-Marks)**

6. **Polyphase systems**: The three-phase generator, The Y-connected generator and load, the Wye-Delta system, The Delta connected generator and load, Delta-Delta and Delta-Wye three phase system.
7. **Balanced and unbalanced three phase circuit analysis**: The three and two wattmeter methods, unbalanced three –phase four-wire Y-connected load, unbalanced three-phase three wire Y-connected load.
8. **Two-port analysis**: Impedance parameters, Voltage gains, Current gains, Cascaded systems, admittance parameters, Hybrid parameters.

**Recommended Reference:**

1. Corcoran, George Francis, and Henry Rouse Reed. ***Introductory electrical engineering***. Wiley, 1957.

2. Alexander, Charles K., and Matthew NO Sadiku. ***Fundamentals of electric circuits***. McGraw-Hill Education, 2000.
3. Boylestad, Robert L., and Louis Nashelsky. ***Electronic devices and circuit theory***. Prentice Hall, 2012.

**A Sample Question Assessment Pattern (Theory courses):**

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-1202 Course Title: Electrical Circuit II Sessional and Electrical workshop**
**Credit Hours: 1.5 Contact Hours: 3 per we**ek
**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE)**

**Objective:** In this course students will perform experiments to verify practically about the theories learned in the course **EEE-1201.**

| S/N | **Course Learning Outcomes (COs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Reflect a basic understanding of alternating current waveform, phase shifting, impedance, power factor, impedance and phasor diagram, circuit theorems for solving series-parallel circuits, poly phase system and resonance. | PLO-1 | Cognitive/Applying |
| CLo-2 | An ability to solve complex series parallel networks to determine current, voltage, power, phasor, and impedance diagram. | PLO-2 | Cognitive/Evaluating |
| CLO-3 | Develop writing and communication skill | PLO-10 | Affective/Responding |

**Recommended Reference:**

1. Corcoran, George Francis, and Henry Rouse Reed. ***Introductory electrical engineering***. Wiley, 1957.
2. Alexander, Charles K., and Matthew NO Sadiku. ***Fundamentals of electric circuits***. McGraw-

Hill Education, 2000.
3. Boylestad, Robert L., and Louis Nashelsky. ***Electronic devices and circuit theory***. Prentice Hall, 2012.

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: EEE-2301** **Course Title: Electronics I**
**Credit Hours: 3** **Contact Hours: 3 per Week**
[Prerequisite: EEE-1201]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Electronics' in regards to the working principle and characteristics of semiconductor diodes and transistors, BJT, MOSFET, Differential and multistage amplifiers.

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Knowledge of basic semiconductor device such as PN junction and Zener diode, BJT, FET, MOSFET, modeling of diodes, field-effect and bipolar junction transistors and different amplifier circuit. | PLO-1 | Cognitive/ Remembering |
| CLO-2 | Problem solving of different types of electronic circuit consisting of diode, BJT, FET, transistor amplifiers as discrete and integrated devices. | PLO-2 | Cognitive/ Analyzing |
| CLO-3 | Design and modeling of BJT, FET, MOSFET, differential and simple amplifier circuits and their small signal, large signal and frequency response performance. | PLO-3 | Cognitive/ Creating |

**Section-A (Mid-term Exam: 30 Marks)**

1. **Semiconductor Diodes**: Intrinsic and extrinsic semiconductors, N and P type semiconductor, current-voltage characteristics of a PN junction diode. Simplified dc and ac diode models, dynamic resistance and capacitance.
2. **Diode Circuits**: Half wave and full wave rectifiers, rectifiers with filter capacitor, Voltage doubler, Clippers and clampers circuits. Zener diode and Voltage regulators.
3. **Bipolar Junction Transistors**: Working principle of PNP and NPN transistor, Input and output characteristics of CB, CE, and CC configuration, Load line analysis, Operating point, cutoff and saturation points, Transistor as an amplifier, BJT as a switch. Transistor biasing and stability factor, design of transistor biasing circuit.

**Section-B (SEE: 50 Marks)**

**Group-A (20-Marks)**

4. **Single Stage Transistor Amplifier**: Transistor equivalent circuits (both D.C and A.C). Modeling of Transistor: $r_e$-model and Hybrid equivalent Model. Small-signal analysis of BJT: Fixed biased, voltage-divider biased and Emitter-Follower Configuration.
5. **Differential and multistage amplifiers**: Description of differential amplifiers, Small-signal operation, differential and common mode gains, RC coupled, Transformer coupled, and Direct Coupled amplifier.

**Group-B (30-Marks)**

6. **Field-Effect Transistors (FET)**: Construction and classification, Principle of operation, Characteristic curves, Channel conductivity, Channel ohmic and pinch-off region, Characteristic parameters of the FET, Effect of temperature on FET, Common source amplifier, Common drain amplifier,
7. **Metal-oxide-semiconductor field-effect-transistor(MOSFET)**: MOSFET as circuit element, structure and physical operation of an enhancement MOSFET, threshold voltage, Body effect. Current-voltage characteristics of an enhancement MOSFET, MOSFET as a switch.
8. **Biasing and Application of MOSFET**: Biasing discrete and integrated MOS amplifier circuits. VMOS, CMOS inverter. UJT.

**Recommended Reference:**


1. Adel S. Sedra & Kenneth C. Smith, ***Microelectronic Circuits***, 7th ed., USA: OXFORD UNIVERSITY PRESS, 2015.
2. Robert L. Boylestad & Louis Nashelsky, ***Electronic Devices and Circuit Theory***, 11th ed., USA: Pearson Education, Inc, 2013.
3. Ben G. Streetman & Sanjay Banerjee, ***Solid State Electronic Devices***, 6th ed., USA: Pearson Prentice Hall, 2006.
4. J. Millman & C.C Halkias, ***Electronic Devices and Circuits***, International Student ed., USA: Tata Mc-Graw Hall, 1967.
5. V.K. Mehta & Rohit Mehta, ***Principle of Electronics***, 11th ed., India: S. Chand Publishing, 2008.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:** **CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-2302** **Course Title: Electronics I Sessional**
**Credit Hours: 1.5** **Contact Hours: 3 per Week**

**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **( SEE).**

**Objective:** This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts develop in EEE-2301. In the second part, students will design simple systems using the principles learned in EEE-2301.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Reflect the understanding of basic semiconductor device such as PN junction and Zener diode, field- effect and bipolar junction transistors and different amplifier circuit. | PLO-1, | Cognitive/ Understanding |
| CLo-2 | An ability to solve complex biasing electronic circuits to determine current, voltage and analyze the voltage - current relationship. | PLO-2, | Cognitive/ Evaluating |
| CLO-3 | Develop writing and communication skill. | PLO-10 | Affective/ Responding |

**Recommended Reference:**


1. Adel S. Sedra & Kenneth C. Smith, ***Microelectronic Circuits***, 7th ed., USA: OXFORD UNIVERSITY PRESS, 2015.
2. Robert L. Boylestad & Louis Nashelsky, ***Electronic Devices and Circuit Theory***, 11th ed., USA: Pearson Education, Inc, 2013.
3. V.K. Mehta & Rohit Mehta, ***Principle of Electronics***, 11th ed., India: S. Chand Publishing, 2008.


**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: EEE-2303** **Course Title: Electrical Machine I**
**Credit Hours**: 3 **Contact Hours: 3 per Week**
[Prerequisite: EEE-1201]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course students will learn about 'Electric Machine' in regards to working principle, construction, characteristics and maintenance of different types of transformers and motors.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Reflect a basic **understanding** of Transformer. | PLO-1 | Cognitive / Understanding |
| CLO-2 | Develop the idea regarding the electrical equivalent circuit of different machines and will be able to solve related mathematical problems. | PLO-2 | Cognitive / Applying |
| CLO-3 | Demonstrate basic proficiency in building transformers and operating motors and generators. | PLO-1 | Cognitive / Understanding |

**Section-A (Mid-term Exam: 30 Marks)**

**1. Transformer**: Working principle, Construction, Types- (core type & shell type), Elementary theory for ideal transformer, E.M.F. equation, Transformation ratio, three phase transformer- (Operating principle, Different types of connection).
**2. Vector diagram and Equivalent circuit:** Transformer with losses but no magnetic leakage, Transformer with winding resistance but no magnetic leakage, Transformer with resistance and leakage reactance, Equivalent circuit of a transformer.
**3. Transformer test & Performance**: Voltage regulation, Transformer tests- (open-circuit & short-circuit test), Losses in a transformer, Efficiency & condition for maximum efficiency, Instrument transformer- (current & voltage Transformer).

**Section B (SEE: 50 Marks)**
**Group A (20 marks)**

4. **DC generators**: Working Principle of generators, Different types of DC generators, General Voltage Equation, no-load voltage characteristics and Application of DC generators. Build-up of a self-excited shunt generator, critical field resistance, load-voltage Characteristic.
**5. DC generator characteristics**: Effect of speed on no-load and load characteristics and voltage regulation. Shunt generator and compound generator. Parallel operation, winding connection of DC generator

**Group-B (30-Marks)**

**6. DC motors**: Operating differences between motors and generators, Torque, counter emf, speed and torque-speed characteristics, starting and speed regulation, Uses of DC motors.
**7. Induction motor**: Theory of operation, Advantage, Disadvantage, Construction, Production of rotating field- (two-phase & three-phase supply) & mathematical proof, Rotation principle, Slip, Frequency of rotor current.
**8. Equivalent circuit**: Induction motor as a generalized transformer, Equivalent circuit of the rotor, Equivalent circuit of the motor, Determination of $G_0$ & $B_0$, No load test, Blocked rotor test.

**Recommended Reference:**


1. B.L. Theraja & A.K Theraja, ***A Text Book of Electrical Technology (Volume II)***, 23rd ed., India, S Chand,1959.
2. Stephen J. Chapman, ***Electric Machinery Fundamentals***, 4th ed., United States, McGraw Hill,1985.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,
ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-2306** **Course Title: Numerical Techniques Sessional**
**Credit Hours: 1** **Contact Hours: 2 per Week**
**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **( SEE)**

**Objectives:** In this course students will perform experiments to verify practically about numerical methods, numerical errors calculation, solution of non-linear equation, interpolation, numerical differentiation and integration curve fitting and solution of differential equation.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Reflect a basic **understanding** of MATLAB programming and its application for various numerical techniques. | PLO-1 | Cognitive/ understanding |
| CLO-2 | **Apply** MATLAB software for programming various numerical techniques for solving various engineering problems. | PLO-2 | Cognitive/ Applying |

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).
A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,
B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: EEE-2401** **Course title: Electrical Machine II**
**Credit Hours: 3** **Contact Hours: 3 per Week**
[Prerequisite: EEE-2303]

| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
|---|---|---|---|
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Electric Machine' in regards to working principle, construction, operation of AC Machine along with their characteristics and stability.

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | **Understand** and mastery of the basic concepts operations of different types of DC, AC motors and special machines (C) | PLO-1 | Cognitive/ Understanding |
| CLO-2 | **Knowledge** of machine control and electrical drives and their applications (C) | PLO-2 | Cognitive/ Applying, |
| CLO-3 | Ability to calculate and **design** electrical machines (P) | PLO-3 | Cognitive/ Evaluate |

**Section-A (Mid-term Exam: 30 Marks)**

**1. Three-phase Induction Motor (Torque and Speed):** Relation between torque and rotor power factor, Starting torque, Condition for maximum starting torque, Effect of supply voltage on starting torque, Change in rotor EMF, frequency and reactance under running condition, Running torque, Condition for maximum running torque, Relation between torque and slip, Effect of change in supply frequency on torque and speed, Torque/Speed curve, Relation between starting torque, full load torque and maximum torque.
**2. Three-phase Induction Motor (Power output and Starter):** Power stages in an Induction motor, Gross torque and shaft torque of an Induction Motor, Relation between torque, Mechanical power and rotor output, Methods of starting Induction Motor- (Direct switching, Primary resistors and Star-delta starter).
**3. Three-phase Induction Motor (Speed Control):** Speed control of Induction Motors.
**Single-phase Induction Motor**: Construction and working principle of single phase Induction Motor, Double field revolving theory, Making single phase Induction Motor self-starting (Split phase and Capacitor start), Equivalent circuit (with and without Cu loss).

**Section-B (Semester end examination : 50 Marks)**

**Group-A (20Marks)**

**4. Synchronous Generator**: Construction, rotor speed and frequency, Single layer armature winding, Pitch factor and Distribution factor, Equation of induced EMF, excitation systems, equivalent circuit, factors affecting voltage regulation, maximum power output. Synchronous impedance, Synchronous impedance method of predicting voltage regulation and its limitations.
**5. Synchronous Generator**: Parallel operation: Necessary conditions, and Procedure of Parallel Operation.
**Synchronous Motor**: Operation, Comparison between Synchronous Motor and Induction motor,Method of starting, Power stages, Equivalent circuit, Effect of increased load with constant excitation, Effect of changing excitation on constant load, V-curves.

**Group-B (30Marks)**

**6. Universal Motor:** Introduction, Type, Construction, Operation, Speed/Load characteristics, Applications, Reversal of rotation, and Speed control.
**Permanent Magnet DC Motor:** Introduction, Construction, Operation, Properties of Permanent magnets, Types of permanent magnets used for motor, Performance, Speed control, Advantage, Disadvantage, and Application.
**Brushless DC Motor (BLDC Motor):** Introduction, Disadvantage of Brush, Advantage and Disadvantage of BLDC Motor, Application, Comparison of conventional and brushless DC motor, and Drive circuit:- (Unipolar and Bipolar).
**7. Stepper Motor:** Introduction, Advantage, Step angle, Resolution, Speed, Application, Types: - (variable reluctance, permanent magnet, hybrid), Variable Reluctance Stepper Motor: - (Construction, Full-step operation, 2-Phase ON mode, Half-step operation, and Microstepping).
**Permanent Magnet Synchronous Motors:** Introduction, Types of magnets used, Classification, Advantage and Disadvantage, Application.
**8. Synchros:** Introduction, Types, Application: - (Torque transmission, Error detection), Control differential transmitter, Control differential receiver.
**Linear Induction Motor:** Sector Induction Motor, Linear Induction Motor: - (Introduction, Construction, Operation, and Application); Magnetic levitation.

.

**Recommended Books:**


1. B.L. Thereja, A.K.Thereja, ***A text book of Electrical technology (Vol-II)***, 7th printed, India: S. Chand, 2018.
2. Rosenblat and Friedman, ***Direct and Alternating current Devices***, 10th ed., India: Pearson, 2009.
3. Stephen J. Chapman, ***Electric Machinery Fundamentals***, 04th ed., India: McGraw Hill Education, 2017.

## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| X | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-2402** **Course Title: Electrical Machine Sessional**
**Credit Hours: 1.5** **Contact Hours: 3 per Week**

**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **( SEE).**

**Objectives:** In this course students will perform experiments to verify practically about the theories learned in the course **EEE-2303 & EEE-2401.**

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CO-1 | Apply knowledge of mathematics, science, and engineering to understand the basic construction and principle of machine. | PLO-1 | Cognitive/ **Apply** |
| CLO-2 | Conduct experiments, as well as to **Analyze** and interpret data. | **PLO-4** | Psychomotor/ Manipulation |
| CLO-3 | **Communicate** effectively through report writing and presentation. | PLO-10 | Affective/ Responding |

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: EEE 2407** **Course Title: Digital Electronics**
**Credit Hours: 3** **Contact Hours: 3 per Week**
[Prerequisite: EEE-2301]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Digital Electronics' in regards to introduction to number systems, minimization of Boolean functions, implementation of basic static logic gates in CMOS and BiCMOS, power optimization of basic gates and combinational logic circuits, combinational logic with MSI and LSI, sequential Logic, counter design and register and memory unit.

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Will have knowledge on Number system, Boolean algebra and different types of Combinational and Sequential circuits. | PLO-1 | Cognitive/ Understanding |
| CLO-2 | Analyze different digital electronics circuits in terms of different systems of Boolean expression and their simplification, truth table, state table etc. | PLO-2 | Cognitive/ Analyzing |
| CLO-3 | Solve various problems related to digital electronics and design circuits like adder, comparator, converter, decoder, encoder, ROM, PLA, counter, register etc. | PLO-3 | Cognitive/ Creating |

**Section A (Mid-term Exam: 30 Marks)**

**1.Introduction to number systems:** Binary, Octal, hexadecimal Numbers, Number Base Conversions, Complements, Binary Codes, Basic logic functions, Boolean Algebra, Canonical and standard forms, BCD numbers, Digital logic gates, Digital logic families (DTL, RTL, TTL, ECL, MOS)

**2.Minimization of Boolean Functions*:*** Forms of Boolean functions, Shannon's theorem, Minimization of Boolean functions using Karnaugh map, Quine Mclusky method, Iterative consensus method, Implementation of switching functions (Using various gates: NOR, NAND, AND - OR- INVERT).

**3. Implementation of basic static logic gates in CMOS and BiCMOS:** DC characteristics, noise margin and power dissipation; Combinational Logic: Design of combinational circuits (Adders, Subtractors, Code Conversion)

**Section B (SEE: 50 Marks)**

**Group A (20 marks)**

**4. Power optimization of basic gates and combinational logic circuits:** Modular combinational Circuit Design; pass transistor, pass gate, Half adder, Full adder, multiplexer, demultiplexer and their implementation in CMOS.

**5. Combinational logic with MSI and LSI:** Difference between combinational circuits and sequential circuits, Decoder, encoder, comparators, binary arithmetic elements and ALU design; Programmable logic devices: logic arrays, field programmable logic arrays and programmable read only memory.

**Group B (30 Marks)**

**6. Sequential Logic:** Difference between combinational circuits and sequential circuits, Types of sequential circuit, Flip-Flops (Basic flip-flop circuit, clocked RS flip-flop, D flip-flop, JK flip-flop, T flip-flop), Triggering of Flip-flop, Analysis of clocked sequential circuits (state table, state diagram, state equations), state reduction, state assignment.

**7.Counter Design:** Types of counters, Design of synchronous and asynchronous counter, MOD number, Propagation delay in Ripple counter, Ring counter, The Johnson Counter, Asynchronous down counter, Digital clock.

**8.Register and Memory unit*:*** Basic shift register, Serial In/Serial out shift registers, Serial In/Parallel out shift register, Parallel In/Serial out shift register, Bidirectional shift register, Integrated circuit memory, Magnetic-core memory.

**Recommended Reference:**


4. M. Morris Mano, ***Digital Logic and Computer Design***, 7th printed, India: Pearson, 2018.
5. Ronald J. Tocci, ***Digital Systems: Principles and Applications***, 10th ed., India: Pearson, 2009.
6. Thomas L. Floyd, ***Digital Fundamentals***, 11th ed., India: Pearson, 2017.
7. Mozammel Haque Azad Khan, ***Digital Logic Design***, 1st ed., Bangladesh: Bangladesh University Monjuri Commission, 2006.
8. Stephen Brown & Zvonko Vranesic, ***Fundamentals of Digital Logic with Verilog Design***, 3rd ed., India: McGraw Hill Education, 2013.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination. Project evaluation & Viva

**Course Code: EEE-2408** **Course Title: Digital Electronics Sessional**
**Credit Hours: 1.5** **Contact Hours: 3 per Week**

**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE).**

**Objectives:** This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts developed in EEE-2407. In the second part, students will design simple systems using the principles learned in EEE-2407.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Reflect a basic **understanding** of digital logic gate and Ics. | PLO-2 | Cognitive/ Understanding |
| CLO-2 | **Design** of different combinational and sequential logic circuits through **simulation** and implementation using digital Ics. | PLO-3 | Psychomotor/ Precision |
| CLO-3 | **Apply** the necessary skills in digital computer design and digital signal processing. | PLO-5 | Cognitive/ Applying |

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: EEE-2411** **Course Title: Electronics II**
**Credit Hours: 3** **Contact Hours: 3 per Week**
[Prerequisite: EEE-2301]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Electronics' in regards to working principle, operational characteristics of operational amplifiers, oscillators, power amplifiers, feedback amplifiers, active filter, optoelectronic and microwave devices**.**

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Reflect a basic understanding of Electronic circuits and Devices such as Operation Amplifier, Negative Feedback, Power Amplifiers, Oscillators, Active Filters, Optoelectronic Devices, and Amplifier Frequency Response. | PLO-1 | Cognitive/ Understanding |
| CLO-2 | Solve different problems related to Electronic circuits and Devices. | PLO-2 | Cognitive/ Evaluating |
| CLO-3 | Design and development of different Electronic circuits and Devices. | PLO-3 | Cognitive/ Designing |

**Section-A (Mid-term Exam: 30 Marks)**

1. **Operation Amplifier**: Introduction to operational amplifier, input signal modes of Op-amp, CMRR, Op-amps with negative feedback, Inverting and Non inverting Amplifier. Frequency response of Op-amp, IC-Op-amp, Application of op-amp (Summing, Differentiator and Integrator)
2. **Negative Feedback**: Properties and topologies of Negative Feedback, Effect of feedback on impedance, Gain, bandwidth, distortion and stabilization.
3. **Power Amplifiers**: Classification of power amplifiers, Collector efficiency, Transformer coupled class A amplifier; Class-B push-pull amplifier, Class-C amplifier, Tuned amplifier, class D, E & S amplifier.

**Section-B (SEE: 50 Marks)**

**Group-A (20 Marks)**

4. **Oscillators**: Introduction to Oscillator, Positive feedback, Condition of Oscillator, Phase Shift Oscillator, The Wein-Bridge Oscillator, Resonant circuit Oscillators. Crystal Oscillator, VCO, Introduction to 555 Timer and its operation, Waveform generator
5. **Low Frequency Amplifier Response:** Amplifier Frequency Response, Effect of Coupling, Internal Capacitances in case of BJT amplifier, Miller's Theorem, Decibel, 0dB References, Bode Plot, The Critical Frequency, Low Frequency Amplifier Response,

**Group-B (30-Marks)**

6. **High Frequency Amplifier Response**: High Frequency Amplifier Response, Total Frequency Amplifier Response. Amplifier noises. Gain, Bandwidth, Distortion& Stabilization.

7. **Active Filters**: Explanation of Low, High, Band Pass and Band Stop Filter Response, Response Characteristics, Damping Factor, Critical Frequency and Roll-Off Rate, Single Pole Filter, Sallen-Key Low Pass and High Pass filter, Cascaded Filter, Multiple Feedback Band-Pass and Band Stop Filter, State Variable Band-Pass and Band Stop Filter,
8. **Optoelectronic Devices:** PN photodiode, Phototransistor, Solar cell, Photoconductive cell, Photovoltaic, Sensors, LED, LCD, Alphanumeric display, Photo couplers, Photodiode, LDR.

**Recommended Reference:**


1. Thomas L.Floyd, ***Electronic Devices***, 9th ed., New Jersey, United States of America, Prentice Hall, 2012
2. Robert Boylestad, Louis Nashelsky, ***Electronic Devices and circuit theory***, 7th ed,New Jersey, United States of America, Prentice Hall.
3. B.L Theraja, A.K Theraja, ***Electrical Technology***, Vol 4, 23rd ed, India, S. Chand.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-2412** **Course Title: Electronics II Sessional and Electronic Workshop**
**Credit Hours: 1.5** **Contact Hours: 3 per Week**

**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **( SEE)**

**Objectives:** This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts developed in EEE-2411. In the second part, students will design simple systems using the principles learned in EEE-2411.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Able to apply the knowledge of electronic devices and circuits. | PLO-1 | Cognitive/ Understanding, |

| | | | |
|---|---|---|---|
| CLO-2 | Design and development of different Electronic circuits and Devices. | PLO-3 | Psychomotor/ Manipulation |
| CLO-3 | Develop communication skill. | PLO-10 | Affective/ Responding |
| CO-4 | Function effectively as a member of team. | PLO-9 | Affective/ Organization |

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: EEE-2415 Course Title: Transmission & Distribution of Electrical Power System**
**Credit Hours: 3 Contact Hours: 3 per Week**
[Prerequisite: EEE-1201]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives**: The objective of the course is to make the student familiar with the transmission and distribution of electrical energy from the places of production to consumer areas and isolated consumers in order to be able to appreciate the relative procedures from the technical, economic and social point of view.

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Develop the idea to deliver quality power to the end users using Transmission and Distribution System. | PLO-1 | Cognitive/ Understanding |
| CLO-2 | Ability to apply various voltage control techniques to maintain proper voltage at the level of end users. | PLO-2, | Cognitive/ Applying, |
| CLO-3 | Modelling of the transmission and Distribution line to analysis the effect of line parameters on the power flow. | PLO-3 | Cognitive/ Analyzing |

**Section– A (Mid-Term Exam: 30 Marks)**

1. **Transmission systems:** Types of conductors, resistance, definition of inductance, inductance of conductor due to internal flux, flux linkages between two points external to an isolated conductor, inductance of a single phase two wire line.
2. **Capacitance of transmission lines:** Capacitance of a three-phase with equilateral spacing and unsymmetrical spacing, effect of earth on the capacitance of three-phase transmission lines, bundled conductors, parallel-circuit three-phase lines.
3. **Current and voltage relations on a transmission line:** Representation of lines, the short transmission line, the medium transmission line the long transmission line, solution of differential equation, interpretation of the equations, hyperbolic form of the equations, the equivalent circuit of a long line, direct current transmission.

**Section-B (SEE: 50 Marks)**

**Group-A (20-Marks)**

4. General line equation in terms of ABCD constants, relations between constants, charts of line constants, constants of combined networks, measurement and advantages of generalized line constants. **Power circle diagram:** Receiving and sending end power circle diagrams, transmitted maximum power, universal power circle diagrams, use of circle diagrams.
5. **Voltage and power factor control in transmission systems:** Tap changing transformer, induction regulators, moving coil regulators, booster transformer, power factor control, static condensers in series or parallel, synchronous condensers, Ferranti effect.

**Group-B (30-Marks)**

6. **Insulated cables:** Cables versus overhead lines, insulating materials, electrostatic stress grading, three core cables, dielectric losses and heating, modern developments, oil-filled and gas-filled cables, measurement of capacitance, cable testing.
7. **Insulator of overhead lines:** Types of insulators, their constructions and performances, potential distribution, special types of insulators, testing of insulators.
8. **Distribution:** Distributor calculation, copper efficiencies, radial ring mains and inter connections. Mechanical characteristics of transmission lines: Sag and stress analysis, ice and wind loading, supports at different elevations, conditions of erection, effect of temperature changes.

**Recommended Reference:**


1. John J. Grainger & Willam D. Stevenson, Jr, ***Elements of Power System Analysis***, 4th ed., Singapore: McGraw-Hill, Inc., 1982.
2. Ashfaq Husain, ***Electrical Power Systems***, 5th ed., New Delhi: CBS, 2017.
3. V.K. Mehta & Rohit Mehta, ***Principles of Power System***, 4th ed., India: S. Chand, 2008.
4. Hadi Saadat, ***Power System Analysis***, 2002 ed., USA: McGraw-Hill, Inc., 2002.
5. D P Kothari & I J Nagrath, ***ModernPower System Analysis***, 3rd ed., India: Tata McGraw Hill Edu. Private Ltd., 2009.
6. Turan Gönen, ***TransmissionSystemEngineeringAnalysisand Design***, 2nd ed., USA: CRC Press, 2009.
7. Arthur R. Bergen & Vijay Vittal, ***Power System Analysis,*** 2nd ed., USA: Prentice-Hall, Inc., 2000.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:** **CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-3501** **Course Title: Continuous Signals and Linear Systems**
**Credit Hours: 3** **Contact Hours: 3 per Week**
[Prerequisite: MATH-2409]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Continuous Signals and Linear Systems' in regard to signals, systems and system representation, impulse response, harmonic representation, Fourier-transform, application of harmonic analysis and analogous systems.

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Strengthen knowledge of about signal, system, properties of signal and system, and representation of system by means of differential equation. | PLO-1 | Cognitive/ Understanding |
| CLO-2 | Learn, analyze, and apply the important mathematical tools such as convolution, Fourier analysis, Laplace transformation for the analysis of the signals and systems of circuit applications. | PLO-2 | Cognitive / Applying |

**Section-A (Mid-term Exam: 30 Marks)**

1. **Signal**: Definitions -Signal, System, Size of signal, Signal Energy, Signal power. Classification of signals. Basic operations on signals. Elementary Signals.
2. **Systems:** Properties of system- Linearity, causality, time invariance, memory, stability, and invariability.
3. **System representation:** Differential Equations, Electrical and Mechanical System representation using Differential Equation, order of the system, Solution Techniques, Zero State and Zero Input Response.

**Section-B (SEE: 50 Marks)**

**Group-A (20-Marks)**

4. **Impulse response:** Convolution integral- determination of system properties; state variable - basic concept, state equation and time domain solution.
5. **Harmonic representation:** Fourier series- Trigonometric Fourier Series, Amplitude and Phase Spectrum, Symmetry Considerations, Exponential Fourier Series and Circuit Applications.

**Group-B (30-Marks)**

6. **Fourier transform:** Fourier Transform and Inverse Fourier Transform. Properties of Fourier Transform. Circuit Applications of Fourier Transform.
7. **Laplace Transform:** Laplace and Invers Laplace transform, Properties of Laplace Transform. Circuit Applications. Solution of system equations, system transfer function and frequency response.
8. **Applications:** System stability analysis using Laplace Transform, Amplitude Modulation and Demodulation, Time-division and Frequency-division Multiplexing.

**Recommended Reference:**


1. Simon Haykin, Barry Van Veen,***Signals and Systems***, 4th ed., Wiley, 2001-2002.
2. Alexander Sadiku, ***Fundamentals of Electric Circuits***, 4th ed., McGraw-Hill, 2009-2010.
3. B. P. Lathi, ***Principles of Linear Systems and Signals***, 2nd ed., Oxford University Press, 2005-2011.
4. Taan S. ElAli, Mohammad A. Karim, ***Continuous Signals and Linear Systems with MATLAB***, 2nd ed., CRC Press, USA, 2013.
5. Cheng, David K., ***Analysis of linear systems***, 1959.


**A Sample Question Assessment Pattern (Theory courses):**

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:** **CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-3505** **Course Title: Microprocessor and Interfacing**
**Credit Hours:3** **Contact Hours:3 per Week**
[Prerequisite: EEE-2407]

| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
|---|---|---|---|
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about' Microprocessor and Interfacing' in regards to digital computer, microprocessor ALU, Intel 8086 Microprocessor**.**

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Explain the architecture and operation of microcomputer and microprocessor. | PLO-1, | Cognitive / Understanding |
| CLO-2 | Learn assembly language programming. | PLO-2, | Cognitive / Understanding |
| CLO-3 | Design various microprocessor-based systems according to practical applications. | PLO-3 | Cognitive/ Creating |

**Section-A (Mid-term Exam: 30 Marks)**

**1. Introduction to microcomputer and Microprocessor**: Microcomputer architecture, organization and its operation, Microprocessor and Microcontroller, Evolution of Microprocessor, General Architecture and operation of microprocessor ( ALU, Control Unit, Register array, system bus), CISC and RISC structure, Instruction execution, Memory array design and memory interfacing.

**2. Architecture of Intel 8086 Microprocessor and Addressing Modes**: 8086 architecture, registers inside 8086, 8086 addressing modes (data addressing modes, program memory addressing modes and stack memory addressing modes).
**3. Instruction Set of 8086 Microprocessor (Data Movement and Arithmetic Instruction)**: Operation of all data movement and arithmetic instructions, Assembly language programming using Instruction Set.

**Section-B (SEE: 50 Marks)**

**Group-A (20-Marks)**

**4. Instruction Set ofIntel 8086 Microprocessor (Logic and Program Control Instructions)**: Operation of all logic and program control instructions, Assembly language programming using Instruction Set.
**5. Pin functions and operation of Intel 8086 Microprocessor and 8284A**: Modes of operation and Pin functions of 8086 microprocessor, Pin functions and operation of 8284A.

**Group-B (30-Marks)**

**6. Intel 8086 Interfacing with 8255 PPI**: Introduction to Programmable Peripheral Interface (8255), Architecture, Operation, Programming.
7. **Intel 8086 Interfacing with 8254 PIT**: Introduction to Programmable Interval Timer (8254), Architecture, Operation, Programming.
**8. Intel 8086 Interfacing with Other ICs and PLC**: Programmable Interrupt Controller (8259), Introduction to PLC, DMA.

**Recommended Reference:**


1. Douglas V. Hall, ***Microprocessors and interfacing***, 3rd ed., India: Tata McGraw Hill, 2012.
2. Mohamed Rafiquzzaman, ***Microprocessors and Microcomputer-Based System Design***, 2nd ed., India: CRC Press, 1995.
3. Ramesh S. Gaonkar, ***Microprocessor Architecture, Programming, and Applications with the 8085***,6th ed., India: Penram International Publishing, 2013.
4. Myke Predko, ***Programming and customizing the PIC microcontroller***,1st ed., India: Tata McGraw-Hill, 2007


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-3506** **Course Title: Microprocessor and Interfacing Sessional**
**Credit Hours:1.5** **Contact Hours:3 per Week**
**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **( SEE).**

**Objectives:** This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE-3505. In the second part, students will design simple systems using the principles learned in EEE-3505.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | The students will be able to **apply** assembly language programming for designing microprocessor based system. | PLO-2 | Cognitive/ Applying |
| CLO-2 | They will be able to **design** various microcontroller-based systems according to practical applications. | PLO-3 | Cognitive/ Creating |
| CLO-3 | They will be able to **use** modern designing tools. | PLO-5 | Psychomotor/ Manipulation |
| CLO-4 | They will be able to **communicate** effectively on complex engineering activities with the engineering community and society. | PLO-10 | Affective/ Responding |

**Course Code: EEE-3508** **Course Title: Circuit Simulation Sessional**
**Credit Hours: 1** **Contact Hours: 3 per Week**
[Pre requisite: EEE-2301]
**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **( SEE).**

**Objectives:** In this course students will learn about electrical and electronic circuit simulation**.**
**A.** In the simulation laboratory based on EEE-1101 and EEE-1201 theory courses, students will verify the theories and concepts learned in EEE-1101 and EEE-1201 using simulation software like pspice and Matlab. Students will also perform specific design of dc and ac circuits theoretically and by simulation.

**B.** In Simulation laboratory based on EEE-2301 and EEE-2411 theory courses, students will verify the theories and concepts learned in EEE-2301 and EEE-2411 using simulation software like Pspice and Matlab. Students will also perform specific design of electronic circuits theoretically and by simulation.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Develop idea on modeling of different electrical and electronic components/equipment. | PLO-1 | Cognitive/ Applying |
| CLO-2 | **Use modern simulation tools for solving complex engineering problems.** | **PLO-5** | Psychomotor/ Precision |
| CLO-3 | Capability to design and analyze different circuits in MATLAB Simulink environment | PLO-3 | Psychomotor/ Designing |

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance

**(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: EEE-3515** **Course Title: Electrical Properties of Materials**
**Credit Hours: 3** **Contact Hours:3 per Week**
[Prerequisite: EEE-2301]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Electrical Properties of Materials' in regards to crystal structures, classical theory of electrical and thermal conduction, introduction to quantum mechanics, band theory, modern theory of metals, dielectric and magnetic properties of materials, introduction of superconductivity.

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Reflect a basic understanding of crystal structure, lattice geometry, quantum mechanical behavior of electrons, molecular orbital theories. | PLO-1 | Cognitive/ Understanding |
| CLO-2 | Develop the concept of dielectric and magnetic material properties and their applications. | PLO-1 | Cognitive/ Understanding |

**Section A (Mid-term Exam: 30 Marks)**

1. **Crystal Structures**: Types of Crystals, lattice and basis, Bravias lattice and Miller indices and crystal defects.
2. **Classical theory of electrical and thermal conduction**: Scattering, mobility and resistivity, temperature dependence of metal resistivity, Mathiessen's rule, Hall effect and thermal conductivity.
3. **Introduction to Quantum mechanics**: Wave nature of electrons, Schrodinger equation, one dimensional quantum problems-infinite quantum well, potential step and potential barrier; Heisenberg's uncertainty principle and quantum box.

**Section- B (SEE: 50 Marks)**

**Group A (20 marks)**

4. **Band theory**: Band theory from molecular orbital, Bloch theorem, Kronig-Penny model, effective mass, density of states; carrier Statistics: Maxwell-Boltzmann and Fermi-Dirac distributions, Fermi energy.
5. **Modern theory of metals**: Determination of Fermi energy and average energy of electrons, classical and quantum mechanical calculation of specific heat.

**Group B (30 Marks)**

6. **Dielectric properties of Materials**: Dielectric constant, polarization-electronic, ionic and oriental; internal field, Clausius-Mosotti equation, spontaneous polarization, frequency dependence of dielectric constant, dielectric loss and piezoelectricity.
7. **Magnetic Properties of Materials**: Magnetic moment, magnetization, relative permittivity, different types of magnetic materials, origin of ferromagnetism and magnetic domains.
8. **Introduction of superconductivity**: Zero resistance and Meissner effect, Type I and Type II superconductors and critical current density.

**Recommended Reference:**

1. S. O. Kasap, Principle of Electronics Materials and Devices, 4th ed., McGraw-Hill, 2017
2. Ben G. Streetman, S. Banerjee, Solid State Electronic Devices, 6th ed., Prentice Hall, 2005

**A Sample Question Assessment Pattern (Theory courses):**

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-3519** **Course Title: Power System Analysis**
**Credit Hours: 3** **Contact Hours: 3 per wee**k
[Prerequisite course: EEE-2415]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Power system' in regard to underground **t**ransmission lines cables, power system stability, flexible ac transmission system, overhead transmission lines cables, series impedance of transmission lines, line parameters, factors affecting stability and power quality.

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Reflect a basic understanding of power system modelling, effects of synchronous machines in power system, one-line diagram, network calculations, bus impedance matrix, different types of power system faults and fault calculations. | PLO-1 | Cognitive/ Understanding |
| CLO-2 | Understand the application of load flow methods such as Gauss-Seidel method and Newton-Raphson method, and application of symmetrical components in power system. | PLO-1 | Cognitive/ Apply |
| CLO-3 | Solve power system networks under different fault and load conditions. | PLO-2 | Cognitive/ Evaluating |

**Section– A (Mid-Term Exam: 30 Marks)**

1. **System modeling:** Review of synchronous machine, the effect of synchronous machine excitation, per unit quantities, changing the base of per unit quantities, per unit impedance in single phase transformer and three phase transformer circuits, per unit impedance of three winding transformers, one-line diagram, impedance and reactance diagram, per unit and percentage method of calculations, advantages and disadvantages of per unit computations.
2. **Network calculations:** Node equation, matrix partitioning, node elimination by matrix algebra, bus admittance and impedance matrices, modification of an existing bus impedance matrix, direct determination of a bus impedance matrix.

**Section- B (SEE: 50 Marks)**

**Group A (20 marks)**

3. **Load flow solution and control:** Classification of buses, specification of bus voltage-power etc, Gauss-Seidel method and Newton-Raphson method of load flow solutions, some principles of load flow control.
4. **Symmetrical three phase faults:**Short circuit currents and the reactance of synchronous machines, internal voltages of loaded machines under transient conditions, bus impedance matrix in fault calculations, bus impedance matrix equivalent network, percentage reactance and short-circuit MVA, reactor control of short-circuit currents and location of reactors and their advantages and disadvantages.
5. **Symmetrical components:** Symmetrical components of unsymmetrical phasors, sequence impedance and sequence networks, sequence network of unloaded generators, positive and negative sequence networks, zero-sequence networks.

**Group B (30 Marks)**

6. **Unsymmetrical faults:** Unsymmetrical short-circuits on an unloaded generator, single line-to-ground fault, line-to-line fault, double line-to-ground fault, unsymmetrical faults of power systems, faults through impedance, unsymmetrical open circuits and series impedances.
7. **Power system stability:** The stability problem of power system, swing equation, power-angle equation, equal area criterion of stability.
8. **Multi-machine stability studies:** Classical representation, step-by-step solution of the swing curve, factors affecting stability, techniques for improving stability.

**Recommended Reference:**


1. Ashfaq Husain, ***Electrical Power Systems***, 5th ed., New Delhi: CBS, 2017.
2. John J. Grainger & Willam D. Stevenson, Jr, ***Elements of Power System Analysis***, 4th ed., Singapore: McGraw-Hill, Inc., 1982.
3. V.K. Mehta & Rohit Mehta, ***Principles of Power System***, 4th ed., India: S. Chand, 2008.
4. Hadi Saadat, ***Power System Analysis***, 2002 ed., USA: McGraw-Hill, Inc., 2002.
5. D P Kothari & I J Nagrath, ***ModernPower System Analysis***, 3rd ed., India: Tata McGraw Hill Edu. Private Ltd., 2009.
6. B.M. Weedy, B.J. Cory, N. Jenkins, J.B. Ekanayake & G. Strbac, ***Electric Power Systems***, 5th ed., UK: John Wiley & Sons Ltd. Publication., 2012.
7. J. D. Glover, M. S. Sarma & T. J. Overbye, ***Power system analysis and design***, 4th ed., India: Thomson learning, 2008.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE | | | | |

| | |
|---|---|
| | and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-3520** **Course Title: Power System Analysis Sessional**
**Credit Hours: 3** **Contact Hours: 3 per wee**k

**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of Semester End examination **(SEE).**

**Objectives**: In this course students will perform experiments to verify practically the theories and concepts learned in EEE-3519.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Develop practical idea on power flow and voltage regulation considering transmission systems together with generation and various load components. | PLO-1 | Cognitive/ Understanding |
| CLO-2 | Capability to make proper connections of power system components to deliver quality power to the end users. | PLO-3 | Cognitive/ Creating |
| CLO-3 | Develop writing and communication skill. | PLO-10 | Affective/ Responding |

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: EEE-3601** **Course Title: Communication Theory**
**Credit Hours: 3** **Contact Hours: 3 per Week**
[Prerequisite: EEE-3501]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives**: In this course student will learn about 'Communication Theory' in regards to communication systems at a glance, noise, communication systems ,angle and pulse modulation, digital communication system, satellite communication, microwave link & radar.

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Reflect a basic understanding of analogue and digital communication, Noise, modulation and Multiplexing technique | PLO-1 | Cognitive/ Understanding |
| CLO-2 | Apply the understating to Solve the problems of analogue and digital communication problem. | PLO-2 | Cognitive / Applying |
| CLO-3 | Use necessary learning skills in different types of analogue and digital communication system design | PLO-3 | Cognitive/ Designing. |

**Section A (Mid Term Exam: 30 Marks)**

1. **Communication Systems at a glance:** Basic Principles, fundamental elements, system limitations, message source, bandwidth requirements, transmission media types, and bandwidth and transmission capacity.
2. **Noise:** Source, characteristics of various types of noise and signal to noise ratio, Measure of information, source encoding, error free communication over noisy channel, channel capacity of a continuous system and channel capacity of a discrete memory less system.
3. **Communication systems:** Transmission types-base-band transmission, carrier transmission, AM (information given by the amplitude of the signal), DSB-FC (Double side band - full carrier), Envelope detector DSB-SC (Double side band - suppressed carrier), SSB (single side band), VSB (vestigial side band), spread spectrum, SS7 system. TV-transmitter & Receiver.

**Section B (SEE: 50 Marks)**

**Group A (20 Marks)**

4. **Angle modulation**: FM-Frequency modulation, PM – phase modulation, Bandwidth calculation (frequency components), 1% bandwidth, Carson's rule, spectral Analysis, Power in FM & PM signals, Demodulation of FM & PM- Phase locked loop, Time domain. Locked loop with loop gain and static phase error, Super heterodyne receiver
5. **Pulse Modulation:** - sampling theorem, Nyquist criterion, aliasing, instantaneous and natural sampling; pulse amplitude modulation- principle, bandwidth requirements; pulse code modulation (PCM)- quantization principle, quantization noise, non-uniform quantization, signal to quantization error ratio, differential PCM, demodulation of PCM; delta modulation (DM)- principle, adaptive DM; line coding- formats and bandwidths..

**Group B (30 Marks)**

6. **Digital Communication System:** Digital modulation technique,Amplitude-shift keying- principle, ON-OFF keying, PSK, FSK- continuous & discontinuous phase FSK, minimum shift keying., DPSK & QAM, Quadrature PSK, noise performance, M-array modulation techniques, spectrum of digital signals, Digital carriers system, Sources of error in digital communication systems, Error control coding,
7. **Satellite Communication:** Introduction, Satellite construction, Orbits; Station keeping, Satellite altitude, Transmission path, Noise considerations, Satellite system, Effective isotropic radiated power. Low orbit satellites for mobile communication, Earth station, Satellite link analysis.
8. **Multiplexing technique**- Time-division multiplexing (TDM), FDM, CDM,WDM Multiple Access System-TDMA, FDMA, CDMA- principle, benefits,Time-division multiple-access (TDMA), frequency-division multiple access (FDMA); code-division multiple- access (CDMA) - spread spectrum multiplexing, coding techniques and constraints of CDMA.

**Recommended Reference:**


1. B.P. lathi, ***Modern Digital and Analog Communication Systems***, 3rd Edition, New York Oxford University Press, 1988.
2. Wayne Tomasi, ***Advanced Electronic Communications Systems***, 6th Edition, 1993
3. Jeffrey S. Beasley, Gary M. Miller, ***Modern Electronic Communication***, 9th Edition, Prentice Hall, 2007.
4. Gorge Kennedy, Bernard Devis,***Electronic Communication Systems***, 4th Edition, New York

McGraw-Hill, 1992.

**A Sample Question Assessment Pattern (Theory courses):**

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-3602 Course Title: Communication Theory Sessional**
**Credit Hours:1.5 Contact Hours: 3 per Week**
**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **( SEE).**

**Objectives:** This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE-3601. In the second part, students will design simple systems using the principles learned in EEE-3601.

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corres-ponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO -1 | Reflect a basic understanding of analogue and digital communication, Noise, modulation and Multiplexing technique | PLO-1 | Cognitive/ Understanding |
| CLO -2 | Apply the understating to Solve the problems of analogue and digital communication problem. | PLO-2 | Cognitive / Applying |
| CLO -3 | Use necessary skills in different types of analogue and digital communication system design Such as AM, FM, ASK, FSK, PWM systems. | PLO-3 | Psychomotor / Manipulation |

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: EEE-3603** **Course Title Digital Signal Processing I**
**Credit Hours: 3** **Contact Hours: 3 per Week**
[Prerequisite: EEE-3501]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Digital Signal Processing' in regards to introduction to digital signal processing (DSP), impulse response, solution of difference equation, Z-transform, discrete time harmonic analysis, discrete Fourier transform, digital and IIR filters.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Learn about mathematical representation of analog signals in digital domain, manipulate signals using analytical techniques and familiarize with discrete time signal & systems. | PLO-1, | Cognitive/ Understanding |
| CLO-2 | Interpret the information of discrete time signals by means of frequency domain analysis using mathematical tools such as Z-transform, Discrete Fourier Transform (DFT), Fast Fourier Transform etc. | PLO-4 | Cognitive/ Analyzing |
| CLO-3 | Design and realize the responses of discrete-time systems like FIR and IIR Filter etc. | PLO-3 | Cognitive/ Creating |

**Section-A (Mid-term Exam: 30 Marks)**

1. **Introduction to Digital Signal Processing:** Digital Signals and Systems, Basic Elements of DSP system, Advantage and Disadvantages of Digital System, Application of DPS, Classification of Signals (Analog, Digital, Continuous time, discrete time, multichannel, multidimensional, deterministic, random signal); Analog to digital conversion (Sampling of analog signal, Alias of frequency, Sampling theorem, Quantization of continuous amplitude signal, Coding of Quantized Samples), Digital to Analog Conversion.
2. **Discrete-Time (DT) Signals and Systems:** Representation of DT signals, Elementary DT signals, Classification of DT Signals (Energy Signals, Power Signals, Periodic-Aperiodic Signals, Symmetric-Antisymmetric Signals), Simple Manipulation of DT signals (Shifting, Folding, down sampling, addition, scaling, multiplication), DT Systems (Input-Output description, Block diagram representation, Classification of DT Systems)
3. **Analysis of Discrete-Time (DT) Linear Time-Invariant (LTI) Systems:** Techniques for the analysis of linear systems, the convolution sum, Recursive and Nonrecursive DT systems, LTI systems characterized by Constant-Coefficient Difference Equations, Correlation of DT Signals (Auto-correlation, Cross-correlation and Application of Correlation).

**Section-B (SEE: 50 Marks)**
**Group-A (20-Marks)**

4. **Z-Transform:** Definition, Physical Significance, region of convergence, properties of z-transform, transfer function, pole-zeros, inverse z transform, causality and stability, pole-zero cancellations.
5. **Implementation of DT System:** FIR and IIR Systems, Structures for FIR Systems (Direct form and cascade-form structures), Structures of IIR Systems (Direct-form structures, transposed, Cascade-form and parallel-form structures)

**Group-B (30-Marks)**

6. **Discrete Transformations:** Discrete Fourier series, Discrete-Time-Fourier Transform (DTFT), **Discrete Fourier Transform (DFT)**: definition, properties of DFT, inverse-DFT (IDFT), zero padding, circular convolution, linear convolution by circular convolution. **Fast Fourier Transform (FFT):** computational complexity in DFT, time and frequency decimation, radix-2 FFT Algorithms, Cooley-Tukey decomposition, fast convolution, convolution of a long sequence, overlap and overlap save method
7. **Digital Filter:** Functions and types of digital filter, Advantage of digital filter over analog filter, Filter kernel, Time domain and frequency domain parameters of filter, other filter kernel from low pass filter kernel, FIR Filter: Linear phase filters, mathematical structures, specifications, design using window, optimum and frequency sampling methods.
8. **IIR Filter and Applications of DSP: IIR Filter**: Mathematical structure, design using impulse invariance and bilinear transform, Butterworth, Chebychev, Inverse Chebychev, Bessel and elliptic filters, finite precision effects in implementing digital filters. **Application of DPS**: Application of DSP in speech processing, medical imaging and radar.

**Recommended Reference:**


1. J. G. Proakis and Dimitris. G. Manolakis, ***Digital Signal Processing: Principles, Algorithms, and Applications***, 4th Edition, USA: Pearson Education, 2014.
2. Steven W. Smith, ***The Scientist and Engineer's Guide to Digital Signal Processing***, 2nd Edition, USA: California Technical Publishing, San Diego,1999.
3. Emmanuel C Ifeachor and Barrie W Jervis, ***Digital Signal Processing: A practical approach***, 2nd Edition, USA: Pearson Education, 2009.
4. Li Tan and Jean Jiang, ***Digital Signal Processing: Fundamentals and Applications***, 2nd Edition, UK: Academic Press, 2013.
5. Sanjit K. Mitra, ***Digital Signal Processing: A computer-based Approach***, 4th Edition, India: McGraw Hill Education (India) Private Limited, 2013.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course code: EEE-3604** **Course Title: Digital Signal Processing I Sessional**
**Credit Hours: 1.5** **Contact Hours: 3 per Week**

**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **( SEE)**

**Objectives**: This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE-3603. In the second part, students will design simple systems using the principles learned in EEE-3603.

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Learning about mathematical representation of analog signals in digital domain, manipulate signals using analytical techniques and familiarize with discrete time signal & systems. | PLO-1 | Cognitive/ Understanding |
| CLO-2 | Developing ability to manipulate and analysis of discrete-time (DT) signal by modern software tools. | PLO-3 | Cognitive/ Analyzing |
| CLO-3 | Developing skill to design (using Simulation tool) and implement of discrete time (DT) system. | PLO-5 | Psychomotor / Precision |
| CLO-4 | To demonstrate the skill to write experimental report individually | PLO-8 | Affective/ Responding |

**Recommended Reference:**


1. J. G. Proakis and Dimitris. G. Manolakis, ***Digital Signal Processing: Principles, Algorithms, and Applications***, 4th Edition, USA: Pearson Education, 2014.
2. Steven W. Smith, ***The Scientist and Engineer's Guide to Digital Signal Processing***, 2nd Edition, USA: California Technical Publishing, San Diego,1999.
3. Emmanuel C Ifeachor and Barrie W Jervis ,***Digital Signal Processing: A practical approach***, 2nd Edition, USA: Pearson Education, 2009.
4. Li Tan and Jean Jiang, ***Digital Signal Processing: Fundamentals and Applications***, 2nd Edition, UK: Academic Press, 2013.
5. Sanjit K. Mitra, ***Digital Signal Processing: A computer-based Approach***, 4th Edition, India: McGraw Hill Education (India) Private Limited, 2013.


**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: EEE-3607** **Course Title: Solid State Devices**
**Credit Hours: 3** **Contact Hours: 3 per Week**
[Prerequisite: EEE-3515]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Solid State Devices in regards to energy bands in solids, carrier transport processes and excess carrier, PN junction, forward and reverse bias, bipolar junction and junction field effect transistor, metal –semiconductor, FET and MOS FET

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | **Understand** the physics of semiconductor devices regarding carriers, the energy band and their behavior in solid. | PLO-1 | Cognitive/ Understanding |
| CLO-2 | **Develop** the designing skill from the idea of carrier transportation in solid and their behavior in various junctions. | PLO-3 | Cognitive/ Analyzing |
| CLO-3 | **Understanding the working** principle of different devices like FET, BJT, Solar Cell and gain necessary knowledge for **device design**, fabrication and characterization. | PLO-4 | Cognitive/ Analyzing |

**Section-A (Mid-term Exam: 30 Marks)**

1. **Energy Bands in Solids and Carrier Concentrations**: Energy bands, Metals, Semiconductor and Insulators, Electrons and Holes, Effective mass, intrinsic and Extrinsic Semiconductors, The Fermi Level, Electron and Hole concentrations of Equilibrium.
2. **Carrier transport processes and excess carriers**: Conductivity and mobility, Drift and Resistance, The Hall-Effect, Diffusion processes, Diffusion and Drift Carriers, Built -in -field, Diffusion and Recombination, Einstein relations, The continuity and diffusion equations for holes and electrons.;.
3. **PN Junction: Fabrication of PN Junction**: The Contact Potential, Equilibrium Conditions, Equilibrium Fermi Level, Space charge at a junction.

**Section-B (SEE: 50 Marks)**

**Group-A (20-Marks)**

4. **Forward and reverse bias**: Carrier injection, minority and majority carrier currents, Reverse Bias, Zener and Avalanche Breakdown, Time variation of stored charge, Capacitance of PN Junction.
5. **Bipolar Junction Transistor**: Basic Principle of pnp and npn transistors, emitter efficiency, base transport factor and current gain, Solution of the diffusion equation in the base, Terminal currents, The coupled diode model, Ebers-Moll equations, frequency limitation of transistors.

**Group-B (30-Marks)**

6. **FET**: Introduction, qualitative theory of operation, Pinch-off and Saturation, Gate Control, Current-Voltage Characteristics, The GaAs MESFET, HEMET, Energy band diagram of metal semiconductor junction, rectifying and ohmic contact.
7. **MOS FET**: The Ideal MOS Capacitor, MOS Output and Transfer Characteristics, Short Channel I-V Characteristics, Threshold Voltage, Qualitative theory of MOSFET operation, Equivalent Circuit of a MOSFET. MOSFET Scaling and Hot Electron Effects.
8. **Optical Devices**: Optical Absorption, Solar cell- The PN junction solar cell, conversion efficiency and solar concentration, the heterojunction solar cell, amorphous silicon solar cells, Light Emitting diode, materials for light LED, Laser diodes, Materials for laser diodes.

**Recommended Reference:**


1. Ben G. Streetman & Sanjay Banerjee, ***Solid State Electronic Devices***, 6th ed., USA: Pearson Prentice Hall, 2006.
2. S O Kasap, ***Principles of electrical engineering materials and devices***, 3rd ed., India: Tata McGraw-Hill, 2007.
3. Thomas L. Floyd, ***Electronic Devices***, 4th ed., India: Pearson Education, Inc., 2006.
4. H.P Myers., ***Introduction to Solid State Physics***, 3rd ed., USA: Taylors and Francis Ltd., 2015.


**A Sample Question Assessment Pattern (Theory courses):**

| Bloom's Category | Evaluations out of 100 marks |
|---|---|

| | | CIE (50 marks) | | | SEE (50 marks) |
|---|---|---|---|---|---|
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination ,Project evaluation & Viva

**Course Code: EEE-3608** **Course Title: Research Methodology & Seminar**
**Credit Hours: 1** **Contact Hours: 2 per Week**

**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE)**

**Objective:** The aim of the course is

a) To understand the concept of various research.
b) To get the ability for preparing various research design, research proposal, scientific journal articles.
c) To be familiar with plagiarism and international presentations.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLos | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | **Explore** themselves for higher studies with self-motivation for **lifelong learning.** | PLO-12 | Affective/ Valuing |
| CLO-2 | **Demonstrate basic proficiency** on **writing** research proposal, research article and **presenting** an article in a formal gathering. | PLO-10 | Affective/ Responding |
| CLO-3 | **Commit** to professional ethics, responsibilities and the norms of the engineering practice. | PLO-8 | Affective/ Valuing |

1. Introduction: Research motivation, research objective, contribution, methodology and research outlines
2. Literature Reviews: Element of research, reviewing of related works, choosing of methodology, comparative method, proposed method
3. Design of Research Methodology: Designing of proposed method
4. Concept of Measurement: Data Collection, data analyzing, compression and discussion
5. Discussion
6. Conclusion
7. Scientific Paper Writing: Abstract, introduction, materials and methods, results, discussion, table, figures, citations, references, format, conference paper, journal paper
8. Seminar and presentation

**Recommended Reference:**


1. Wayne C. Booth, Gregory G. Colomb, and Joseph M. Williams, The Craft of Research, 3rd ed, University of Chicago Press, 2008
2. C. R. Kothari, Research Methodology Methods and Techniques, 2nd ed, New Age Int. Pub, 2004.
3. Jerrold H. Zar., ***Biostatistical Analysis***, Pearson education.


**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: EEE-3612** **Course Title: Electrical Service Design Sessional**
**Credit Hours: 1** **Contact Hours: 2 per Week**

**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **( SEE)**

**Objectives:** In this course students will learn about domestic and industrial electrical services. Wiring system design, drafting, and estimation. Design for illumination and lighting. Electrical installations system design: substation, BBT and protection, air-conditioning, heating and lifts.

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | **Analyze** electrical power demand and provide **plan** for electrical issues in a building. | **PLO-11** | Cognitive/ Applying |
| CLO-2 | Design system components for different electrical home safety issues. | PLO-3 | Cognitive/ Creating |
| CLO-3 | Apply appropriate techniques and tools to design electrical services for buildings. | PLO-5 | Psychomotor / Manipulation |
| CLO-4 | Function effectively **as an individual** to test and collect different experimental data during the lab classes. | PLO-9 | Affective/ Organization |
| CLO-5 | Recognize the need for life-long learning of electrical services in the broadest context of technological change. | PLO-12 | Cognitive/ Understanding |

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: EEE-3621** **Course Title: Engineering Electromagnetism**
**Credit Hours: 3** **Contact Hours: 3 per Week**
[Pre requisite: EEE-1201]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives**: In this course student will get comprehensive idea about electromagnetism, Maxwell equation, static electric fields, magneto statics, time varying electric fields, wave guide, transmission line, behavior of materials in space.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Learn some fundamental laws and theories of electromagnetic fields and waves with applications. | PLO-1 | Cognitive/ Understanding |
| CLO-2 | Understand the interactions of electromagnetic (EM) fields and waves with various materials and media. | PLO-1 | Cognitive/ Understanding. |
| CLO-3 | Apply mathematical foundations to solve various electromagnetic fundamental issues. | PLO-2 | Cognitive/ Apply |

**Section-A (Mid-term Exam: 30 Marks)**

1. **Electrostatic Fields**: Coulomb‟s Law, Gauss‟s Law- Maxwell‟s Equation, Application of Gauss‟s Law, Electric Potential, An Electric Dipole & Flux Lines, Energy Density in Electrostatic Fields.
2. **Electric Fields in Materials Space**: Polarization in Dielectrics, Dielectric Constant and strength, Linear & Isotropic and Homogeneous Dielectrics, Continuity Equation and Relaxation Time, Boundary Conditions.
3. **Electrostatic Boundary Value Problems**: Poisson‟s and Laplace‟s Equations, Uniqueness Theorem, General Procedures for solving Poisson‟s or Laplace‟s Equation, Method of Images.

**Section-B (SEE:50 Marks)**

**Group-A (20-Marks)**

4. **Static Magnetic Field**: Magnetic flux density, Biot-Savarts law, Ampere and Faraday; magnetic field intensity and relative permeability, Displacement current, Maxwell's equations.
5. **Propagation of Electromagnetic Waves**: Wave equations, Plane Wave concept, Plane electromagnetic waves in Free space, Conducting, Dielectric and Ionized media, Poynting vector.

**Group-B (30 Marks)**

6. **Reflection and Refraction of Electromagnetic Waves:** Boundary conditions, The laws of reflection and Snell's law of refraction, Fresnel's equations, The Brewster angle, Total reflection, Skin effect, Phase and group velocities.
7. **Transmission Lines:** Transmission line equations and parameters, Input Impedance, Standing Wave Ratio, Smith Chart, Impedance matching, Distortion less line.
8. **Propagation of Electromagnetic wave in the guided media:** Rectangular wave guides, TM and TE modes, Wave Propagation in the Guide, Cut-off wave length of a rectangular waveguide, Relation between cut-off wavelength, guide wavelength and free space wavelength, selected topics of current research in Electromagnetic.

**Recommended Reference:**

1. Matthew N. O. Sadiku, ***Elements of Electromagnetics***, 5th Edition, Oxford University Press, 2010.
2. W.H Hayt, J.A.Buck, ***Engineering Electromagnetics***, 6th Edition, McGraw-Hill, 2001.

## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination. Project evaluation & Viva

**Course Code: EEE-4701** **Course Title: Control System I**
**Credit Hours: 3** **Contact Hours: 3 per week**
[Prerequisite: EEE-3501]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about „Control System" in regard to linear system models, system block diagrams and signal flow graphs, stability, time response, steady-state error, dynamic compensation, root locus analysis and design, frequency response analysis and design.

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO -1 | Learn about basic control system engineering to model, analysis, and design a system | PLO-1 | Cognitive/ Understanding. |
| CLO -2 | Demonstrate basic proficiency in solving basic electrical and mechanical control system modeling | PLO-2 | Cognitive/ Evaluating |
| CLO -3 | Design basic controllers for application-specific troubleshooting, identify problems and provide solutions for society's sustainable development. | PLO-3 | Cognitive/ Creating |

**Section-A (Mid-term Exam: 30 Marks)**

1. **Linear System Models**: Introduction to control systems, Design process of feedback control system, Mathematical Models of Systems: transfer function and state-space models, conversion betweentransfer function and state-space models, Linearization.

2. **Block Diagrams and Signal Flow Graphs**: Block diagrams of systems block diagram reduction, signal flow graphs of systems, Mason's formula, Signal flow graphs of state equations. Effect of adding poles and zeros
3. **Stability**: Bounded-input bounded-output (BIBO) stability, Routh-Hurwitz stability criterion, Stability in State Space

**Section-B (SEE: 50 Marks)**

**Group-A (20-Marks)**

4. **Time Response**: Pole-zero plots, first and second order transient responses, higher order system approximation, Laplace transform and time domain solution of State equations.
5. **Steady-state Error**: Steady-state Error for feedback systems, System Type, Sensitivity, and Steady-stat error for Systems in State Space.

**Group-B (30-Marks)**

6. **Root Locus Analysis and Design**: Definition of root locus, Properties of root locus, sketching of root locus plots. Effect of open-loop zeros and poles. Root locus design concepts the root locus method, rules for root locus plotting and construction of root locus, root locus design.
7. **Dynamic Compensation**: Feedback compensation, lead-lag compensation.
8. **Frequency Response Analysis, Design and Selected Topics**: Frequency response, polar plots, bode plots, gain and phase margins, compensator design in the frequency domain, Digital Control System, Selected topics (such as PLC, SCADA, and DCS).

**Recommended Reference:**


1. Norman S. Nise, ***Control System Engineering***, 7th Ed., Wiley, 2015.
2. Katsuhiko Ogata, ***Modern Control Engineering***, 5th Ed., Prentice Hall, 2010.
3. Stuart A. Boyer, ***SCADA: supervisory control and data acquisition, International Society of Automation***, 2009.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination. Project evaluation & Viva

**Course Code: EEE-4702** **Course Title: Control System I Sessional**
**Credit Hours: 1.5** **Contact Hours: 3 per week**

**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE)**

**Objectives**: This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE-4701. In the second part, students will design simple systems using the principles learn in EEE-4701.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLos | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Get familiar with the control system tools of MATLAB. | PLO-1 | Cognitive/ Understanding. |
| CLO-2 | Model engineering system and analyze the system response using modern tools. | PLO-5 | Cognitive/ Analyzing; |
| CLO-3 | Design and tuning of controller for engineering application. | PLO-3 | Cognitive/ Designing |

## MATLAB Software

MATLAB is a popular computation and visualization software package developed by the MathWorks, Inc. In this course, MATLAB will be used together with its Control System Toolbox. The best way to learn MATLAB in the control context is through the web-based Control Tutorials for MATLAB (*http://www.engin.umich.edu/class/ctms/*). The tutorials combine explanatory text with sample MATLAB commands and illustrative plots and graphics. The outline of the tutorials closely follows that of most undergraduate control textbooks and should be a useful on-line tool for all control stream courses.

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,
B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva.

**Course Code: EEE-4804** **Course Title: Industrial Attachment**
**Credit Hours: 1** **Contact Hours: 2 per Week**

**Marks distribution for the courses:** There will be 100 marks for the course**.** These 100 marks will be distributed as follows:

| **Assessment** | **Marks** |
|---|---|
| Quiz | 30% |
| Viva | 20% |
| Report Writing | 20% |
| Presentation | 30% |
| Total | 100% |

**Objectives**: The aim of the course is to prepare students for professional environment in the field of Electrical & Electronic & Engineering.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO1 | **Apply**knowledge of Mathematics, Science, professional standardsand Engineering Fundamentals. | PLO-1 | Cognitive/ Applying |
| CLO2 | **Apply** appropriate **techniques and tools** to identify and solve engineering problems. | PLO-5 | Psychomotor/ Manipulation |
| CLO3 | Demonstrate the ability to **work as an individual and in group**with the capacity to be a leader or manager as well as an effective team member. | PLO-9 | Affective/ Organization |
| CLO4 | Effectively demonstrateskillsin**communication**through professional report writing and oral presentation. | PLO-10 | Affective/ Responding |
| CLO5 | Demonstrate the practical skill in professional environment through professional standard and **lifelong learning.** | PLO-12 | Cognitive/ Applying |

Industrial training must be related to practical knowledge on combined technical field of Electrical and Electronic Engineering (Major parts), Instrumentation and Control Engineering (Major Parts), Mechanical Engineering (Minor parts), and Operation, Safety and Process Technology.

**Course Code: EEE-4822** **Course Title: General Viva-Voce**
**Credit Hours: 1** **Contact Hours: 1 per Week**

**Objective:** The aim of the course is to give an overview on electrical engineering, make them motivated for analytical study to prepare themselves for higher study and life-long learning. To prepare students to face a formal viva.

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Explain on any diverse topics of electrical engineering | PLO-01 | Cognitive/ Understanding |
| CLO-2 | Demonstrate basic proficiency on discussing on a topic in a formal gathering | PLO-10 | Affective/Valuing |
| CLO-3 | Develop the analytical ability of study being motivated for higher studies and to continue for life-long learning | PLO-12 | Cognitive/ Applying |

**Course Code: EEE-4860** **Course Title: Project / Thesis**
**Credit Hours**: **3**

**Objective:** The aim of the course is to develop the ability of investigation and problem solving skills of students in the field of Electrical & Electronic & Engineering.

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Students will be able to **apply** their knowledge of basic science and engineering fundamentals throughout the course and that they will demonstrate an in-depth technical competence in at least one discipline related to electrical and electronic engineering. | PLO-1 | Cognitive/ Applying |

| | | | |
|---|---|---|---|
| CLO -2 | They will demonstrate the ability to find out the state-of-the-art problems as well as the solutions with appropriate design of professional standard which will develop the capacity to undertake **lifelong learning**. | PLO-12 | Cognitive/ Creating. |
| CLO -3 | Be able to present the project/thesis, outlining the approach and expected results using good **oral and written presentation skill** | PLO-10 | Affective/ Responding |
| CLO -4 | Student will learn to function effectively as an individual and also in a **group** as a group member | PLO-9 | Affective/ Organization |
| CLO -5 | **Demonstrate** professional ethics, responsibilities and the norms of the engineering practice. | **PLO-8** | Affective/ Valuing |
| CLO -6 | **Conduct investigations** of engineering problems, considering design of experiments, analysis, and interpretation of data and synthesis of information to provide valid conclusions. | **PLO-4** | Cognitive/ Analyzing |

**Assessment Pattern:**

| Assessment | Marks |
|---|---|
| Project/Thesis evaluation by Supervisor- | **35%** |
| External | **30%** |
| Final Defense Board | **35%** |
| **Total** | **100%** |

# E. EEE Elective Courses

***Power Systems Engineering***

**Course Code: EEE-4705** **Course Title: Power Electronics**
**Credit Hours: 3** **Contact Hours: 3 contact hours per week**
[Prerequisite course: EEE-2411]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Power Electronics' in regards to power semiconductor switches and triggering devices, uncontrolled, single-phase controlled and three-phase controlled rectifiers, 2 DC-DC converters, pulse-width-modulated and resonant pulse inverters, AC voltage controllers**.**

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Reflect a basic understanding of power electronic devices, its application and power control mechanism. | PLO-01 | Cognitive/ Understanding |
| CLO-2 | Solve different problems related to converters and controllers. | PLO-02 | Cognitive/ Evaluating |
| CLO-3 | Design and development of different converters and controllers. | PLO-03 | Cognitive/ Designing |

**Section-A (Mid-term Exam: 30 Marks)**

1. **Power Semiconductor Switches and Triggering Devices:** BJT, MOSFET, SCR, IGBT, GTO, TRIAC, UJT and DIAC
2. **Uncontrolled Rectifiers:** Single-Phase Half-Wave rectifier, Performance parameters, Single-Phase Full-Wave Rectifiers with R load and RL load, Three-Phase Full-Wave Rectifiers with R load and RL load.
3. **Single-Phase Controlled Rectifiers:** Thyristor Characteristics and Applications, Two Transistor model of Thyristor, Thyristor Turn-On and Turn-Off, Thyristor types. Phase Controlled Converter operation, Single-Phase Full Converters with R Load and RL load, Single-Phase Dual Converters and Semiconverters**.**

**Section-B (SEE: 50 Marks)**

**Group-A (20-Marks)**

4. **Three-Phase Controlled Rectifiers:** Three-Phase Half-wave Converters, Three-Phase Full Converters with R load and RL load, Three-Phase Dual Converters and Semiconverters, Power Factor Improvements, Twelve-Pulse Converters.
5. **2 DC-DC Converters:** Generation of Duty Cycle, Step-Down Converter, Step-Up Converter, Converter Classification, Switching-Mode Regulators: Buck regulators, Boost Regulators. Buck-Boost Regulators, Cuk Regulators.

**Group-B (30-Marks)**

6. **Inverters**: Principle of Operation, Single-Phase Bridge Inverters, Three-Phase Inverters: 180-Degree Conduction, 120-Degree Conduction, Resonant Pulse Inverters: Series and Parallel Resonant Inverters,
7. **AC voltage Controllers**: Principle of On-Off Control, Principle of Phase Control, Single Phase Controllers with Resistive and Inductive load, Three-Phase Full-Wave Controllers, Three Phase Full-Wave Controllers, Three Phase Bidirectional Delta-Connected Controllers, Single-Phase and Three-Phase Cycloconverters.
8. **AC and DC Drives**: Basic characteristics of DC motors, Single phase drives, Three phase drives, Chopper drives, Induction Motor Drives, Synchronous motor drives.

**Recommended Reference:**

1. Muhammad H.Rashid, ***Power Electronics, Circuits, Devices and Applications***, 3rd ed., India, Pearson Education, Inc., 2004.
2. Thomas L.Floyd, ***Electronic Devices***, 9th ed., New Jersey, United States of America, Prentice Hall, 2012.

**A Sample Question Assessment Pattern (Theory courses):**

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-4706** **Course Title: Power Electronics Sessional**
**Credit Hours: 1.5** **Contact Hours: 3 per week**

**Objectives:** This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE-4705. In the second part, students will design simple systems using the principles learned in EEE-4705

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Apply the knowledge of power electronic devices and power control mechanism. | PLO-1 | Cognitive/ Apply |
| CLO-2 | Design and development of different Power Electronic Circuits | PLO-3 | Cognitive/ Designing |
| CLO-3 | Develop communication skill. | PLO-10 | Affective/ Responding |

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: EEE-4707** **Course Title: Power Plant Engineering**
**Credit Hours: 3** **Contact Hours: 3 per week**

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives**: In this course student will learn about 'Power Plant Engineering' in regards basic principle of power plant, steam turbine power plant, gas turbine power plant, hydroelectric power plant, nuclear power plant, magneto hydro dynamic generator, power plant economics and economic problems.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Students will be able to understand the operating principles and economics of different power plants. | PLO-01 | Cognitive/ Understanding |
| CLO-2 | They will learn different possible engineering solutions for power plant in societal and environmental contexts. | PLO-07 | Cognitive/ Remembering |
| CLO-3 | They will be able to apply mathematical foundations to solve various power plants and power plant economics related issues. | PLO-02 | Cognitive/ Apply |

**Section-A (Mid-term Exam: 30 Marks)**

1. **Introduction:** Importance of Electrical Energy,Basic principle of power plant, Brief introduction of various Energy sources, Present situation of power plants in Bangladesh, Power station design, **Steam Turbine Power Plant:** Operating principle, Site selection, Advantages & disadvantages.
2. **Steam Turbine Power Plant:** Pulverized Coal, Main Accessories, Automatic boiler control, Boilers:Water tube and Fire tube boilers, Boiler furnace, Types of Condensers: Surface and Jet Condensers, Super Heater, Economizer, Water treatment Plant, Steam Engine VS Steam turbine.
3. **Gas Turbine Power Plant (GTPP):** Operating principle, Classification, Constituents of GTPP, Gas turbine cycles, Compressors, combined cycle gas turbine power plant, Advantages & disadvantages of GTPP, Steam turbine VS Gas turbine, Starting of GTPP.

**Section-B (SEE: 50 Marks)**

**Group-A (20-Marks)**

4. **Hydro Electric Power Plant (HEPP):** Operating principle, Constituents of HEPP, Site selection, Types of HEPP, Water hammer & cavitations, Advantages and disadvantages, Application, Performance of water turbine, Turbine governing, Choice of water turbine.
5. **Nuclear Power Plant (NPP):** Basic idea of nuclear fission and chain reaction, Operating principle of NPP, Details of plant equipments, Fuel of NPP, Types of nuclear reactor, Uranium enrichment, Nuclear waste management, Site selection, Advantages and Disadvantages.

**Group-B (30-Marks)**

6. **Magneto Hydro Dynamic (MHD) Generator:** Operating principle, Types of MHD generator, Advantages and disadvantages, Terms and definitions, Combination of MHD power plant and steam power plant. **Power station performance:** Connected load,demand factor, load factor, capacity factor, utilization factor, diversity factor etc. and impact of different factors over the cost analysis of power generation and utilization.
7. **Power Plant performance and operating characteristics:** efficiency, heat rate,Input-output curve, Heat rate curve, Incremental rate curve. Generation scheduling, Variable load problems, load curve and load duration curve, Base load and peak load plants, method of meeting the load, interconnected grid system.

8. **Power Plant Economics:** Economic load sharing, Economics of power generation, cost of electrical energy: Analysis of fixed cost and running/operating cost, Choice of power station. **Energy Tariffs:** description, types and tariff in Bangladesh. **Private generation:** industrial co-generation, capacity generation.

**Recommended Reference:**


1. G. R. Nagpal, ***Power Plant Engineering***, 15th ed., India: Khanna Publishers, 2006.
2. V. K. Mehta & Rohit Mehta, ***Principles of Power System***, 2006 ed., India: S. Chand, 2006.
3. William A. Vopat & Bernhardt G.A. Skrotzki, ***Power System Engineering and Economy***, 2nd ed., USA: McGraw Hill, 1960.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Coode: EEE-4801** **Course Title: Power System Protection**
**Credit Hours: 3** **Contact Hours: 3 per week**
[Prerequisite course: EEE-3519 Power System Analysis]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives**: In this course student will learn about 'Power System Protection' in regards to switchgear, fuse & relay, circuit breakers and breaker ratings; transformer, generator, motor, bus and transmission line protection; static, digital and numerical relay.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO -1 | Reflect a basic understanding of switchgear, fuse, protective relay, static and numerical relay, circuit breaker, transformer and alternator protection, bus bar | PLO-01 | Cognitive/ Understanding |

| | | | |
|---|---|---|---|
| | and line protection etc. | | |
| CLO -2 | Develop the idea regarding the different types of protection system design | PLO-02 | Cognitive/ Understanding |
| CLO -3 | Demonstrate basic proficiency in building protective system | PLO-03 | Psychomotor/Precision |

**Section-A**
**(Mid-term Exam:30 Marks)**

**1. Introduction to Switchgear:** Purpose of power system protection, Introduction to Switchgear, circuit interruption and protection. Criteria for detecting faults and requirements of protective devices, Terminologies and general characteristics of relays and circuit breaker, Different types of protective devices used in Switchgear.
**2 Fuse:** Fuse, Characteristics of fuse, terms related to fuse, types of fuse, current carrying capacity of fuse.
**3. Protective Relay:** Fundamental requirements, basic relay, terms related to relay, over-current, differential, directional, distance relay, types of protection.

**Section-B (SEE: 50 Marks)**

**Group-A (20-Marks)**

**4. Circuit breakers**: Circuit breaker, Arc Phenomenon, arc extinction method, term related to circuit breaker, Air blast, Oil, SF6, vacuum circuit breaker, switchgear components, problems of circuit interruption, resistance switching, circuit breaker ratings.
**5. Transformer protection:** Different types of faults in Transformer, different types of protection scheme in transformer, Buocholz Relay etc. Integrated HV transmission line protection, Combined Transformer and Bus bar protection.

**Group-B (30-Marks)**

**6. Generator and Motor protection**: Introduction, Different types of faults in Generator and motor, different types of protection scheme.
7. **Bus and Transmission line protection**: Bus bar arrangement, Pilot-wire and carrier current protection, different types of Bus and Transmission line protection scheme, Over voltage protection, lightning and lightning arresters, Grounding
**8. Static and digital/numerical relay**: definition, features, Operation, application, Block diagram and types, Microcontroller and Microprocessor based protection.

**Recommended Reference:**


1. V.K. Mehta, ***Principles of Power System***, Revised Edition, India, S Chand.
2. J. Lewis Blackburn, ***Protective Relaying: Principles and Applications***, 4th Edition, US, Marcel Dekker Incorporated, 1987.
3. Sunil S. Rao, ***Switchgear and Protection***, Khanna Publishers, 1992.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode | | | | |

| | |
|---|---|
| | must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-4802** **Course Title: Power System Protection Sessional**
**Credit Hours: 1.5** **Contact Hours: 3 per week**

**Objectives:** This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE-4801.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Understand about switchgear, fuse, protective relay, circuit breaker, and Transformer and alternator protection. | PLO-01 | Cognitive/ Understanding |
| CLO-2 | Generate the idea regarding safety issues using the different types of protection system design. | PLO-06 | Cognitive/ Understanding |
| CLO-3 | Demonstrate basic proficiency in building protective system. | PLO-03 | Psychomotor / Manipulation |

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Coode: EEE-4805** **Course Title: Power System Operation and Control**
**Credit Hours: 3** **Contact Hours: 3 per week**
[Prerequisite course: EEE-3519]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Power System Operation and Control' in regards to evaluation of small network, SCADA, power market, economic operation of power generation, control of voltage and frequency, conventional and competitive electricity market and Power system control.

**Section-A (Mid-term Exam: 30 Marks)**

1. **Principles of power system operation**: State evaluation of small network, Phasor diagram Method, summation of losses method, two port equation.

2. **State estimation**: Underlying assumption, solution method, SCADA,
3. **Power market**: conventional and competitive environment. Overview of power system operation

**Section-B (SEE: 50 Marks)**

**Group-A (20-Marks)**

4. **Economic Operation**: Economic Load Dispatch (ELD) with the objective being cost minimization as well as environmental emission minimization.
5. **Unit Commitment** with the objective being cost minimization as well as environmental emission minimization.

**Group-B (30-Marks)**

6. **Overview of optimum power** flow and its application. Static security analysis, dynamic security analysis.
7. **Power system control:** Control of frequency, control of active power generation, spinning reserve.
8. **Automatic generation** control and control of reactive power and Voltage

**Recommended Reference:**


1. Leonard L. Grigsby, ***Power System Stability and Control***, CRC Press, 2007.
2. Wood, B.F. Wollenberg, ***Power Generation Operation and Control,*** Second Edition, John Wiley and Sons, 1996.
3. P. Kundur, ***Power System Engineering Series***, MacGraw-Hill Inc., 1994.
4. J.D. Glover and M.S. Sarma, ***Power System Analysis and Design***, Third Edition, Brooks/Cole, 2002.
5. M. Shahidehpour, H. Yamin, Z. Li, ***Market Operations in Electric Power Systems***, John Wiley and Sons, 2002.
6. Stuart A. Boyer, ***SCADA: supervisory control and data acquisition, International Society of Automation***, 2009.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination. Project evaluation & Viva

**Course Code: EEE-4807** **Course Title: High Voltage Engineering**
**Credit Hours: 3** **Contact Hours: 3 per week**
[Prerequisite course: EEE-3519]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'High Voltage Engineering' in regards to high voltage generators, transformer, insulators, high voltage measuring, testing and switching.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Reflect a basic understanding of breakdown criterion in different insulating materials (gases, liquids, and solids) which are used in power system equipment's, generation method of high voltages both AC & DC, insulation coordination, measurement of high voltage techniques etc. | PLO-01 | Cognitive/ Understanding |
| CLO-2 | Demonstrate the problem solving of different types of high voltages engineering circuits. | PLO-02 | Cognitive/ Applying |
| CLO-3 | Design the mathematical model for lightning phenomena and corresponding high voltage engineering circuits. | PLO-03 | Cognitive/ Designing |

**Section –A (Mid-term Exam: 30 Marks)**

1. **High voltage dc**: Rectifier circuits, voltage multipliers, Van-de-Graaf and electrostatic generators.
2. **High voltage ac**: Cascaded transformers and Tesla coils.
3. **Impulse voltage**: Shapes, mathematical analysis, codes and standards,

**Section- B (SEE: 50 Marks)**

**Group- A (20-Marks)**

4. **Single and multi-stage impulse generators**, tripping and control of impulse generators.
5. **Breakdown in gas**, liquid and solid dielectric materials.

**Group-B (30 Marks)**

6. **Corona;** High voltage measurements and testing.
7. **Insulation:** Over-voltage phenomenon and insulation coordination.
8. **Lightning** and switching surges, basic insulation level, surge diverters and arresters.

**Recommended Reference:**


1. E. Kuffel & W.S. Zaengl & J. Kuffel, ***High voltage engineering Fundamentals***, 2nd ed., UK: Butterworth-Heinemann press, 2000.
2. C. L. Wadhwa, ***High voltage engineering***, 2nd ed., New Delhi: New age, 2007.
3. M. S. Naidu & V. Kamaraju, ***High voltage engineering***, 3rd ed., New Delhi:McGraw-Hill,2004.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |

| | | | | | |
|---|---|---|---|---|---|
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

***Electronic Engineering***

**Course Code: EEE-4753** **Course Title: VLSI I**
**Credit Hours: 3** **Contact Hours: 3 per week**
[Prerequisite course: EEE-3607]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about VLSI design technique and modeling as well as CMOS circuit design, characteristics and applications.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Reflect a basic understanding of IC design and fabrication technique. | PLO-01 | Cognitive/ Understanding |
| CLO-2 | Solve different problems related to MOS Device, CMOS logic circuits and Fabrication. | PLO-02 | Cognitive/ Applying |
| CLO-3 | Design and development of different CMOS logic circuits. | PLO-03 | Cognitive/ Designing |

**Section A (Mid Term: 30 Marks)**

**1. Introduction:** Integrated Circuits trends, choice of technology, design approaches, the design process, Mooer`s law, VLSI Design style, overviews of VLSI Design Tools.

**2. Introduction to MOS Devices and Basic Circuits:** MOS device structure, MOS device mode of operation (cut off, saturation, linear, accumulation, depletion), threshold voltage, body effect, NMOS I-V equations and characteristics, PMOSI-V equations and characteristics, Principle of inverter, NMOS Inverter with resister load, NMOS Inverter with NMOS Enhancement Transistor load, NMOS Inverter with NMOS Depletion Transistor load.

**3.CMOS Inverter Design:** The CMOS inverter, transfer characteristics, noise merging, Resistance, capacitance, rise and fall times, delay, switching characteristics, gate transistor sizing and power consumption. [4 lecture]

**Section-B (SEE: 50 Marks)**
**Group-A (20-Marks**

**4. CMOS Fabrication:** Introduction to Fabrication, Basic Fabrication Steps, Lithograpy, Diffusion and Ion Implementation, Epitaxy, Etching, Wafer cleaning, Metallization and Passivation, Steps for Fabricating a NMOS Transistor, n-Well CMOS Technology, p-Well CMOS Technology.

**5. Design Rule:** CMOS Process Layers, Intra-Layer Design Rules (λ), Inter-Layer Design Rules - Transistor Layout (λ), Inter-Layer Design Rules - Contact and Via (λ), Select Layer (λ), CMOS Inverter Layout.

**Group B (30 Marks)**

6. **MOS Logical Circuit Design:** Combinational and sequential logic, Random logic, Static and Dynamic logic gates, N-MOS Transistor series/ Parallel combination, P-MOS Transistor series/ Parallel combination, DC analysis (NAND, NOR, X-OR, X-NOR), Series Parallel Equivalent Circuits, Pass transistor and Transmission gates

**7. Overview of Implementation Approaches:** Full Custom and Semi-Custom Design, Cell based design, Array based design, Standard cells design, Programmable Logic Array, FPGA, Stick Diagram, Scaling, Effect of Scaling in Circuit Performance.

**8**. **Introduction of HDLs and VHDL:** HDLs applications, Range of use, VHDL - overview: VHDL - History, VHDL - Application Field, VHDL benefits, VHDL model components, VHDL architecture bodies, Structural description, Behavioral description.

**Recommended Reference:**


1. Linda E.M Brackenbury, ***Design of VLSI Systems- A Practical Introduction***, 1st ed.,London,UK, Macmillan Education Ltd.1987
2. Neil H.E.Weste, David Money Harris, ***CMOS VLSI Design- A Circuits And Systems Perspective***, 4th ed. United States of America, Pearson Education Inc., 2011
3. Adel S. Sedra , Kenneth C.Smith, ***Micro Electronic Circuits***, 5th ed. Newyork, USA, Oxford University Press, 2004
4. Douglas A. Pucknell, Kamran Eshraghian, ***Basic VLSI Design***, 3rd ed.,India , PHI


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-4754** **Course Title: VLSI I Sessional**
**Credit Hours: 1.5** **Contact Hours: 3 per week**
**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE)**

**Objectives**: This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE-4753. In the second part, students will design simple systems using the principles learned in EEE-4753.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO -1 | Apply the knowledge of MOS devices and CMOS logic circuits. | PLO-01 | Cognitive/ Understanding |
| CLO -2 | Simulate and Layout Design of different CMOS logical circuits using Cadence VLSI Design tools. | PLO-05 | Psychomotor/ Precision |
| CLO -3 | Develop communication skill. | PLO-10 | Affective/Responding |

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,
B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: EEE-4713 Course Code: Compound Semiconductor and Hetero-junction Devices**
**Credit Hours: 3** **Contact Hours: 3 per week**
[Prerequisite course: EEE-2411]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Compound Semiconductor and hetro-junction devices' in regards to the structure of compound semiconductors and characteristics of hetero-junction dvices and their preparation.

**Section A (Mid Term: 30 Marks)**

1. **Compound semiconductor**: Zinc-blend crystal structures, growth techniques, alloys, band gap, and density of carriers in intrinsic and doped compound semiconductors.
2. **Hetero-Junctions**: Band alignment, band offset, Anderson's rule,
3. **Single and double sided hetero- junctions**,

**Section-B (SEE: 50 Marks)**
**Group-A (20-Marks)**

4. **Quantum wells and quantization effects**, lattice mismatch and strain and common hetero-structure material systems.
5. **Hetero-junction diode:** Band banding, carrier transport and I-V characteristics.

**Group B (30 Marks)**

6. **Hetero-junction field effect transistor**: Structure and principle, band structure, carrier transport and I-V characteristics.
7. **Hetero-structure bipolar transistor (HBT**): Structure and operating principle, quasi-static analysis,
8. **Different Models**: Extended Gummel-Poon model, Ebers-Moll model, secondary effects and band diagram of a graded alloy base HBT.

**Recommended Reference:**


1. Donald A. Neamen, ***Semiconductor Physics and Devices***, 3rd Ed., McGraw Hill.
2. M.N. Horenstein, ***Solid State Electronic Device***, 3rd Ed., McGraw Hill.
3. S. M. Sze, ***Semiconductor Devices Physics and Technology***, John Wiley & Sons.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-4809** **Course Title: VLSI II**
**Credit Hours: 3** **Contact Hours: 3 per week**
[Prerequisite course: EEE-4753]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course students learn about Integrated VLSI fabrication process, design layout, floor planning and routing**.**

**Section A (Mid Term: 30 Marks)**

1.**VLSI MOS system design layout ex**traction: Fabrication Process, Wires and Bias, Design rules and tools
2.VLSI MOS system design layout verification,
3. Full and semi-full custom design styles and logical and physical positioning.

**Section-B (SEE: 50 Marks)**

**Group-A (20-Marks**.)

4. **Design entry tools**: Schematic capture and HDL.
5. Logic and switch level simulation. Static timing. Concepts and tools of analysis,

**Group B(30 Marks)**

6. **Floor planning**: solution techniques for floor planning,
7. Placement, global routing and detailed routing.
8. Application specific integrated circuit design including FPGA.

**Recommended Reference:**


1. Jan M. Rabaey, ***Digital Integrated Circuits: A Design Perspective***, Prentice Hall.
2. Abdellatif Bellalaouar, Mohamed I. Elmasry, ***Low-Power Digital VLSI Design: Circuits and Systems***, Kluwer Academic Publishers.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-4810** **Course Title: VLSI II Sessional**
**Credit Hours: 1.5** **Contact Hours: 3 per week**

**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **( SEE)**

**Objectives:** This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE 4809. In the second part, students will design simple systems using the principles learned in EEE 4809.

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: EEE-4811** **Course Title: Optoelectronics**
**Credit Hours: 3** **Contact Hours: 3 per week**
[Prerequisite course: EEE-2411]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about '**Optoelectronics' in regards to** optical properties in semiconductor, LED, Laser, Photo-detectors and solar cells.

**Section A (Mid Term: 30 Marks)**

**1. Optical properties in semiconductor:** Direct and indirect band-gap materials, radiative and non-radiative recombination, optical absorption, photo-generated excess carriers, and minority carrier lifetime, luminescence and quantum efficiency in radiation.
**2. Properties of light:** Particle and wave nature of light, polarization, interference, diffraction and blackbody radiation.
**3. Light emitting diode (LED):** Principles, materials for visible and infrared LED, internal and external efficiency, loss mechanism, structure and coupling to optical fibers.

**Section B (SEE -50 Marks)**

**Group-A (20 Marks)**

**4. Stimulated emission and light amplification**: Spontaneous and stimulated emission, Einstein relations, population inversion, and absorption of radiation, optical feedback and threshold conditions.
**5. Semiconductor Lasers:** Population inversion in degenerate semiconductors, laser cavity, operating wavelength, threshold current density, power output, hetero-junction lasers, optical and electrical confinement. Introduction to quantum well lasers.

**Group-B (30 Marks)**

**6. Photo-detectors**: Photoconductors, junction photo-detectors, PIN detectors, avalanche photodiodes and phototransistors.
**7. Solar cells**: Solar energy and spectrum, silicon and Schottkey solar cells.
**8. Modulation of light**: Phase and amplitude modulation, electro-optic effect, acousto-optic effect and magneto-optic devices. Introduction to integrated optics.

**Recommended Reference:**


1. O.Kasap, ***Optoelectronics and Photonics***, Prentice Hall.
2. M. A. Parker, ***Physics of Optoelectronics***, CRC, 2005.
3. E. Rosencher, B. Vinter, and P. G. Piva, ***Optoelectronics***, Cambridge University Press.
4. G. Cardinale, ***Optoelectronics: Introductory Theory & Experiments***, Delmar Cengage Learning


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and | | | | |

| | |
|---|---|
| | Psychomotor (Skills) domain of Bloom's Taxonomy. |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination. Project evaluation & Viva

**Course Code: EEE-4813** **Course Title: Semiconductor Device Theory**
**Credit Hours: 3** **Contact Hours: 3 per week**
[Prerequisite course: EEE-3607]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Semiconductor Device Theory' in regards to band theory of solid, energy bands, lattice vibrations, band structure of semiconductor, scattering theory**.**

**Section A (Mid Term: 30 Marks)**

**1. Band Theory of Solid:** Bloch Theorem, Kronig Penny model, Brillouin zones, Fermi energy, Fermi surfaces, de Haas-Van Alphen effect,

**2. Energy bands**: Formation energy bands, Density of states, Origin of band gaps, Application of zone theory.

**3. Lattice Vibrations**: Vibrations of Lattices, Organization of lattice vibrations, acoustic and optical phonons, phonon momentum, lattice heat capacity, thermal expansion and thermal conductivity.

**Section B (SEE -50 Marks)**

**Group-A (20 Marks)**

**4. Band structure of semiconductor**: Isotropic and anisotropic crystals, band diagrams and effective masses of different semiconductors and alloys.

**5. Scattering theory**: Review of classical theory, Fermi-Golden rule, scattering rates of different processes, and scattering mechanisms in different semiconductors, mobility.

**Group-B (30 Marks)**

**6. Different carrier transport models**: Drift-diffusion theory, ambipolar transport, hydrodynamic model, Boltzman transport equations, quantum mechanical model, and simple applications.

7. **Charge transfer devices**: Dynamic effects in MOS capacitors,, the basic CCD and Application of CCD's.

8. **IC Testing, Bonding and Packaging**: Testing, Wire bonding, Flip-Chip Techniques and Packging.

**Recommended Reference:**


1. Donald A. Neamen, ***Semiconductor Physics and Devices***, 3rd Ed., McGraw Hill.
2. M.N. Horenstein, ***Solid State Electronic Device***, 5th Edition, Prentice Hall.
3. S. M. Sze, ***Semiconductor Devices Physics and Technology***, John Wiley & Sons.
4. B. G. Streetmen &S.Kumer Banerjee, ***Solid State Electronic Devices***.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |

| | |
|---|---|
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

## Communication Engineering

**Course Code: EEE-4723** **Course Title: Microwave Engineering**

**Credit Hours: 3** **Contact Hours: 3 per week**

[Prerequisite course: EEE-3601]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course the student will learn about '**Microwave Engineering' in regard to** generation and. transmission of microwave energy and microwave devices.

**Section- A (Mid-term: Marks 30)**

1. **Transmission Lines*:*** Transmission line equations and parameters; Transmission line configuration and formulae, Transmission line at radio and audio frequency,
2. **Impedance matching**: Line termination, Smith chart, S. W. R. Q and band width, Balanced and unbalanced feeder from transmitter to antenna, Distortion less line.
3. **Wave Guides:** Rectangular and cylindrical wave guides, Cavity resonators, Microstrip lines and their characteristics,

**Section –B (SEE -50 Marks)**

**Group-A (20 marks)**

4. **Microwave Components:** Microwave hybrid circuits, scattering parameters, Wave guide Tees, Directional couplers, Circulators and Isolators, Phase shifter and attenuator,
5. **Solid state microwave devices**. Gunn diode, IMPATT Diode, TRAPATI Diode,

**Group-B (30 marks)**

6. **Microwave Tubes:** Klystron, Magnetron, TWT.
7. **Microwave Antenna:** Hertzian and half wave dipoles. Mono pole, horn, rhombic and parabolic reflector, array, and Yagi-Uda antenna.
8. **Microwave Link:** Microwave link and its advantage, Frequency assignment and modulation methods, Transmitting and receiving equipment, Base band repeater, IF repeater, Microwave carrier supply, Auxiliary channels

**Recommended Reference:**


1. D. Raddy & Coolen, Electrical Communication.
2. J. D. Ryder, Networks, Lines and Fields.
3. Bronwell and Beam, Theory and Application for Microwave.
4. J.B.Kraus, Antennas.
5. J Reich, Microwave Principle.
6. Y. Liao, Microwave Devices and Circuits Devices.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | Evaluations out of 100 marks | |
|---|---|---|
| | CIE (50 marks) | SEE (50 marks) |

| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
|---|---|---|---|---|---|
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-4724** **Course Title: Microwave Engineering Sessional**
**Credit Hours: 1.5** **Contact Hours: 3 per week**

**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **( SEE)**

**Objectives:** This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE 4723. In the second part, students will design simple systems using the principles learned in EEE 4723.

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: EEE-4715** **Course Title: Digital Signal Processing II**
**Credit Hours: 3** **Contact Hours: 3 per week**

[Prerequisite course: EEE-3603]

**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **( SEE)**

**Objectives :**In this course student will learn about Digital Signal Processing in regards to spectral estimation, periodogram, adaptive signal processing, IR filters, multirate DSP and wavelets**.**

**Section- A (Mid-term: Marks 30)**

1. **Spectral estimation**: Nonparametric methods – discrete random processes, autocorrelation sequence,
2. **Periodogram**; parametric method – autoregressive modeling, forward/backward linear prediction,
3. **Algorithm**: Levinson-Durbin algorithm, minimum variance method and Eigen-structure method I and II.

**Section –B (SEE -50 Marks)**

**Group-A (20 marks)**

4. **Adaptive signal processing**: Application, equalization, interference suppression, noise cancellation,
5.**Filters**: IR filters, minimum mean-square error criterion, least mean-square algorithm and recursive least square algorithm.

**Group-B (30 marks)**

6. **Multirate DSP:** Interpolation and decimation, poly-phase representation and multistage implementation.
7. **Perfect reconstruction filter banks**: Power symmetric, alias-free multi-channel and tree structured filter banks.
8. **Wavelets**: Short time Fourier transform, wavelet transform, discrete time orthogonal wavelets and continuous time wavelet basis.

**Recommended Reference:**


1. Alan V. Oppenheim, Ronald W. Schafer, Digital Signal Processing.
2. Rabiner and Gold. A, Theory and Application of Digital Signal Processing.
3. William D. Stanley, Digital Signal Processing.
4. J. G. Proakis and D. G. Manolakis, Digital Signal Processing: Principles, Algorithms, and Applications
5. Richard G. Lyons, Understanding Digital Signal Processing


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-4833** **Course Title: Digital Communication**
**Credit Hours: 3** **Contact Hours: 3 per week**
[Prerequisite course: EEE 3601 Communication Theory]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Digital Communication' in regard to sampling, multiplexing, information theory, source coding, error control coding, video transmission and storage, system noise as regard to digital communication.

**Section –A (Mid-term Exam: 30 Marks)**

**. Digital Communication Overview:** Electronic Communications; Sources and sinks of information; ADC, Digital Communication; Radio receivers; Signal transmission, Switching and networks; Advantages of digital communication over analogue communication.

**2. Sampling, Multiplexing:** Introduction, Pulse modulation, Sampling, Analogue pulse multiplexing, Quantised pulse amplitude modulation, Signal to quantisation noise ratio (SNqR), Pulse code modulation, Bandwidth reduction techniques.

**3. Baseband Transmission:** Introduction, Baseband centre point detection, Error accumulation over multiple hops, Line coding, Multiplex telephony, Digital signal regeneration, Symbol timing recovery, Repeater design.

**Section –B (SEE -50 Marks)**

**Group A-(20 marks)**

**4. Information Theory and Source Coding:** Introduction, Information and entropy, Conditional entropy and redundancy, Information loss due to noise, Source coding, Variable length coding, Source coding examples.

**5. Error Control Coding:** Introduction, Hamming distance and codeword weight, (n,k) Block codes, Syndrom decoding, Cyclic codes, Encoding of convolutional codes, Practical coders.

**Group B-(30 marks)**

**6. Video transmission and storage:** Introduction, Color representation, Conventional TV transmission systems, High definition TV, Digital video, Video data compression, Compression standards, Packet video**.**

**7. Queuing theory and its application in communication:** Introduction, The arrival process, the simple server queue, Packet speech transmission.

**8. System noise and communications link budgets:** Introduction, Physical aspects of noise, System noise calculations, Radio communication link budgets.

**Recommended Reference:**


1. Ian Glover&Peter Grant, Digital Communications, Prentice-Hall Inc.
2. J.F. Kuross & K. W. Ross, Computer Networking.
3. William Stallings, Data & Computer Communication.
4. Andrew S. Tanenbaum, Computer Networks.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-4834** **Course Title: Digital Communication Sessional**
**Credit Hours: 1.5** **Contact Hours: 3 per week**

**Objectives:** This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE-4833. In the second part, students will design simple systems using the principles learned in EEE-4833

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: EEE-4835** **Course Title: Mobile Cellular Communication**
**Credit Hours: 3** **Contact Hours: 3 per week**
[Prerequisite course: EEE-3601]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Section –A (Mid-term Exam: 30 Marks)**

**1. Cellular Concept:** Historical development of Cellular Mobile Communication. A Mobile Wireless to Cellular concept, Frequency reuse and its application for different types of cell design, Co-channel interference and non-co channel interference, other Interferences. Call drops and necessity of Handoffs, types of Handoffs.
**2. Capacity Enhancement:** Cell design, 4 cell and 7 cell design concept, Cell divisions, Sectoral Antennas for the cell sites for different types of cell design, Types of antennas used in Cell sites,
**3. Large scale path loss:** Path loss and Path loss models in Mobile Wireless Communications, Foliage loss, Loss due to atmospheric conditions,

**Section –B (SEE -50 Marks)**
**Group A-(20 marks)**

**4. Small Scale Path loss:** Different types of Fading in Mobile Wireless Communications,
**5. GSM Architecture:** GSM, specifications for cellular telephony, Difference between GSM and other types of Cellular Mobile Communication system, GSM Architecture, Functions of MSC, BSC, BTS and other functional blocks (subsystems and parts) of a GSM system, Situations and Techniques of Handover in GSM

**Group B-(30 marks)**

**6. GSM Channels and Coding:** Different types of Channels and Signaling in GSM, Voice and Control channels of a GSM system, Channel Structure and traffic channels, Control Channel and Burst structure, Speech Coding, Channel coding, modulation and power coding in GSM,
**7. Advanced Cellular:** Enhancement of GSM for Data transmission, GPRS and EDGE, Brief introductions to 3G and 4G Cellular Mobile Communications Systems.
**8. AMPS and CDMA:** Introduction to AMPS system. channel assignment, An introduction to CDMA in mobile communication and CDMA 2000,

**Recommended Reference:**


1. Theodor S. Rappaport, Wireless Communications; Principle and Practice.
2. WCY Lee, Cellular communication.
3. Schiller, Mobile Communication.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-4837** **Course Title: Telecommunication Engineering**
**Credit Hours: 3** **Contact Hours: 3 per week**
[Prerequisite course: EEE-3601]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Telecommunication Engineering' in regards to telephone apparatus, telephone signal and switching, concepts of TDM, traffic engineering, modern telephone services and network as well as cellular mobile telephone.

**Section –A (Mid-term Exam: 30 Marks)**

1. **Introduction and Telephone apparatus:** Principle, evolution, networks, exchange and international regulatory bodies.microphone, speakers, ringer, pulse and tone dialing mechanism, side-tone mechanism, local and central batteries and advanced features.
2. **Switching system**: Principles of common control touch tone dial telephone, Cross point technology, No. 1 ESS, Japanese D-10, Metaconta. digital switching systems – space division switching, blocking probability and multistage switching, time division switching and two-dimensional switching.
3. **Signal Switching**: Stored program control, Centralized SPC, Distributed SPC, Software architecture, Application software, Enhanced services, Two-stage network, Three-stage network, n-stage network.

**Section –B (SEE -50 Marks)**

**Group A-(20 marks)**

4. **Concepts of TDM**: Basic time division space switching, Basic time division time switching, Time multiplexed space switching, Time-multiplexed time switching, Combination switching, Three-stage combination switching, n-stage combination switching.
5. **Traffic Engineering:** Network traffic load and parameters, Grade of service and blocking probability, Modeling switching systems, Incoming traffic and service time characterization, Blocking models and loss estimation, Delay system and queuing.

**Group B-(30 marks)**

6. **Telephone Networks:** Subscriber loop systems, Switching hierarchy and routing, Transmission plan, Transmission systems. numbering plan Charging plan, signaling techniques, in channel signaling, Common channel signaling.
7. **Modern telephone services and network**: Internet telephony, facsimile, integrated services digital network, asynchronous transfer mode and intelligent networks. Introduction to cellular telephony and satellite communication
8. **Cellular Mobile Telephone:** Mobile telephone systems, Trunking efficiency, Basic cellular system, Performance criteria, Mobile radio environment, Operation of cellular systems, Planning a cellular systems, Analog and digital cellular systems.

**Recommended Reference:**


1. N.N. Biswas, Principles of Telephony
2. M.T. Hills, Telecommunication Switching Principles
3. T. Viswanathan, Telecommunication Switching Systems and Networks
4. W.C.Y. Lee, Mobile Cellular Telecommunication
5. J.Y. Bryce, Using ISDN
6. J.C. Bellamy, Digital Telephony


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

***Interdisciplinary Fields***

**Course Code: EEE-4825** **Course Title: Biomedical Instrumentation**
**Credit Hours: 3** **Contact Hours: 3 per Week**
[Pre requisite: EEE-2411]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Biomedical and Analytical Instrument' in regards to human body, measurement of Bio-signals, blood flow measurement and operation and working principles of different types of biological instruments.

**Section –A (Mid-term Exam: 30 Marks)**

1. **Physics of human body*:*** The cell, Body fluid, Musculo-skeletal system, Respiratory system, Nervous system, The circulatory system, The body as a control system, The heart, Bioelectricity, Work done by heart, blood pressure and its measurements, Membrane potentials, Electrical activity of excitable cells, Molecular basis of muscle contraction, Basic electrical signals from the muscles.
2. **Interaction of wave and radiation with human body**: Body's detector and matter wave, speech noise, physiological effects of intense matter waves, Interaction of electromagnetic radiation on living mater, penetration of ray's into tissue. Biological effects of ionizing radiation***:*** Dosimetry, primary effects, Biophysical effects of whole body irradiation, radiation measurement and protection.
3. **Biopotentials electrodes and amplifiers*:*** Biopotential electrode, Sensors, Transducers and bioelectric amplifiers, Electromagnetic interference of medical electronic equipment, ENG, EMG, ECG, ERG, EEG, MEG.

**Section-B (SEE: 50 Marks)**

**Group-A (20-Marks)**

4. **Ultrasonography*:*** Physics of ultrasonic wave, Ultrasonic transducers, Absorption and attenuation of ultrasound, Scan modes, scan pattern and scanning systems, Doppler imaging, Echocardiography, Ultrasonic flow meter, Ultrasonic blood pressure measurement.
5. **X-ray:** X-ray production, X-ray image formation and contrast, Contrast types, Effects of photon energy, Area contrast, Fluoroscopic imaging system, computed tomography.

**Group B. (30 Marks)**

6. **Magnetic resonance imaging**: Nuclear magnetic resonance, Image characteristics, Gamma camera.
7. **Analytical and Medical Laboratory Instruments:** Blood components, Colorimeter, spectrophotometer, Blood cell counter, pH/Blood gas analyzer, chromatograph, Auto analyzer, Atomic absorption and atomic emission spectroscopy.
8. **Therapeutic and Prosthetic Devices:** Cardiac pacemaker, Hemodilysis, Defibrillator, Surgical diathermy.

**Recommended Reference:**


1. C. J. Casey, Biophysics concept and mechanism
2. Joseph J Carr & John M Brown, Introduction to Biomedical equipment technology
3. John G Webster, Medical Instrumentation
4. J. G. Skofronick, Medical Physics


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,
ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-4826** **Course Title: Biomedical Instrumentation Sessional**
**Credit Hours: 1.5** **Contact Hours: 3 per Week**
**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **( SEE)**
**Objectives:** This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE 4825. In the second part, students will design simple systems using the principles learned in EEE 4825.

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).
A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,
B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).
A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,
B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: EEE-4827** **Course Title: Measurement and Instrumentation**
**Credit Hours: 3** **Contact Hours: 3 per Week**
[Pre requisite: EEE-2411]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course students will learn about 'Measurement and Instrumentation' in regards to measurement system, measuring instruments, measurement of electrical non-electrical quantities, transducers and data transmission.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO -1 | Reflect a basic understanding of measurement system, measuring instruments, converters, and application of instruments in measuring electrical and non-electrical quantities. | PLO-01 | Cognitive/ Understanding |

| | | | |
|---|---|---|---|
| CLO -2 | Demonstrate basic proficiency in developing converters, and design measurement system for electrical and non-electrical quantities. | PLO-03 | Psychomotor/ Manipulation |
| CLO -3 | Apply the necessary learning skills in industrial electrical and various non electrical measurements and data processing sector. | PLO-02 | Cognitive/ Apply |

**Section-A (Mid-term Exam: 30 Marks)**

1. **Introduction**: Applications, Methods, functional elements of a measurement system and classification of instruments.
2. **Measurement of electrical quantities**: Current and voltage, power and energy measurement. (PMMC and Electrodynamometer Type instruments).
3. **Instruments**: Rectifier type instruments (elements, characteristics, types, sensitivity), Instrument Transformer: Current and Potential Transformer.

**Section-B (SEE: 50 Marks)**

**Group-A (20-Marks**

4. **Transducer**: Mechanical, Electrical and Optical.
5. **Measurement of non-electrical quantities**: Temperature, pressure, flow, level, strain, force and torque.

**Group-B (30-Marks)**

6. **Data Transmission and Telemetry**: Methods of data transmission, dc/ac telemetry system and digital data transmission.
7. **Basic elements of dc and ac signal conditioning**: Instrumentation amplifier, noise and source of noise, noise elimination compensation, function generation and linearization.
8. **Converters**: A/D and D/A converters, sample and hold circuits.

**Recommended Reference:**


1. A.K. Sawhney & Puneet Sawhney, ***A Course in Electrical and Electronic Measurements andInstrumentation***, 17th ed., India: Dhanpat Rai & Co., 2006.
2. B. C. Nakra & K. K. Chaudhry, ***Instrumentation Measurement and Analysis***, 4th ed., India: McGraw Hill India., 2016. Digital Systems: Principles and Applications
3. Ronald J. Tocci, Neal Widmer & Gregory L. Moss, ***Digital Systems: Principles and Applications***, 10th ed., USA: Prentice Hall., 2006.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-4828** **Course Title: Measurement and Instrumentation Sessional**
**Credit Hours: 1.5** **Contact Hours: 3 per Week**
**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **( SEE)**

**Objectives:** This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE-4827. In the second part, students will design simple systems using the principles learned in EEE-4827.

| S/N | CourseLearning Outcomes (COs): Upon the successful completion of the course, students will be able to | Correspondi ng PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO -1 | Reflect a basic understanding of measuring instruments, tools, sensors and application of these in measuring electrical and non-electrical quantities. | PLO-05 | Cognitive/ Understanding |
| CLO -2 | Design different type of system for home and industrial application using sensors. | PLO-03 | Cognitive/ Designing |
| CLO -3 | Apply the necessary practical skills in industrial electrical and various non-electrical measurements for public health, social and safety issues. | PLO-06 | Psychomotor/ Manipulation |

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: EEE-4843** **Course Title: Renewable Energy System**
**Credit Hours: 3** **Contact Hours: 3 per week**

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will learn about 'Renewable Energy System' in regards to solar constants, solar collectors and their characteristics, solar cells, wind energy and other non-conventional energy**.**

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO -1 | Understand the need for sustainable development through the knowledge of world energy scenario and energy scenario of Bangladesh. Also, they will learn modern conversion technologies for different types of | PLO-07 | Cognitive/ Understanding |

| | | | |
|---|---|---|---|
| | RE sources such as Solar energy, Wind Energy, Biomass energy, Tidal Energy, Wave Energy, Biofuels etc. | | |
| CLO -2 | Identify problems and providing solutions using RE technologies for the better environmental and social human life. | PLO-06 | Cognitive/ Analyzing |
| CLO -3 | Design and demonstrating proficiency in the development of RE-based power system and integration of RE technologies with the power grid. | PLO-03 | Cognitive/ Designing |

**Section- A (Mid-term: Marks 30)**

**1. Introduction:** Importance of Renewable energy, Sustainable energy and sustainable development, World energy scenario: demand and reserve, Future energy solution, Source of non-Conventional energy, Energy scenario of Bangladesh, Introduction to different renewable energy sources, Statistics regarding solar radiation and wind speed, Solar geometry: Solar constant, Azimuth, Zenith angle, clearness index, Declination, Day length, hour angle, Air mass, solar radiation etc., Topics include environmental benefits of solar energy.

**2. Solar Radiation measurement and Solar energy conversion**: Estimation of solar radiation: Mathematical approach; Measurement of solar radiation; Different types of Pyranometer: Thermopile Pyranometer, Photovoltaic Pyranometer etc.; Different methods of solar energy conversion system; Solar thermal power generation; Active and passive solar design.

**3. Solar energy collectors**: Flat plate collectors, Concentrating collectors, Evacuated tube collector, collector, enclosed trough type collector, CSP, Solar pumping, collector efficiency factor, heat removal factor and flow rate factor.

**Section –B (SEE -50 Marks)**

**Group-A (20 marks)**

**4. Solar Cells**: Theory of Solar cell: Principle of operation, characteristics and construction of a solar cell, classification of solar cell, equivalent circuit, factors affecting conversion efficiency, maximum power output, Optimization of cell design, different types of solar cell in details etc.; Photovoltaic ( PV) modules and arrays: stationary and tracking; Mismatch effect of solar cell; degradation and failure of solar cell; Maintenance and protection of PV module; urban/rural applications.

**5. PV system, Energy storage and Radiation characteristics**: PV system design: stand alone; hybrid photovoltaic/thermal systems, battery storage, reliability indices for PV system; Different types of energy storage, sensible heat storage, latent heat storage; Absorption, transmittance, reflectance, selective surfaces.

**Group -B (30 marks)**

**6. Wind Energy:** Wind energy conversion systems: Basic principle of operation, classification of wind turbine generators (WTG), output power equation, wind turbine components, efficiency, output power characteristics etc.; different types of modern technologies for harvesting wind energy; Installation of wind farm: types of wind farm, wind speed assessment, site selection, determination of potentiality of wind energy and application to power generation, estimation of expected power, cost, and capacity factor etc.

**7. Renewable Energy Penetration on the Power Grid:** Problems related to integration of RE sources with the power grid; interfacing primary sources; generator/load characteristics; Modern technologies for interfacing RE sources with the power grid; Solar energy grid interfacing: grid-interactive PV system configurations and associated control systems for stable output power from PV; Wind energy grid interfacing: Modern WTG such as DFIG, PMSG systems, and its associated control systems for controlling output power, voltage, frequency etc., impact of variability of wind turbine output on power system, impact of wind energy penetration on power system dynamics and stability ; battery charging/management; AC and DC hybrid system with the interconnection of RE sources.

8. **Other non-conventional energy**: Biomass energy, tidal energy conversion, geothermal energy, wave energy generator, Biofuel, Micro-hydro, Fuel-cell etc.

**Recommended Reference:**


1. Gilbert M. Masters, “Renewable and Efficient Electric Power Systems” John Wiley & Sons, Inc., Hoboken, New Jersey, USA, ISBN 0-471-28060-7, Year 2004.
2. G. R. Nagpal, S.C. Sharma, “Power Plant Engineering” G R. Edition 15, Khanna Publisher, ISBN-10: 8174091556, ISBN-13: 9788174091550, Year 2007.

3. I. Munteanu, E. Ceanga, "Optimal control of Wind Energy Systems", Springer, ISBN: 978-1-84800-079-7, Year 2008.

**A Sample Question Assessment Pattern (Theory courses):**

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination. Project evaluation & Viva

**Course Code: EEE-4844** **Course Title: Renewable Energy System Sessional**
**Credit Hours: 3** **Contact Hours: 3 per week**

**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE)**

**Objectives:** In this course students will perform experiments to verify practically the theories and concepts learned in EEE-4843.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Get the basic **understanding** about operation and characteristics of modern conversion technologies of Renewable Energy (RE) harvesting technologies such as solar cell, wind turbine etc. and investigation of potentiality of RE sources for different location. | PLO-01, | Cognitive/ Understanding |
| CLO-2 | Demonstrating proficiency in **Design** and development of the stand-alone solar home system (SHS). | PLO-03 | Cognitive/ Designing; |
| CLO-3 | RE-based power system using **modern simulation tools** such as MATLAB, PSCAD, Homer etc., and power quality analysis for the integration of RE technologies with the power grid. | PLO-05 | Cognitive/ Analyzing |

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance

**(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: EEE-4841** **Course Title: Antenna & Propagation**
**Credit Hours: 3** **Contact Hours: 3 per Week**
[Pre requisite: EEE-3601]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** The *objective* of this *course* is to introduce the fundamental ideas of the antenna and propagation.

**Section –A (Mid-term Exam: 30 Marks)**

**1) Antenna Basics:** Radiation fields of elemental dipoles. Antenna patterns and antenna parameters: beamwidth, directivity, gain, side-lobes, linear polarization, circular polarization, radiation resistance.

**2) Antenna Basics:** equivalent circuit of receiving antenna, effective length, capture area, Friis transmission formula. Reciprocity theorem. Radiation by dynamic currents and charges, retarded potentials, isotropic source. Half-wave dipole, loop antenna.

**3) Antenna Arrays:** Two-element array, N-element linear array, phased array, uniform spacing and amplitude, non-uniform amplitude, planar array.

**Section- B (SEE: 50 Marks)**

**Group- A (20-Marks)**

**4) Analysis of Different types of Antennas:** Biconical antenna, cylindrical dipole, folded dipole, Monopole antenna, V Antennas, Inverted V Antennas, J-pole antenna, rhombic antenna, helical antenna, Yagi-Uda arrays,

**5) Analysis of Different types of Antennas:** log-periodic antenna, slot, micro strip antenna, rectangular horn Antenna, circular horn antenna, Cassegrain Antenna, parabolic reflectors, lenses.

**Group-B (30 Marks)**

**6) Radio Wave Propagation:** Electromagnetic waves, wave front, characteristic impedance of free space, reflection, refraction and diffraction. Ground waves and sky waves.

**7) Radio Wave Propagation:** The ionospheric layers, refractive index, virtual height, critical frequency and angle, maximum usable frequency, skip zone, skip distance, fading.

**8) Radio Wave Propagation:** VHF line of sight transmission. Tropospheric scattering communications. Relationship between transmitter power, antenna gains and received signal to noise in a free space radio link. VHF and microwave point-to-point link.

## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the | | | | |

| | |
|---|---|
| | semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-4842** **Course Title: Antenna & Propagation Sessional**
**Credit Hours: 1.5** **Contact Hours: 3 per Week**

**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **( SEE)**

**Objectives:** In this course students will perform experiments to verify practically the theories and concepts learned in EEE-4841.

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Code: EEE-4845** **Course Title: Embedded system**
**Credit Hours: 3** **Contact Hours: 3 per Week**

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course students will learn the basics of designing, interfacing, configuring, and programming embedded systems. They will make use of the PIC microcontroller, which is an inexpensive, popular embedded microcontroller used by hobbyists, researchers, and in industry, to implement the techniques learned in class.

**Section- A (Mid-term: Marks 30)**

**(1) Introduction of Embedded System and Microcontroller Architecture:** Definition, characteristics, application and challenges in embedded system design, use of microprocessor in embedded system, embedded system design process, inside the embedded system, Microcontroller, Microcontroller architecture, inside the microcontroller, Commercial microcontroller devices, and selection of microcontroller.

**(2) Embedded Microcontroller and Programming:** Block diagram, pin functions and features of 8051/PIC16F887 (or any other) microcontroller, Programming language (Machine, Assembly and high level language), Basics of C (data type, variable, constants, operator, conditional operator, loop, array and functions), Assembly language Instructions.

**(3) Parallel I/O ports:** Parallel Ports (Simple parallel and multifunctional parallel I/O ports), Use of parallel ports, Pull-up resistor, I/O Ports of PIC16F887 (or any other) microcontroller, interfacing microcontroller with switch, LED, Single &multiple LED segment display, matrix display and digital sensors.

**Section –B (SEE -50 Marks)**

**Group-A (20 marks)**

**(4) Some important I/O interface and Interrupt System:** LCD display, Key pad, electromagnetic relay, DC motor and servo motor interfacing, interfacing with digital sensors (Ultrasonic, IR, motion, sound sensor etc.), Interrupt definition and sources, recognizing an interrupt, Interrupt System of PIC16F887 (or any other) microcontroller, Application of interrupt in real time system.

**(5) Timer/Counter:** Purpose and application of timer/counter, Timer counter in PIC16F887 (or any other) microcontroller, operation in timer mode and counter mode, use of prescaler and interrupt in timer operation, Application of timer/counter in real time system.

**Group -B (30 marks)**

**(6) Interfacing to analog world:** Analog to digital conversion techniques, quantization error, sampling rate, A/D Converter inside PIC16F887 (or any other) microcontroller, Sensor interfacing (LDR, thermistor, Gas sensor etc.), Applications such as digital voltmeter, light intensity measurement etc.

**(7) Serial Communication:** Basic Serial Port operation, USART, Serial peripheral interface (SPI), inter-IC (I2C) serial interface, Serial communication modules of PIC16F887 (or any other) microcontroller, Application of serial communication in real time system.

**(8) FPGA:** FPGA definition and application, FPGA Vs ASICs and ASSPs, History of FPGA, FPGA architecture, FPGA programming language, Verilog HDL, Structural Verilog coding, RTL Verilog coding for combinational and sequential digital circuit, Design of RAM and bi directional I/O ports in FPGA.

**Recommended Reference:**


1. Milan Verle, ***PIC Microcontroller***, 1st edition, mikroElectrica, 2009.
2. Steve Heath, ***Embedded System Design***.
3. Wayne Wolf, ***Computer as components***.
4. Md. Liakot Ali, ***Verilog HDL: An easy approach for beginners***.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination . Project evaluation & Viva

**Course Code: EEE-4846** **Course Title: Embedded system sessional**
**Credit Hours: 1.5** **Contact Hours: 3 per Week**

**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **( SEE)**

**Objectives:** In this course students will perform experiments to verify practically the theories and concepts learned in EEE-4845.

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance

**(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

**Course Title: EEE-4847** **Course Title: Optical Fiber Communication**
**Credit Hours: 3** **Contact Hours: 3 per week**
[Prerequisite course: EEE-3601]

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student will lean about 'Optical fiber Communication' in regards to characteristics optical fiber, light sources and detectors for optical communication, noises, receiver analysis, optical amplifier and multi-channel optical system.

**Section- A (Mid-term: Marks 30)**

1. **Introduction**: Principle of light transmission in a fiber, propagation of light in an optical fiber, ray model and wave model.
2. **Optical fiber**: Types and characteristics, transmission characteristics, fiber joints and fiber couplers.
3. **Losses in fibers,** Dispersion, Power and rise time budget, SNR and BER calculations,

**Section –B (SEE -50 Marks)**

**Group-A (20 marks)**

4. **Light sources and detectors**: Light emitting diodes and laser diodes. PIN photo-detector and avalanche photo-detectors, Photo detector connector and splices.
5. **Coherent optical communication**: Introduction, WDM systems, Devices for coherent optical communication, Chromatic dispersion, nonlinear refraction, four wave mixing and laser phase noises.

**Group-B (30 marks)**

6. **Receiver analysis**: Direct detection and coherent detection, noise and limitations.
7. **Optical amplifier**: Laser and fiber amplifiers, applications and limitations. Introduction to high-speed long-distance fiber optic links.
8. **Multi-channel optical system:** Frequency division multiplexing, wavelength division multiplexing and co-channel interference.

**Recommended Reference:**


1. S.E.Miller& A.G. Chynoweth, ***Optical Fiber Telecommunication***.
2. Barnoski, ***Fundamentals of Optical Fiber Communication***.
3. Chrin, ***An Introduction to Optical Fiber***.
4. J. M. Senior, ***Optical Fiber Communication***.


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE | | | | |

| | |
|---|---|
| | and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term &Semester end examination. Project evaluation & Viva

**Course Title: EEE-4848** **Course Title: Optical Fiber Communication Sessional**
**Credit Hours: 3** **Contact Hours: 3 per week**

**Marks distribution for Sessional courses:** There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc.
at the end of semester end examination **(SEE)**

**Objectives:** In this course students will perform experiments to verify practically the theories and concepts learned in EEE-4847.

**Course Assessment Pattern (Sessional Courses):** There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester end examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid &Semester End), Table Viva

# F. University Requirement Courses

**Course Code: UREL 1106** **Course Title: Advanced English**
**Credits hours: 2** **Contact hours: 2 contact hours per week**

| | | | |
|---|---|---|---|
| Course Assessments | CIE: Continuous Internal Evaluation | Attendance | 10 Marks |
| | | Class test/ Assignment/ Quizzes | 10 Marks |
| | | Mid-term | 30 Marks |
| | SEE: Semester End Examination | | 50 Marks |

Rationale of the Course: This course has been designed for the students of first semester because they need to develop four basic skills of English (i.e. Listening, Speaking, Reading and Writing) to a level that they can comprehend lectures given in English, comprehend literary, non-literary, formal and informal texts and communicate effectively both orally and in written form. They also need to prepare themselves for IELTS/TOEFL exams so that they can take these exams for their higher study abroad. They also need to build up confidence in their own speaking and writing which will be provided by teaching them essential grammatical points. This course is designed with an objective to fulfill this aim.

| S/N | **Course Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding IIUC Mission | Bloom's taxonomy domain/level |
|---|---|---|---|
| **CLO1** | Acquire four skills of English language which enable them to study, analyze, explain both orally and in written form different aspects of science and engineering. | IIUCMS-1 | Cognigtive/ Understand |
| **CLO2** | Understand the lectures given in English and write answers in the examination using correct and standard English. | IIUCMS-1 | Cognigtive/ Understand |
| **CLO3** | Communicate effectively in relation with science and engineering by overcoming English language barriers. | IIUCMS-1 | Cognitivd/Apply |
| **CLO4** | Get good grades in all international examinations, competitive examinations as well as internal examinations by using fluency in both spoken and written English. | IIUCMS-1 | Cognigtive/ Apply |
| **CLO5** | Study and comprehend Science and Engineering texts, reference books which are written in English, engineering and science related articles in national and international journals and acquire substantial knowledge about science and engineering. | IIUCMS-2 | Cognigtive/ Annalyse |
| **CLO6** | Develop a self-confidence in the use of English all through the science and engineering career and thus to achieve a lucrative social status. | IIUCMS-3 | Cognitive/ Evaluate |

Course content:

| Chapter | Section-01: Mid-term :<br>(Reading-1 (Seen-08), Reading-2 (Unseen-07), Writing-1 (Sentence Construction)-05, Writing-2 (composition)-05, Listening-05 or Speaking-05) | Number of Lectures | CLOs |
|---|---|---|---|
| 1 | - Reading from the prescribed Text. (First half of the prescribed text)<br>(Any one of the following texts will be chosen for both midterm & final)<br>● Exercises in Reading Comprehension<br>Edited by: E.L. Tibbits<br>Longman Group Limited, Longman House<br>Burnt Mill, Essex, UK<br>● Build up Your English,<br>A.J. Glover,<br>The English Language Book Society and<br>J.M. Dents and Sons Ltd. London<br>● The Pilgrim's Progress (selected passages)<br>John Bunyan<br>William Collins Sons & Co. Ltd. London (part one)<br>● The Old Man and the Sea (selected passages)<br>Earnest Hemingway<br>Peacock Books<br>B-2, Vishal Enclave, New Delhi-110027 | 5 | CLO-1 |
| 2 | (Passages in the examination will be unseen). Students will practice reading Dhaka Courier/daily newspaper/Passages for IELTS reading module at the lab.<br>Focus will be given on: Strategies of reading, scanning for specific details and skimming for general understanding, identifying main and supporting ideas, summarizing, understanding argument, identifying opinion/attitude and making inferences, analysis and interpreting variety of texts, techniques and strategies for improving comprehension skills, practicing comprehension from literary and non-literary texts, techniques of speed reading.<br>The following websites will be used:<br>● http://www.dhakacourier.com.bd/<br>● http://ielts-up.com/reading/ielts-reading-practice.html#academic<br>● https://allmedialink.com/english-newspaper-of-bangladesh/<br>● http://www.indiacelebrating.com/paragraph/paragraph-on-moral-values/ | 5 | CLO-1 |
| 3 | -Sentence writing and composition<br>Sentences: sentence variety, (Construction of assertive, imperative, interrogative, optative, exclamatory, simple, complex, compound), common errors (use of active in place of passive and vice versa/sequence of tense/WH questions/ Y/N questions etc.)<br>Composition:<br>Paragraph (free and guided)<br>Writing/completing a story. | 4 | CLLO-2 |

| | | | |
|---|---|---|---|
| 4 | Speaking and listening<br>Speaking- Introducing oneself, dialogue.<br><br>Listening: Listening for specific information, identifying detail<br>Developing vocabulary: Students are required to sign up with –<br>● https://www.vocabulary.com/<br>● https://helloenglish.com/<br>(Students will use their own android devices/laptops/computers at the lab and work at home with the above two sites. The teacher will monitor their progress and take occasional tests)<br>The following site will be used for listening practice.<br>● http://ielts-up.com/listening/ielts-listening-practice.html | 4 | CLO-3 |
| Section-02: SEE; 50 marks:<br>Reading-1 (Seen-15), Reading-2 (Unseen-10), Writing-1 (Sentence Construction)-10, Writing-2 (composition)-05, Listening-05, Speaking-05 | | | |
| 5 | Reading from the prescribed Text. (The last half of the prescribed text)<br>(Any one of the following texts will be chosen for both midterm & final)<br>● Exercises in Reading Comprehension<br>Edited by: E.L. Tibbits<br>Longman Group Limited, Longman House<br>Burnt Mill, Essex, UK<br>● Build up Your English,<br>A.J. Glover, The English Language Book Society<br>and J.M. Dents and Sons Ltd. London<br>● The Pilgrim's Progress (selected passages)<br>John Bunyan<br>William Collins Sons & Co. Ltd. London (part one)<br>● The Old Man and the Sea (selected passages)<br>Earnest Hemingway<br>Peacock Books<br>B-2, Vishal Enclave, New Delhi-110027 | 6 | CLO-3 |
| 6 | (Passages in the examination will be unseen). Students will practice reading Dhaka Courier/daily newspaper/Passages for IELTS reading module at the lab.<br>Focus will be given on : Strategies of reading, scanning for specific details and skimming for general understanding, identifying main and supporting ideas, summarizing, understanding argument, identifying opinion/attitude and making inferences, analysis and interpreting variety of texts, techniques and strategies for improving comprehension skills, practicing comprehension from literary and non-literary texts, techniques of speed reading.<br>The following websites will be used:<br>● http://www.dhakacourier.com.bd/<br>● http://ielts-up.com/reading/ielts-reading-practice.html#academic<br>● https://allmedialink.com/english-newspaper-of-bangladesh/<br>● http://www.indiacelebrating.com/paragraph/paragraph- | 7 | CLO-5 |

| | | | |
|---|---|---|---|
| | on-moral-values/ | | |
| 7 | Sentences: common grammatical problems, tense, article, preposition, subject verb agreement, clause, modals, conditional sentence<br>Composition: Composition:<br>*Describing pie chart, column chart, graphs, tables,<br>* Agreeing/ disagreeing on some opinion,<br>* Business letters, formal and informal letters. | 7 | CLO-6 |
| 8 | Speaking- describing people and places, narrating events, extempore speech and presentation techniques<br>Listening: Listening for specific information, identifying detail<br>Developing vocabulary: Students are required to sign up with –<br>● https://www.vocabulary.com/<br>● https://helloenglish.com/<br>(Students will use their own android devices/laptops/computers at the lab and work at home with the above two sites. The teacher will monitor their progress and take occasional tests)<br>The following site will be used for listening practice.<br>http://ielts-up.com/listening/ielts-listening-practice.html | 7 | CLO-6 |

***Books Recommended:***


1. Text Book: Exercises in Reading Comprehension,
   Edited by: E.L. Tibbitts,
   Longman House Harlow,
   Essex, UK
2. Raymond Murphy, *Intermediate English Grammar*, Foundation Books, 2/19 Ansari Road, Daryaganj, New Delhi-110002, ManasSaikia, 1995. (Published by arrangement with Cambridge University Press, The Edinburgh Building, and Shaftsbury Road, Cambridge CB2 2RU, U.K.).
3. Wren & Martin, *High School English Grammar and Composition*-, New Delhi, S. Chand & Company Ltd. 2002.
4. Thomson & Martinet, *Practical English Grammar*, Oxford University Press, Walton Street, Oxford OX2 6DP, 1993 (reprinted in India by arrangement with Oxford University Press).
5. Michael A. Pyle and Mary Ellen Munoz, *Cliffs TOEFL Preparation Guide*, New Delhi, BPB Publications, B-14, Connaught Place, New Delhi-110001, 1992.
6. Bruce Rogers, *Peterson's TOEFL Success*, Princeton, New Jersey, Peterson's, 2000.
7. AS Hornby, *Oxford Advanced Learner's Dictionary of Current English*, Oxford University Press, 2002-2003.
8. Chowdhury & Hossain, *Advanced English*, Dhaka, Sayma Chowdhury and Halima Chowdhury, 2004.
9. Mohammad Sarwar Alam & Mohammad Taher Hossain Salim, *English Sentences: Learning through Structures & Functions*, Friends' Book Corner, 16 Rafin Plaza 2nd floor, 3/B Mirpur Rood, Dhaka- Bangladesh. 2018
10. Build up Your English, A.J. Glover, The English Language Book Society and J.M. Dents and Sons Ltd. London


- http://www.dhakacourier.com.bd/
- http://ielts-up.com/reading/ielts-reading-practice.html#academic
- https://allmedialink.com/english-newspaper-of-bangladesh/

- http://www.indiacelebrating.com/paragraph/paragraph-on-moral-values/
- https://www.vocabulary.com/
- https://helloenglish.com/

**Course Assessment Pattern (Theory courses):**

| **Bloom's Category** | | **Evaluations out of 100 marks** | | | |
|---|---|---|---|---|---|
| | | **CIE (50 marks)** | | | **SEE (50marks)** |
| Cognitive learning | Affective Learning | Mid-term: (30) | Assignment/ Class Test: (10) | Attendance Marks (:10) | Written Exam: (50) |
| Remember | - | - | - | - | 5 |
| Understand | - | 5 | 5 | - | 5 |
| Apply | - | 5 | - | - | 10 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 10 |
| Create | - | 5 | - | - | 10 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. | | | | |

**Note: CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination.
**Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,
**Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment. Mid-Term &Semester End Exam. Project evaluation & Viva

**Course Code: UREM-1101.** **Course Title: Text of Ethics and Morality**
**Credit Hours: 1** **Contact Hours: 2 Contact Hours per Week**

| | | | |
|---|---|---|---|
| Course Assessments | **CIE**: Continuous Internal Evaluation | Attendance | 10 Marks |
| | | Class test/ Assignment/ Quizzes | 10 Marks |
| | | Mid-term | 30Marks |
| | **SEE**: Semester End Examination | | 50 Marks |

**Course Objectives: The main objectives of this course are:**
To make students capable of understanding the text of the Holy Qur'an so that they can understand the rules of ethics from the main and basic ethical book as well as to make students capable of understanding the basic Arabic language so that they can communicate with the foreign countries and be fit with labor market worldwide especially in the Middle East. To inspire students in reading the Holy *Qur'an, which is* the complete code of life. To make students familiar with *Ayats* of *Ahkam* of the Holy *Qur'an* so that they can lead their life being enlightened with them.

| S/N | **Course Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | **Corresponding IIUC Mission** | **Bloom's taxonomy domain/level** |
|---|---|---|---|
| **CLO1** | Understand the text of the Holy Qur'an as well as the basic Arabic language to communicate easily in the job market globally. | IIUCMS-1 | Cognitive/ Understanding |
| **CLO2** | Understand the rules of ethics and morality from the basic ethical | IIUCMS-1 | Cognitive/ |

| | | | |
|---|---|---|---|
| | book –the holy Quran. | | Understanding |
| **CLO3** | Achieve knowledge on the various legal issues that are depicted in Qur'anic texts related to different laws of human life as well as able to save themselves from any evil activity, which boost up morally throughout their professional life. | IIUCMS-3 | Cognitive/ Applying |

Course Contents:

| Chapter | **Section-A (Midterm Exam: 30 Marks)** | **Number of Lectures** | **CLOs** |
|---|---|---|---|
| **1** | 1. An introduction to the text of Ethics and Morality.<br>2. Selected text on the introductory chapter of a valuable Ethical Book - the holy Qur'an<br>3. An introduction to Arabic language.<br>4. Identifying the forms of Arabic alphabet with example. | 04 | **CLO1** |
| **2** | 1. Selected text on procreation of the creation of humankind: 22:5<br>2. Selected text on Islamic monotheism*:* 2: 1-5; 112: 1-4<br>3. Text on ensuring social peace by removing bad behavior 49:10-12<br>4. The sun letters and the moon letters<br>5. Arabic numbers and common Arabic words used in daily life.<br>6. Arabic prepositions. | 06 | **CLO1** |
| **3** | 1. Selected text on duties and obligations towards family and relatives = 4: 34-36.<br>2. Selected text on the transition of human life: 10:24.<br>3. Selected text on the rule of livelihood = 2: 172- 174, 5:3-5.<br>4. Exercise of Arabic demonstrative pronouns. | 04 | **CLO2** |
| **Section-B (SEE: 50 Marks)** | | | |
| **4** | 1. Selected text on the rule and impact of interest (*al-riba*) and loan = 2: 275-279.<br>2. Selected Text on the rules and impact of drug and gambling =5: 90-91<br>3. Exercise of Arabic interrogative pronoun.<br>4. The name of days and months in Arabic.<br>5. Formation of Arabic word | 05 | **CLO2**<br>**CLO3** |
| **5** | 1.Selected Text on the rules and ethical directions of marriage, *ma*hr and veil: 4: 2-4; 24: 30-31, 33:59.; 2. Text on the rule and ethical directions of divorce 2:227-230; 3. The names directions in Arabic.<br>3.Formation of verb in Arabic. | 03 | **CLO1**<br>**CLO2** |
| **6** | 1. **Formation** of particle in Arabic.<br>2. Selected text on the sermon of a father to his son =31:13-19. | 02 | **CLO1** |
| **7** | 1. Selected text on the characteristics of human beings = 23:1-11; 25: 63-76 | 02 | **CLO1** |
| **8** | 1. Formation of Arabic sentence.<br>2. Conversation in Arabic: 'Yourself'. | 04 | **CLO1** |
| | | **30** | |

**Text Books:**


1. Abbott, N., Studies in Arabic literary papyri II, Qur'anic commentary and tradition, Chicago: University of Chicago, 1967.
2. Dr. M. Fazlur Rahman, Everyday Arabic Conversation, Riyad Prokashani, Dhaka, 2005.
3. Haleem, M. A., Understanding the Qur'an: themes and Style, London: I. B. Tauris, 1999.
4. Izzath Uroosa, Learning Arabic Language of the Qur'an, Darussalam, Riyadh, 2010.
5. Saheeh International, The Qur'an Arabic Text with Corresponding English Meanings, Jeddah, Saudi Arabia, 1997.


**Course Assessment Pattern (Theory courses):**

| **Bloom's Category** | | **Evaluations out of 100 marks** | | | |
|---|---|---|---|---|---|
| | | **CIE (50 marks)** | | | **SEE (50marks)** |
| Cognitive learning | Affective Learning | Mid-term: (30) | Assignment/ Class Test: (10) | Attendance Marks (:10) | Written Exam: (50) |
| Remember | - | - | - | - | 5 |

| | | | | | |
|---|---|---|---|---|---|
| Understand | - | 5 | 5 | - | 5 |
| Apply | - | 5 | - | - | 10 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 10 |
| Create | - | 5 | - | - | 10 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. | | | | |

**Note: CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination.
**Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,
**Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment. Mid-Term &Semester End Exam. Project evaluation & Viva.

**Course Code: URED-1201.Course Title: Basic Principles of Islam (*Aqidah* + '*Ibadah*)**
**Credit Hours: 2 Contact Hours: 2 Contact Hours per Week**

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class Test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Rationale of the Course**: Soundness of belief & thinking and righteousness of actions are the foundation of a good life. Again actions that are related between us and our Creator are termed as `Ibadah. This course is designed to provide the students with the pure belief system of Islam that will guide them to sound thinking for removing some misconceptions & traditional superstitions contradicting the basic faith & tenets of Islam. This course also provides them with a clear and comprehensive concept of 'Ibadah in Islam to encourage them to be used to it and to illuminate every walk of life in accordance with the lessons derived from it as the slaves of Allah (SWT).

| SL | **Course Learning Outcomes (CLOs)** Upon the successful completion of the course, students will be able to | Corresponding Mission of IIUC | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | Understand the clear concept of Islamic Aqidah, its importance, benefits and effects on our practical life | **IIUCMS-01& 02** | Cognitive/ Understanding |
| CLO-2 | Understand the meaning of belief in Allah (*Tawhid*), nurse it in their minds and protect it from any filthy beliefs (Shirk & Tashbih), hypocrisy (Nifaq), other contemporary misconceptions or superstitious fancies | **IIUCMS-02& 03** | Cognitive/ Analyzing |
| CLO-3 | Understand the other articles of faith and their relationship with the main belief - belief in oneness of Allah | **IIUCMS-02& 03** | Cognitive/ Understanding |
| CLO-4 | Understand the concept of worship in Islam and it all-embracing view | **IIUCMS-01& 03** | Cognitive/ Analyzing, Understanding |
| CLO-5 | Understand the significance of some prescribed rituals of Islam that will help them | **IIUCMS-02& 03** | Cognitive/ Understanding |

| | | | |
|---|---|---|---|
| | to be a practicing Muslims holding proper beliefs and performing that rituals of Islam. | | |

**Course Content:**

| Chapter | Course Outline: Section-A (Midterm Exam: 30 Marks) | Number of Lectures | CLOs |
|---|---|---|---|
| **01** | Chapter# 01: Islamic 'Aqidah: An introduction:<br>(a) Islam: Its definition and characteristic (b) Islamic 'Aqidah: Its definition and importance. | 4 | CLO-1 |
| **02** | Chapter# 02: Some Articles of Faith (Pillars of Iman):<br>[01] Believe in Allah (SWT):<br>* We must believe in Tawheed: (1) Existence of Allah (SWT) (2) Tawhid: Definition and classifications (Tawhid Al-Rabubiah, Tawhid Al-Uluhiah, and Tawhid Al-Asma Was-Sifat) (3) Impact of Tawhid.<br>* We must avoid Shirk: (1) Definition, classifications and consequences (2) Examples of some Shirks in contemporary society.<br>[02] Belief in Allah's Angels (Malaikah):<br>(a) Belief in Angels of Allah (SWT): It's meaning, their Nature and Functions (b) Benefits of belief in Angels.<br>[03] Belief in the Books of Allah:<br>(a) Belief in the Books of Allah: It's meaning and an introduction to the revealed Books and Scriptures (b) The position of the Holy Qur'an amongst the other revealed Books (c) Benefits of belief in the Books of Allah (SWT). | 6 | CLO-2 |
| **03** | Chapter# 03: Some Articles of Faith (Pillars of Iman):<br>[01] Belief in Allah's Prophets:<br>(a) Belief in Allah's Prophets: It's meaning and purpose of their sending (b) Features of Prophethood and Contributions of the Prophets towards humanity (c) Muhammad (SAAS) is the greatest, the best and the last among all the Prophets and Messengers.<br>[02] Belief in the Akhirah (Life after Death):<br>(a) Definition and Stages of Akhirah (b)The logic and evidence regarding Akhirah (c) Impact and benefits of belief in Akhirah.<br>[03] Belief in Qadr/ Taqdir (Fate) and divine decree:<br>(a) Definition of belief in Qadr/ Taqdir (b) Opinions of the scholars regarding Taqdir (c) Concept of man's freedom of will in Islam.<br>[04] The nullifiers of Iman: (a) Kufr and Nifaq: Definition, classifications and consequences (b) Description of the nullifiers of Iman in details. | 4 | CLO-3 |

| Section-B (SEE: 50 Marks) | | | |
|---|---|---|---|
| **04** | Chapter# 04: 'Ibadah: Its introduction:<br>(a) Meaning of 'Ibadah (b) Various types of 'Ibadah (c) The best 'Ibadah (d) Objectives and aims of 'Ibadah. (e) Conditions of 'Ibadah. | 2 | CLOs-4 |
| **05** | Chapter# 05: Characteristics of 'Ibadah and signs of 'Ibadur Rahman: Characteristics of 'Ibadah in Islam: Free from Intermediaries, Not being confined to specific places, All-Embracing View (Scope of 'Ibadah)...etc.<br>Signs of 'Ibadur Rahman (Servants of Ar- Rahman): According to the Holy Qur'an.<br>Taharah & Najasah: Definition of Taharah (purity) and Najasah (impurity), ways and means of Taharah: Wadu, Gusl. | 4 | CLOs-4 |
| **06** | Chapter# 06: *Some Articles of Islam (Pillars of Islam) and* Defense system of Islam*:*<br>Salah (Prayer): Its significance, teachings & some basic rules:<br>(a) Definition and kinds (b) Importance (c) Prerequisites of Salah (Shurutus-Salah) (d)Essentials/ Basic components of Salah (Arkanus-Salah) (e) How to perform the Salah in detail (practically)? (f) Things that invalidate the prayer (Mufsidatus-Salah) (g) Sajdah that makes prayer correct (Sajdatus-Sahu) (h) Friday prayer (Salatul-Jumu'ah) (i) The funeral prayer (Salatul-Janazah) (j) Prayer of the traveler (Salatul-Musafir) (k) 'Eid prayer (Salatul-'Eid) (l) Impact of Salah.<br>Zakah (poor-due) : Its significance, teachings & some basic rules:<br>(a) Definition and types (b) Importance (c) kinds of property on which Zakah is obligatory (d) Who should give Zakah (e) Due recipients of Zakah (f) Zakah and poverty alleviation (g) Impacts/ benefits of Zakah. | 4 | CLOs-5 |
| **07** | Chapter# 07: Sawm (Fasting): Its significance, teachings & some basic rules:<br>(a) Definition and types (b) Importance (c) Things which invalidate the fast (Mufsidatus-Sawm) (d) Who must fast? (e) Exemption from fasting (f) Recompense of mistake (Qada and kaffarah) (g) Sahdktul Fitr/ Zakatul Fitr (h) Impact of Sawm.<br>Hajj (pilgrimage): Its significance, teachings & some basic rules:<br>(a) Definition and types (b) Importance (c) How to perform Hajj in detail? (d) Impact of Hajj. | 4 | CLOs-5 |
| **08** | Chapter# 08: Defense system of Islam:<br>(a) Definition and classification of Jihad from various aspects (b) Importance of Jihad (b) Differences between Jihad and Terrorism. | 2 | CLO4 |

**List of Books:**

1- Rafique Dr. Abu Bakr, Islam The Ultimate Religion (Book one) Islamic 'Aqidah', Chittagong: ABC Publications, 2002.
2- Mohammad Amimul Ahsan and others, Towards Understanding `Ibadah in Islam, Bangladesh Institute of Islamicthought (BIIT), Humanscience Series-06, First Eddithion, May-2015.

**Basic Principles of Islam (Pillars of Islman):**

1. Bhuiyan, Mohammad ShafiulAlam, The Fundamental Beliefs of a Pure Muslim, 1st edition, WAMY,

Bangladesh office, Dhaka, 2003.
2. Sabiq, Assayed, Al-`Aqaeed Al- Islamiyah, Cairo, Al-Fathu Lil-IelamilArabi, 10th edition-2000.
3. Bilal Philips, Dr. Abu Ameenah. The Fundamentals of Thwhid (Islamic Monotheism), International Islamic Publishing House.
4. Farid, Ahmed, An Encounter with Islam, Dhaka: Islamic Foundation, BaitulMukarram, Dhaka, 1995.

**Basic Principles of Islam (Pillars of Islam):**

1. Abdalati, Hammudah, Islam in Focus, The Dept. of Islamic Affairs, The Ministry of Awqaf and Islamic Affairs, State of Qatar, 1995/ Islamic Teaching Course. Vol.-1
2. Al-Quardawi, Dr. Yousuf, Al-'Ibadah in Islam, Wahba publication, Etypt, 24th edition, 1995.
3. Alkhuli, Muhammad Ali, The Light of Islam, E 4, Riyadh: Al Farazdak Press, 1983.
4. Sarwar, Ghulam, Islam: Beliefs and Teachings, London: The Muslim Educational Trust, 1980.

**Course Assessment Pattern (Theory courses):**

| **Bloom's Category** | | **Evaluations out of 100 marks** | | | |
|---|---|---|---|---|---|
| | | **CIE (50 marks)** | | | **SEE (50marks)** |
| Cognitive learning | Affective Learning | Mid-term: (30) | Assignment/ Class Test: (10) | Attendance Marks (:10) | Written Exam: (50) |
| Remember | - | - | - | - | 5 |
| Understand | - | 5 | 5 | - | 5 |
| Apply | - | 5 | - | - | 10 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 10 |
| Create | - | 5 | - | - | 10 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. | | | | |

**Note: CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination.

**Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

**Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment. Mid-Term &Semester End Exam. Project evaluation & Viva.

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**Course Code: URED-2302** **Course Title: Sciences of *Qur'an* and *Hadith***
**Credit Hours:1** **Contact Hours: 2 Contact Hours per Week**

| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
|---|---|---|---|
| | | **Class Test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Rationale of the Course:** The Holy Qur'an and Hadith are the main sources of Islamic Knowledge. They are the primary sources of Islamic *Aqidah, Ibadah, Muamalah* and *Akhlaq*. So after taking basic beliefs exactly from them and acquiring comprehensive knowledge about *'Ibadah*, it is necessary to know the method of explanation and understanding the Holy Qur'an and Hadith in order to apply them in our worldly life. Thus this course is designed to make the students familiar with these two primary sources of Islamic knowledge and help them to remove any misconception prevailing in the

society concerning with or contrary to the spirit of the Qur'an and Hadith by establishing their authenticity and superiority.

| SL | **Course Learning Outcomes (CLOs)**<br>Upon the successful completion of the course, students will be able to : | Corresponding IIUCMS | Bloom's taxonomy domain/level |
|---|---|---|---|
| **CLO1** | To understand the nature and features of the holy Quran and Sunnah as the last revelation of Allah (SWT). | IIUCMS-1,2&3 | Cognitive/ Understand |
| **CLO2** | To analyse how the both Quran and Sunnah has been collected, preserved and transmitted to us accurately and how the text of both are existed at present. | IIUCMS-1,2&3 | Cognitive/ Analyse |
| **CLO3** | To understand the text of the holy Quran and Hadith based on their general and specific contexts. | IIUCMS-1,2&3 | Cognitive/ Understand |
| **CLO4** | To analyse why *Shariah* does not accept any change or modification by human kind. | IIUCMS-1,2&3 | Cognitive/ Analyse |
| **CLO5** | To understand the miraculous nature of the holy Quran, and how the Sunnah classified from various angles to find out authentic Hadith. | IIUCMS-1,2&3 | Cognitive/ Understand |

**Course Content:**

| **Chapter** | **Course Outline: <u>Section-A (Midterm Exam: 30 Marks)</u>** | **Number of Lectures** | **CLOs** |
|---|---|---|---|
| **01** | **Al-Quran: Some General information:**(1) Definition of the Sciences of the Qur'an Literally and Terminologically (2) Definition of the *Qur'an* Literally and Terminologically (3) Various Names and Attributes of the Holy *Qur'an* and their Significance (4) Characteristics of the Holy *Qur'an* (5) Central Subject Matter & the Main Themes of the Holy *Qur'an* (6) The necessity of the Holy *Qur'an* (7) The authenticity of the Holy *Qur'an*. | 4 | **CLOs-1** |
| **02** | **The Quranic Revelation (*Wahi* of the Holy *Qur'an)*:** (1) Meaning of *Wahi* (2) Various classifications and procedure of *Wahi*(3) Stages of revelation of the Holy *Qur'an* (4) Gradual revelation of the Holy *Qur'an* and the wisdom behind it (5) The First and the Last Revelation. | 4 | **CLOs2** |
| **03** | **Division of the text of the Holy Quran:** (1) The *Aayah* of the *Qur'an*: Definition of *Aayah*. The Number of *Ayah*, words and letters of the Holy *Qur'an*. The Arrangement of the *Ayah* of the Holy *Qur'an* (2) The *Surah* of The *Qur'an*: Definition of *Surah*. The Arrangement of *Surah* of the Holy *Qur'an.* The classification of *Surah* of the Holy *Qur'an*. | 4 | CLO-4 |
| **Section-B (SEE: 50 Marks)** | | | |
| **04** | **Understanding the text of the holy Quran:**<br>(1) ***Makki*&*Madani* Revelations:** (a) The Definition of *Makki* and *Madani* (b) The Characteristics of *Makki* and *Madani* Revelations (c) The benefits of knowing *Makki* and *Madani* Revelations.<br>(2) ***Asbabunnuzul* (The Causes of Revelation):** Meaning and classification of *Asababunnuzul*. The benefits of Knowing *Asbanunnuzul*. (3)***Al-Naskh* (Abrogation)** Definition, The proofs, The Classifications of *Naskh*. The benefits of knowing *Nasikh*(abrogating) and *Mansukh* (abrogated) verses. | 4 | CLO5 |

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|---|---|---|---|
| **05** | **Transmission of Quranic Revelation:** (1) Types of transmission of Quranic revelation: Verbal Transmission & written form of transmission (2) Collection and compilation (*Jam`ul Quran*) (3) Stages of collection (4) difference between collection of Abu Bakr (ra) and Othman (ra). | 3 | CLO3 |
| **06** | ***I'jaz al-Quran* (Inimitability of The Holy *Qur'an)*:** Definition of *I'jaz,* Condition, The Proofs of *I`jaz.* Various aspects of *I`jaz Al-Qur'an.* | 3 | CLO5 |
| **07** | **General Information About Sunnah and Hadith:**(1) Definition of *Sunnah* (2) Difference among *Qur'an, Sunnah* and *Hadith Qudshi* (3) The Position, importance and authority of *Sunnah* in Islamic *Shari'ah* (4) history of Collection & Compilation of *Sunnah.* | 4 | CLO3 |
| **08** | **Explanation of some important terms of *Sunnah,* the classification of *Hadith* and fabrication in *Hadith:***<br>(1)**Explanation of some important terms of *Sunnah*:** *Isnad/Sanad, Matn, Rawee* and *Riwayah, Al-jame', Al-Musnad, Al-Sahih, Al-Sunan, Sahihayn, Muttafaqun 'Alayh, Al-kutub As-Sittah*…etc.<br>(2)**The classification of *Hadith*:** (a)According to the reference to a particular authority (b) According to the links in the *Isnad*(c) According to the number of narrators involved in each stage of the *Isnad*(d) According to the reliability and memory of the narrator.(3) **Fabrication in *Hadith*:** (a) Definition of Fabrication (b) Causes and consequence of fabrication (c) Some examples of commonly used fabricated *Hadith* in our society. | 4 | CLO5 |

**List of Books**

**Sciences of *Qur'an*:**


1. Denffer, Ahmad, vol. *'UlumAl-Qur'an:An Introduction to the Sciences of the Qur'an,* The Islamic Foundation, UK, reprinted by – A.S. Noordeen, Kuala Lumpur. 1983.
2. Ushama, Dr.Thameem, *Sciences of the Qur'an: An Analytical Study,* International Islamic University Malaysia, Cooperative Limited, Kuala Lumpur. 1998.
3. Bucaille, Dr. Maurice, *The BibleThe Qur'an & Science*, Thinkers Library, Selangor Darul Ehsan. Malaysia, 1996.
4. Badruddin Muhammad bin Abdullah Al-Badruddin Al- Zarkashi, *Al-Burhan Fi UlumilQur'an,* Dar Al-Marifah, Bairuth, Vl. 01.
5. *A Study of the Holy Qur'an and its Teachings*, First edition, IQRA International Education Foundation, Chicago, April-1999.


**Sciences of *Hadith*:**


1. Al-Azami, Dr Mohammad Mustafa, *Studies in Early Hadith Literature*, American Trust publication, Indiana, 1978.
2. Hasan, Dr.Suhaib, An Introduction to the Science of *Hadith*, London, *AL-Qur'an* Society, 1994.
3. Marhribi, Al-Hassan, Introduction to the Study of the *Hadith*, Roshmee, South Africa, Roshmee Islamic School, 1994.
4. Salih, Muhammad Adeeb, Lamahat fee Usul al-Hadeth, Damascus, 1393 AH.
    1. Siddiqi, Muhammad Zubayr, Hadith Literature: its Origin, Development & Special Features, Cambridge, Islamic Texts Society, 1993.


**Course Assessment Pattern (Theory courses):**

| **Bloom's Category** | | **Evaluations out of 100 marks** | | | |
|---|---|---|---|---|---|
| | | **CIE (50 marks)** | | | **SEE (50marks)** |
| Cognitive learning | Affective Learning | Mid-term: (30) | Assignment/ Class Test: (10) | Attendance Marks (:10) | Written Exam: (50) |
| Remember | - | - | - | - | 5 |
| Understand | - | 5 | 5 | - | 5 |

| | | | | | |
|---|---|---|---|---|---|
| Apply | - | 5 | - | - | 10 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 10 |
| Create | - | 5 | - | - | 10 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. | | | | |

**Note: CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination.
**Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,
**Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment. Mid-Term &Semester End Exam. Project evaluation & Viva.

**Course Code: URED- 2305.** **Course Title: Comparative Religion**
**Credit Hours: 3** **Contact Hours: 3 Contact Hours per Week**

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class Test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**The Rationale of the Course:** Today there are several Religions In this world. Many men many minds and scopes of thinking are available. So, the Religions demand from everyone to compere among all these Religions and chose the excepted Religion by the Almighty Allah the Cherisher and sustainer of the worlds. So the followers of this chosen Religion will be able to perform their activities according to the directions of their belief and chosen Religion. This course is designed to help the students to know about the several Religions and compere their chosen Religion with other Religions and create a firm decision and belief to practice on it without hating any other relations. They also be able to make a good relationship between Islamic beliefs and their actions, thus they can make their activities perfect for both lives here and hereafter.

| SL | **Course Learning Outcomes (CLOs) :**Upon the successful completion of the course, students will be able to : | Corresponding IIUCMS | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO1 | Acquire basic knowledge about Major Religions | IIUCMS-1,2&3 | Cognitive/ Understand |
| CLO2 | Understand about the teachings and admonitions of different religions. | IIUCMS-1,2&3 | Cognitive/ Understand |
| CLO3 | Analyze the principles of Major Religions. | IIUCMS-1,2&3 | Cognitive/ Analyze |
| CLO4 | Evaluate the ultimate Goal of the followers of different religions. | IIUCMS-1,2&3 | Cognitive/ Evaluate |
| CLO5 | Students will develop skills in observing and critically analyzing religion in the contemporary world. | IIUCMS-1,2&3 | Cognitive/ Analyze |

**Course Content Outlines:**

| Chapter | **Contents**<br>**Section-A (Midterm Exam: 30 Marks)** | Number of lectures | Corresponding CLOs |
|---|---|---|---|
| **1** | **Comparative Religion**:<br>A. Definition of Religion<br>B. Significance, Necessity and characteristics of Religion.<br>C. Approaches to the study of religions (Historical, Anthropological, Sociological, Philosophical and Phenomenological etc.) | 4 | CLO1 |
| **2** | **Origin and Development of Major Religions**:<br>A. Basic History of major religions (Judaism, Christianity, Hinduism, Buddhism and Islam).<br>B. Founders and Profounder of religions. | 7 | CLO1 |
| **3** | **The features of Major Religions and Holy Books and Sacred Texts:**<br>A. The distinguishing features of major religions (Judaism, Christianity, Hinduism, Buddhism and Islam).<br>B. Holy books and sacred texts of major religions. | 7 | CLO1 |
| | **Section-B (SEE: 50 Marks)** | | |
| **4** | The Comparative study of God in major religions<br>A. Concept of God in Judaism.<br>B. Concept of God in Christianity.<br>C. 5Concept of God in Hinduism<br>D. Concept of God in Buddhism.<br>E. Concept of God in Islam. | 6 | CLO2 |
| **5** | Religious rituals, festivals and Holy places<br>A. Rituals of major religions. B. Festivals of major religions.<br>B. Holy places of major religions. | 5 | CLO3 |
| **6** | The Comparative study of religious mentors and prophets in major religions<br>A. Necessity of prophets and spirituals guides for human life.<br>B. Comparative study of prophecy and religious mentors in famous religions. | 4 | CLO3 |
| **7** | The comparative study of life after death in major religions<br>A. Concept of death in different religions.<br>B. Concept of the Day of Judgment in different religions<br>C. Concept of Heaven and Hell in different religions<br>D. Concept of Reward and Punishment in different religions. | 4 | CLO3 |
| **8** | The understanding of Man and Universe in major religions:<br>A. The purpose of Human being in different religions.<br>B. The purpose of the Universe. | 4 | CLO3 |
| **9** | The common in major religions:<br>A. Ethics and Morality. B. Evil. C. Justice, D.Destiny and Luck.<br>E. Religious Diversity. F. Non-violence and peaceful co-existence.<br>G. Harmony and Interfaith dialogue.Social Justice and Human Ideological rights. | 4 | CLO5 |

**Texts Books:**

1. Sharpe, E. J. (1989), Comparative Religion: A history.
2. Eliade, M. (1996) Pattern in Comparative Religion of Nebraska Press.
3. Eastman, Roger (1999), The ways of Religion: An Introduction to the Major Traditions, Oxford University Press, US, 3 Editions.

**Course Assessment Pattern (Theory courses):**

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50marks) |
| Cognitive learning | Affective Learning | Mid-term: (30) | Assignment/ Class Test: (10) | Attendance Marks (:10) | Written Exam: (50) |
| Remember | - | - | - | - | 5 |
| Understand | - | 5 | 5 | - | 5 |
| Apply | - | 5 | - | - | 10 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 10 |
| Create | - | 5 | - | - | 10 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. | | | | |

**Note: CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination.

**Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

A. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment. Mid-Term &Semester End Exam. Project evaluation & Viva.

**Course Code: GEBL-2401** **Course Title: Bangla Language and Literature**
**Credit hours:2** **Contact hours: 2 contact hours per week**

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

Rationale of the Course:মাতৃভাষামানবজীবনেরঅত্যাবশ্যকীয়অনুষঙ্গ|বাংলাআমাদেরমাতৃভাষাএবংমহানমুক্তিযুদ্ধেরমাধ্যমেঅর্জিতস্বাধীন সার্বভৌমবাংলাদেশেররাষ্ট্রভাষা|

শিক্ষার্থীদেরভাষাগতওসৃজনশীলদক্ষতাঅর্জনেরজন্যকোর্সেরপাঠ্যসুচিতেবাংলাভাষারউদ্ভবওবিকাশ, ব্যাকরণেরউল্লেখযোগ্যপ্রায়োগিকবিষয়, নির্মিতিওসাহিত্যেরবিভিন্নরূপশ্রেণিতেবাংলাসাহিত্যেরপ্রথিতযশাসাহিত্যিকদেরকিছুউল্লেখযোগ্যসাহিত্যকর্মসংযুক্তিরমাধ্য মেকোর্সটিকেসময়োপযোগীওভারসাম্যপূর্ণকরাহয়েছে|

| S/N | Course Outcomes (CLOs): Upon the successful completion of the course, students will be able to | Corresponding IIUC Mission | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO1 | ভাষাওনির্মিতিঅধ্যয়নেরদ্বারাশিক্ষার্থীগণযোগাযোগেরমাধ্যমহিসেবেস্বচ্ছন্দভাববিনিময়েবিশুদ্ধভাষাগতপারদর্শিতালাভকরবেন| | IIUCMS-1 | Cognigtive/ Understand |

| | | | |
|---|---|---|---|
| CLO2 | প্রতিবেদনওবক্তব্যতৈরিরকৌশলআয়ত্তেরমাধ্যমেপ্রতিযোগিতামূলককর্মপরিবেশেরউপযোগীকার্যকরযোগাযোগদক্ষতাওকর্মমুখীব্যক্তিত্বগঠনেসক্ষমহবেন| | IIUCMS-1 | Cognigtive/ Understand |
| CLO3 | গল্পপঠনওগল্পলেখনসম্পর্কিতদক্ষতাশিক্ষার্থীগণেরসৃজনশীলতাবিকশিতকরবে| | IIUCMS-1 | Cognitivd/Apply |
| CLO4 | বাংলাসাহিত্যেরউল্লেখযোগ্যসাহিত্যকর্মেরসাথেপরিচিতিওসাহিত্যেরবিভিন্নআঙ্গিকের(কবিতা,ছোটগল্প,প্রবন্ধ,নাটক)<br>স্বরূপউপলব্ধিকরারযোগ্যতাশিক্ষার্থীদেরসামাজিকব্যবস্থাসম্পর্কেজানারপরিধিবৃদ্ধিসহবিরোধনিষ্পত্তিকরারযোগ্যকরেগড়েতুলবে| | IIUCMS-1 | Cognigtive/ Apply |
| CLO5 | অসাম্প্রদায়িকতা,বাংলাসংস্কৃতি ,মুক্তিযুদ্ধেরচেতনাসমৃদ্ধওজীবনমুখীগল্প-কবিতাপাঠেরমাধ্যমেশিক্ষার্থীগণউদারনৈতিকমানবিকমূল্যবোধঅর্জনেসমর্থহবেন| | IIUCMS-2 | Cognigtive/ Understand |
| CLO6 | জাতীয়,আন্তর্জাতিক,<br>ঐতিহ্যিকবিষয়েসংক্ষিপ্তআলোচনাবাংলালোকসংস্কৃতিওশিল্প-সাহিত্যেরপ্রতিইতিবাচকমনোভাবতৈরিকরবে| | IIUCMS-3 | Cognitive/ Evaluate |

Course Content:

| Chapter | Content | Number of Lectures | CLOs |
|---|---|---|---|
| | Midterm Exam : 30 Marks<br>ভাষা ও নির্মিতি: 20<br>1. বাংলা ভাষার উদ্ভব ও বিকাশ|<br>2. বাংলা বর্ণ ও ধ্বনি পরিচয়|<br>3. প্রতিবেদন বা বক্তব্য লেখন|<br><br>বাংলা সাহিত্য: 10<br><br>ছোটগল্প:(ক) পোস্টমাস্টার (রবীন্দ্রনাথ ঠাকুর)<br>(খ) পুঁইমাচা (বিভূতিভূষণ বন্দ্যোপাধ্যায়)<br>(গ) নয়নচারা (সৈয়দ ওয়ালীউল্লাহ) | 12 | |
| **01 fvlv** | 1. বাংলাভাষারউদ্ভবওবিকাশ|<br>2. বাংলাবর্ণওধ্বনিপরিচয়|<br>3. বাংলাবানানেরনিয়ম|<br>4. যতিচিহ্ন| | 4 | CLO1<br>CLO2 |
| **02 নির্মিতি** | 1. বঙ্গানুবাদ/ক্ষুদেগল্পলেখা|<br>2. প্রতিবেদনবাবক্তব্যলেখন|<br>3. পত্রলিখন |<br>4. সংক্ষিপ্তআলোচনা| | 4 | CLO1<br>CLO6 |
| **03 কবিতা** | (ক) বঙ্গভাষা(মাইকেলমধুসূদনদত্ত) | 4 | CLO4 |

| | | | |
|---|---|---|---|
| | (খ) আজসৃষ্টিসুখেরউল্লাসে (কাজীনজরুলইসলাম)<br>(গ) তোমাকেপাওয়ারজন্যহেস্বাধীনতা (শামসুররাহমান) | | CLO5 |
| | Semester end examination :50 Marks<br>ভাষা ও নির্মিতি: 30<br>1. বাংলা বানানের নিয়ম\|<br>2. যতিচিহ্ন\|<br>3. বঙ্গানুবাদ/ক্ষুদে গল্প লেখা\|<br>4. পত্র লিখন \|<br>5. সংক্ষিপ্ত আলোচনা\|(ক.একুশে ফেব্রুয়ারি ;খ.মুক্তিযুদ্ধ; গ.বাংলার লোকসংস্কৃতি;ঘ. মানবতা ও নৈতিকতা;ঙ.আধুনিক তথ্যপ্রযুক্তি\| )<br>বাংলা সাহিত্য : 20<br>কবিতা :(ক) বঙ্গভাষা (মাইকেল মধুসূদন দত্ত)<br>(খ) আজ সৃষ্টি সুখের উল্লাসে (কাজী নজরুল ইসলাম)<br>(গ) তোমাকে পাওয়ার জন্য হে স্বাধীনতা (শামসুর রাহমান)<br>প্রবন্ধ : (ক) সভ্যতার সংকট (রবীন্দ্রনাথ ঠাকুর)<br>(খ) যৌবনে দাও রাজটিকা (প্রমথ চৌধুরী)<br>নাটক : কবর (মুনীর চৌধুরী) | 18 | |
| **04**<br>**ছোটগল্প** | (ক) পোস্টমাস্টার (রবীন্দ্রনাথঠাকুর)<br>(খ) পুঁইমাচা (বিভূতিভূষণবন্দ্যোপাধ্যায়)<br>(গ) নয়নচারা(সৈয়দওয়ালীউল্লাহ) | 6 | CLO3<br>CLO4<br>CLO5 |
| **05-প্রবন্ধ** | (ক) সভ্যতারসংকট (রবীন্দ্রনাথঠাকুর)<br>(খ) যৌবনেদাওরাজটিকা (প্রমথচৌধুরী) | 6 | CLO4 |
| **06-নাটক** | কবর (মুনীরচৌধুরী) | 6 | CLO4 |

Learning Materials:

Text Book

বাংলা ভাষা ও সাহিত্য (রফিকুল ইসলাম ও সৌমিত্র শেখর)

Reference Books

1.মুহম্মদ শহীদুল্লাহ,বাঙ্গালা ভাষার ইতিবৃত্ত|
2.মুহম্মদ আব্দুল হাই,ধ্বনিবিÁvন ও বাংলা ধ্বনিতত্ত্ব|
3.জীনাত ইমতিয়াজ আলী,ধ্বনিবিÁvনের ভূমিকা|
4.মাহবুবুল হক,বাংলা বানানের নিয়ম|
5.মুহম্মদ শহীদুল্লাহ,বাঙ্গালা ব্যাকরণ|
6.প্রমিত বাংলা বানানের নিয়ম,বাংলা একাডেমি|
7.জ্যোতিভূষণ চাকী,বাংলা ভাষার ব্যাকরণ|
8.রবীন্দ্রনাথ ঠাকুর,গল্পগুচ্ছ|
9.প্রমথ চৌধুরী,প্রবন্ধ সংগ্রহ|
10.কাজী নজরুল ইসলাম,সঞ্চিতা|
11.শামসুর রাহমান,বন্দী শিবির থেকে|
12.রবীন্দ্রনাথ ঠাকুর,কালান্তর|

**Course Assessment Pattern (Theory courses):**

| **Bloom's Category** | | **Evaluations out of 100 marks** | | | |
|---|---|---|---|---|---|
| | | **CIE (50 marks)** | | | **SEE (50marks)** |
| Cognitive learning | Affective Learning | Mid-term: (30) | Assignment/ Class Test: (10) | Attendance Marks (:10) | Written Exam: (50) |
| Remember | - | - | - | - | 5 |
| Understand | - | 5 | 5 | - | 5 |
| Apply | - | 5 | - | - | 10 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 10 |
| Create | - | 5 | - | - | 10 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. | | | | |

**Note: CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination.
**Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,
**Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment. Mid-Term &Semester End Exam. Project evaluation & Viva.

**Course Code: URED-3503.** **Course Title: Political Thoughts and Social Behavior**
**Credit Hours: 1** **Contact Hours: 2 per Week**

| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
|---|---|---|---|
| | | **Class Test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**The Rationale of the Course:** Following are the Objectives of the course:

i. To help the students demonstrate an in-depth understanding of their real position in this temporary world.
ii. To understand their relation with the state and society.
iii To help them in performing their duties and responsibilities towards their state, society and humanity at large.

| SL | **Course Learning Outcomes (CLOs) :**Upon the successful completion of the course, students will be able to : | Corresponding IIUCMS | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO1 | Acquire basic knowledge about politics, Islamic politics, Law & Constitution, State and Government | IIUCMS-1,2&3 | Cognitive/Understand |
| CLO2 | Realize the nature of Citizen and Citizenship and relationship between state and citizen, citizen and government as well | IIUCMS-1,2&3 | Cognitive/ Apply |
| CLO3 | Understand about the dealings and behavior of a man relating to himself, his Family and society | IIUCMS-1,2&3 | Cognitive/ Understsand |
| CLO4 | Analyze the principles of permissible and prohibition in Islam in regards to dress, food and drinking and in other parts of life | IIUCMS-1,2&3 | Cognitive/ Analyze |

| | | | |
|---|---|---|---|
| CLO5 | Evaluate the Economic System of Islam and Festivals in Islam | IIUCMS-1,2&3 | Cognitive/ Evaluate |

**Course Contents:**

| Chapter | Chapter Title | Contents | Number of Lectures | Corresponding CLOs |
|---|---|---|---|---|
| Section A: Mid Term 30 Marks | | | | |
| **01** | Politics and Islamic Politics: | A. Nature of the course from viewpoint of Islamic jurisprudence<br>B. Literal and terminological Meaning of of Politics<br>C. Definition of Islamic Politics<br>D. Basic Principles of Islamic Political System<br>E. Conventional Political System and Islam | 3 | CLO1 |
| **02** | *Shariah* and constitution : | A. Meaning of Shariah<br>B. Sources of Shariah<br>C. Difference between Shariah and man-made law<br>D. Definition of Constitution<br>E. Contents and main features of an Islamic Constitution | 3 | CLO1 |
| **03** | State and Government: | A. Meaning of State<br>B. Elements of State<br>C. The major characteristics of modern national states<br>D. Meaning of Islamic State<br>E. Basic principles of an Islamic state<br>F. Meaning, Objective, types of government<br>G. Relation between state and government<br>H. Organs of a government - Executive, Legislative and Judiciary | 3 | CLO1 |
| **04** | Citizen and Citizenship: | A. Meaning of citizenship<br>B. Types of citizenship and<br>C. Rights & duties of citizens | 3 | CLO2 |
| Section B- Semester End Examination (SEE): 50 Marks | | | | |
| **05** | Marriage and Family: | A. Marriage in Islam<br>B. Objective, Nature and some features of marriage in Islam<br>C. Classification of Marriage<br>D. Legal effects of various types of marriage<br>E. Prohibited Marriages<br>F. The general essentials of a Muslim marriage | 3 | CLO3 |
| **06** | Matrimonial Disputes Resolution and Divorce: | A. Definition of Matrimonial Disputes<br>B. Sources and causes of matrimonial disputes<br>C. Quranic Approach to matrimonial disputes<br>D. Divorce as a last resorts to dissolve a matrimonial disputes | 3 | CLO3 |

| | | | |
|---|---|---|---|
| **07** | Women in Islam:<br>A. Status of women in Islam<br>B. Rights and duties of women in Islam | 2 | CLO3 |
| **08** | Family Relationship Social Relationship & Festivals in Islam:<br>A. Husband-wife relationship<br>B. Parent-child relationship<br>C. Family relationship<br>D. Kinship<br>E. Neighbourhood<br>F. Wide circle of relationship relationship<br>G. Eid-al-Fitr and Eid-Al-Adha | 3 | CLO3 |
| **09** | Economic System & Dress Code in Islam:<br>A. Earning and Expenditure by Halal Means<br>B. Right to property and Individual Liberty<br>C. System of *Zakah* (Welfare Contribution)<br>D. Prohibition of *Riba* (Interest or usury)<br>E. Law of Inheritance *(Mirath*) , Conclusion<br>F. Common Clothing Regulations<br>G. Clothing Regulations for Man<br>H. Clothing Regulations for Woman | 3 | CLO5 |
| **10** | Principles of permissible and prohibition:<br>A. All things are lawful for mankind except what have been prohibited explicitly by Allah and His Messenger<br>B. Only Allah (SWT) has the right to declare a thing lawful or prohibited<br>C. Allah has prohibited only shameful things<br>D. What has been made lawful for us is sufficient<br>E. the means or causes that lead to unlawful action are also prohibited<br>F. what is prohibited, it is prohibited for all<br>G. a grave necessity legalizes temporarily an illegal thing | 4 | CLO4 |

**References:**


1. Bhuiyan, Mohammad ShafiulAlam (2007), *The Government and Politics in Islam*, Dhaka: Noor Publications.
2. Hamid, E. A. (2004). *The Qur'an and Politics*, London: International Institute of Islamic Thought.
3. Islam, A. B. M. M. (2005). *Islamic Constitution: Quranic and Sunnatic Perspectives*.
4. A'LaMaududi, S. A. (1980). *The Islamic Law & Constitution*: Islamic Books.
5. Sarwar, G. (1982). *Islam, beliefs and teachings*: Muslim educational trust.
6. Hannan, S. A. (2017). *Social Laws of Islam*. Dhaka: Bangladesh Institute of Islamic Thought (BIIT)
7. Zino, Muhammad bin Jamil, *Islamic Guidelines*,Darusalam, Riyadh, 1996.
8. Al-Qaradawi, Y. (1988). *Halal and Haram in Islam*.
9. Ahmad, M. (2009). *Business ethics in Islam*: International Institute of Islamic Thought (IIIT).
10. Chapra, M. U. (2016). *The future of economics: An Islamic perspective* (Vol. 21): Kube Publishing Ltd.


**Course Assessment Pattern (Theory courses):**

| **Bloom's Category** | **Evaluations out of 100 marks** | |
|---|---|---|
| | **CIE (50 marks)** | **SEE (50marks)** |

| Cognitive learning | Affective Learning | Mid-term: (30) | Assignment/ Class Test: (10) | Attendance Marks (:10) | Written Exam: (50) |
|---|---|---|---|---|---|
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination.

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions
Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment.Mid-Term &Semester End Exam. Project evaluation & Viva

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**Course Code: URED- 3604. Course Title: Life and Teachings of Prophet Muhammad (SAAS)**
**Credit Hours: 1** **Contact Hours: 2 Contact Hours per Week**

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class Test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

Rationale of the Course: The life of Prophet (SAAS) has remained as a source of inspiration not only for the Muslims but also for the people of different races, colors and origins belonging to various levels of society. It has led various people to make a deeper study of his message and even fashion their own lives on his pattern. Every deed of Prophet's (SAAS) life is to be followed by every individual of Muslim Ummah. Love of Allah's messenger (SAAS) is an integral part of our Iman and hence the highest love for the Prophet (SAAS) is made as a test for our faith. This course, therefore, has been designed to have an insight thought

| S/N | **Course Outcomes (CLO)**: Upon the successful completion of the course, students will be able to | Corresponding IIUC Mission | Bloom's taxonomy domain/level |
|---|---|---|---|
| **CLO1** | The students will have proper knowledge regarding the life and times of Prophet Muhammad (SAAS) | IIUCMS-1,2&3 | Cognitive/ Understanding |
| **CLO2** | Students will be able to identify the Prophet (SAAS) as the only ideal mentor to follow. | IIUCMS-1,2&3 | Cognitive/ Understanding |

| | | | |
|---|---|---|---|
| **CLO3** | Students will be able to lead their life according to the exalted characters, manners, habits and behaviors of the teacher of mankind and beloved Prophet (SAAS) | IIUCMS-1,2&3 | Cognitive/ Applying |

**Course Content:**

| Chapter | Content | Number of Lectures | Corresponding CLO |
|---|---|---|---|
| **Section-A, Mid Term: 30 Marks** | | | |
| **01** | An introduction to *Siratunnabi* (SAAS):A comprehensive view, *Sirah* and its literally and technical meaning, Selection of Arabia as the birthplace of the Final Prophet (SAAS), | 2 | CLO1 CLO2 |
| **02** | Socio-Political, Religious condition of pre-Islamic Arabia: an Overview. Early life of Prophet (SAAS): Birth and Childhood, Business trip to Syria with his uncle Abu Talib, Battle of *Fujjar* and formation of *Hilful-Fudul*, Contribution of Mohammad (SAAS) in the business of Khadijah, Marriage with Khadijah. | 3 | CLO1 CLO2 |
| **03** | Early life of Prophet (SAAS): Rebuilding of *Al-Ka'bah*, Search for the truth and receiving the truth. Beginning of Islamic Movement at *Makkah*: (From first revelation to the emigration to Abyssinia): Prophet hood, First revelation and its impact. Propagation of Islam Begins in secret. | 2 | CLO1 CLO3 |
| **04** | The early Muslims, End of the First Phase. Islamic Movement becomes public, The Prophet on the Mount of *Safa*. | 2 | CLO1 CLO2 |
| **05** | Oppositions from the Quraysh begin, Qur'anic approach towards *Quraysh*, Oppositions, | 2 | CLO2 |
| **06** | Migration to Abyssinia. Prophet (SAAS) at *Makkah*: Boycott and Confinement of the Prophet (SAAS) and *BanuHashim* by the *Quraysh*, The year of sorrow. | 2 | CLO2 |
| **07** | *Ta'if*- the most difficult day, *Mi'raj* of the Prophet. Covenants of *Al-'Aqabah*. | 2 | CLO2 |
| **Section-B: Semester End Examination (SEE): 50 Marks** | | | |
| **08** | *Hijrah* of the Prophet (SAAS). | 1 | CLO2 |
| **09** | The Prophet (SAAS) at *Madinah*: (From migration to *Hudaybiyah*) Construction of the Mosque, | 2 | CLO2 |
| **10** | The Charter of *Madinah*, Important Battles till the agreement of *Hudaybiyah*- The Battle of *Badr*, | 2 | CLO3 |
| **11** | The Battle of *Uhud*, The Battle of *Ahzab*, Campaigns against the Jews of *Madinah*, *Hudaybiyah* Agreement | 3 | CLO3 |
| **12** | Letters of the Prophet (SAAS) to the kings beyond Arabia, Battle of *Muta*, Battle of *Hunayun*, The conquest of *Makkah*. The Farewell Pilgrimage, | 2 | CLO3 |
| **13** | The Farewell Address of the Prophet (SAAS) and its lessons, | 2 | CLO1 CLO2 |
| **14** | Departure of the Prophet (SAAS), Contributions of the Prophet (SAAS) as a reformer and as a nation builder and | 2 | CLO2 CLO3 |

| | | | |
|---|---|---|---|
| | as an Ideal for the all. | | |
| **15** | Review Class | 1 | |

**List of Books:**


1. Nadwi, SaiyidSulaiman, *Muhammad The Ideal Prophet: A Historical, Practical, Perfect Model for Humanity*. Translated by Mohiuddin Ahmad. Islamic Book Trust K.L.N.D.
2. Guillaume, Alfred. *The Life of Muhammad: A Translation of IbnIshaq'sSiratRasul Allah.* London: Oxford University Press, 1955.
3. Lings, Martin. *Muhammad: his life based on the earliest sources.* New York: Inner Traditions International, 1983.
4. Nasr, SeyyedHossein, *Muhammad: Man of God*. Chicago, IL: Kazi Publ., 1995.
5. Ramadan, Tariq. *In the Footsteps of the Prophet: Lessons from the Life of Muhammad.* New York: Oxford University Press, 2009.
6. Watt, William Montgomery. *Muhammad: Prophet and Statesman.* London: Oxford University Press, 1961.


**Course Assessment Pattern (Theory courses):**

| **Bloom's Category** | | **Evaluations out of 100marks** | | | |
|---|---|---|---|---|---|
| | | **CIE (50 marks)** | | | **SEE(50marks)** |
| Cognitive learning | Affective Learning | Mid-term:(30) | Assignment/ Class Test: (10) | Attendance Marks (:10) | Written Exam: (50) |
| Remember | - | 5 | - | - | 05 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | X | x | 10 | |
| Remarks | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester.<br>If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

.**Note:CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination.

**A. Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

**B. Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment.

Mid-Term &Semester End Exam. Project evaluation & Viva

**Course Code: GEHE-3601 Course Title: History of the Emergence of Bangladesh**
**Credits: 2 CH Contacts: 2 lectures per week**

| | | | |
|---|---|---|---|
| Course Assessments | **CIE**: | Attendance | 10 Marks |
| | Continuous Internal Evaluation | Class test/ Assignment/ Quizzes | 10 Marks |
| | | Mid-term | 30Marks |
| | **SEE**: Semester End Examination | | 50 Marks |

Rationale of the Course: The course has been designed to study the dynamic and diverse movements of the people of Bangladesh to achieve its independence in 1971. The course, primarily, focuses on the rising of Bengali nationalism and the national identity crisis of the Bengali along with significant autonomous vibrations regarding changes in the politics of social dominance in the period –from appearance of united Pakistan to the emergence of Bangladesh as an independent country.

| SL | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to : | Corresponding IIUCMS | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO1 | Analyze the historical contexts and socio-political perspectives for the Independence movement of Bangladesh | IIUCMS-1&3 | Cognitive/ Analyze |
| CLO2 | Appreciate the background and events of the glorious War of Liberation of Bangladesh | IIUCMS-1&3 | Cognitive/ Undrrstand |
| CLO3 | Estimate the role of national leaders and political parties in the Independence movement of Bangladesh | IIUCMS-2&3 | Cognitive/ Evaluate |
| CLO4 | Evaluate the role of Bangabondhu Sheikh Mujibur Rahman as the founder and un-parallel leader of the Independence movement of Bangladesh. | IIUCMS-1&2 | Cognitive/ Evaluate |
| CLO5 | Uphold the spirit of liberation war resulting in the enhancement of patriotism. | IIUCMS-1,2&3 | Cognitive/ Apply |

**Course Content:**

| Chapter | **Section-A (Midterm Exam: 30 Marks)** | Number of lectures | Corresponding CLOs |
|---|---|---|---|
| 01. | **Introduction to the country and its people:** Geographical features and their influence, ethnic composition, language, cultural syncretism and religious tolerance, distinctive identity of Bangladesh in the diverse context. | 06 | CLO1 |
| 02. | **Proposal for undivided sovereign Bengal and the partition of the Sub-Continent, 1947:** Rise of communalism under the colonial rule, Lahore Resolution 1940, The proposal of Suhrawardi and Sarat Bose for undivided Bengal: consequences, The creation of Pakistan 1947. | 03 | CLO1 |
| 03. | **Pakistan: Structure of the state and disparity:** Central and provincial structure, influence of military and civil bureaucracy, economic, social and cultural disparity. | 06 | CLO1 |
| 04. | **Language Movement and quest for Bengali identity:** The Language Movement: context and phases, United Front: election of 1954, consequences, misrule by Muslim League and struggle for democratic politics, framing of the constitution of Pakistan in 1956. | 03 | CLO2<br>CLO3 |
| | **Section-B (SEE: 50 Marks)** | | |
| 05. | **Military regimes of Ayub Khan and Yahya Khan (1958-1971):** Definition of military rules and its characteristics, Ayub Khan's rise to power and characteristics of his rule (Political repression, Basic democracy), Fall of Ayub Khan and Yahya Khan's rule (Abolition of one unit, universal suffrage, the Legal Framework Order). | 03 | CLO2<br>CLO3<br>CLO4 |
| 06. | **Rise of nationalism and the Movement for self-determination:** Resistance against cultural aggression and resurgence of Bengali culture, Student movement 1962, the six point movement: reactions, importance and significance. The | 06 | CLO2<br>CLO3<br>CLO4 |

| | | | |
|---|---|---|---|
| | Agartala conspiracy case 1968, Mass upsurge of 1969. | | |
| 07. | **Election of 1970 and the Declaration of Independence:** Election result and centres refusal to comply, The non-cooperation movement, the 7th March Address, Operation Search-light, Declaration of Independence and the arrest of Bangabondhu Sheikh Mujibur Rahman. | 06 | CLO2<br>CLO3<br>CLO4<br>CLO5 |
| 08. | **The war of Liberation 1971:** Genocide and repression of people, Formation of Bangladesh government and proclamation of Independence, Formation of MuktiBahini, Publicity Campaign in the war of Liberation, Contribution of students, women and the masses, The role of super powers, The Anti-liberation activities, killing of the intellectuals, Trial of Bangabondhu and reaction of the World Community, The role of ArabWorld in the Liberation War, The role of India in the Liberation War, Formation of joint command and the Victory. | 06 | CLO2<br>CLO3<br>CLO4<br>CLO5 |
| 09 | **Immediate Development of Independent Bangladesh:** Homecoming of Bangabondhu, Making of the constitution, Reconstruction of the war ravaged country. Reign of Bangabandhu (1972-1975). Contribution of National leaders of Bangladesh: AK FazlulHuq, MaulanaVashani, Hussein ShahidSuhrawardi, Bangabondhu Sheikh Mujibur Rahman, Syed Nazrul Islam, Tajuddin Ahmed, HM Kamruzzaman, Captain M Mansur Ali, MAG Osmani. | 06 | CLO6<br>CLO7 |

## Text Books:


- Muntasir Mamun and Soumitra Shekhar, *Swadhin Bangladesher Obvyudyer Itihas*, (Dhaka: University Grand Commission-UGC, Bangladesh, 2017).
- Rounaq Jahan, *Pakistan: Failure in National Integration,* (Dhaka: University Press Limited, 1977).
- Md. Thowhidul Islam and others, *Bangladesh Studies*. (Dhaka: Bangladesh Institute of Islamic Thought-BIIT, 2017).


## Reference Books:


- Sirajul Islam (ed.), *Banglapedia: National Encyclopedia of Bangladesh*, Vol. 1-14, (Dhaka: Asiatic Society of Bangladesh, 2014).
- Sirajul Islam (ed.), *BangladesherItihash,*Vol. 1-3, (Dhaka: Asiatic Society of Bangladesh, 2014).
- Dr. Md. Emran Zahan & Dr. Md. Siddiqur Rahman Khan, *BangladesherItihas 1972-2014*, (Dhaka: AbosarProkashanaSangstha, 2018).
- Maidul Hasan, *Muldhara 71,* (Dhaka: The University Press Ltd., 1986).
- Shamsul I. Khan, *Political Culture, Political Parties and the Democratic Transition in Bangladesh*, (Dhaka: The University Press Ltd., 2008).
- Abul Mansur Ahmad, *Amar Dekha Rajniteer Poncash Bochor*, (Dhaka: Srijon Prokashoni Ltd., 1988).
- Kamruddin Ahmed, *Social History of East Pakistan*, (Dhaka: Crescent Book Center, 1967).
- Shaikh Maqsud Ali, *From East Bengal to Bangladesh: Dynamics and Perspectives*, (Dhaka: The University Press Ltd., 2009).
- Siddiq Salik, *Witness to Surrender*, (Dhaka: The University Press Ltd., 1997).
- Moudud Ahmed, *Bangladesh: Constitutional Quest for Autonomy*, (Dhaka: The University Press Ltd., 2003).
- Akbar Ali Khan, *Discovery of Bangladesh*, (Dhaka: The University Press Ltd., 2009).
- Talukdar Maniruzzaman, *Bangladesh Revolution and its Aftermath*, (Dhaka: The University Press Ltd., 1992).
- M.A. Barnik, *Rasthra Bhasha Andoloner Itihas*, (Dhaka: AHDPH, 1998).
- Oli Ahad, *Jatiyo Rajniti 1945-1975*, (Dhaka: Bangladesh Co-operative Book Society, 2004).

**Course Assessment Pattern (Theory courses):**

| **Bloom's Category** | | **Evaluations out of 100 marks** | | | |
|---|---|---|---|---|---|
| | | **CIE (50 marks)** | | | **SEE (50marks)** |
| Cognitive learning | Affective Learning | Mid-term: (30) | Assignment/ Class Test: (10) | Attendance Marks (:10) | Written Exam: (50) |
| Remember | - | - | - | - | 5 |
| Understand | - | 5 | 5 | - | 5 |
| Apply | - | 5 | - | - | 10 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 10 |
| Create | - | 5 | - | - | 10 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. | | | | |

**Note: CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination.
**Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,
**Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment. Mid-Term &Semester End Exam. Project evaluation & Viva.

**Course Code: URIH-4701** **Course Title: A Survey of Islamic History & Culture**
**Credit Hours: 1** **Contact Hours: 2 contact hours per Week**

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class Test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

Rationale of the Course: The objective of this study is to enrich the learners with the glorious history of four pious *Khalifah* of Islam and their remarkable contributions towards the development of just administration, advancement of civilization and education and their great services towards humanity at large. This course also aims at making the students acquainted with the glorious contribution of the Muslims towards the world civilization during the *Ummayads* and *Abbasids Khilafah.* The contributions include the advancement of administration, society, civilization, different branches of science such as geography, mathematics, history, medical science, philosophy etc.

| S/N | **Course Outcomes (CLO)**: Upon the successful completion of the course, students will be able to | Corresponding IIUC Mission | Bloom's taxonomy domain/level |
|---|---|---|---|
| **CLO1** | With the study of this course, the learners will be able to explore the glorious history of early Islamic society and state, particularly of four pious *Khalifah* and their successors. | IIUCMS-1,2&3 | Cognitive/ Understanding |
| **CLO2** | The learners will also have the idea about the Muslim contributions towards the difference branches of world civilization. | IIUCMS-1,2&3 | Cognitive/ Understanding |
| **CLO3** | This study will also help the students to realize the | IIUCMS- | Cognitive/ |

| | | | |
|---|---|---|---|
| | historical processes of development of Muslim society in early time and to make a comparison with the present society. | 1,2&3 | Applying |
| **CLO4** | It will enable the learners to appreciate various good practices and cultures that will in turn be resulted in becoming a responsible citizen. | IIUCMS-1,2&3 | Cognitive/ Analyze |

| SL.NO | CONTENT OF COURSE (as Summary) | Number of Lectures | Corosponding CLO |
|---|---|---|---|
| 01. | **Section A (Midterm Examination: 30 Marks):**<br>**Introduction to the course and its objectives.**<br>**Chapter One: *Khilafah*:** Definition, Origin and Development of *Khilafah*; Types of *Khilafah*; Election system to the office of *Khilafah*; *Khilafah* and *Mulukiyyah*; Qualifications, Duties and Responsibilities of a *Khalifah*. | 3 | CLO1 |
| 02. | **Chapter Two: Introduction to the Four Pious *Khalifah*:** Achievements and Contributions of the Pious *Khalifah*. Comprehensive study of the historical events during four pious *Khalifah*: Abu Bakr (R) -the savior of Islam, Umar (R) - the model of modern administration and great conqueror of Islamic empire, Uthman (R) – compiler of the Holy Qur'an, Causes of revolt, assassination of Uthman (R) and its effect on the history, Ali (R) - civil wars during his time and end of the four Pious *Khalifah*. | 6 | CLO2<br>CLO3<br>CLO7 |
| 03. | **Chapter Three: Administration under the Four Pious *Khalifah***: The *Shura*, Civil Administration, Revenue System, *Bait-al-Mal*, Judicial Administration, Police-Prison, Religious Administration and Military Administration. | 3 | CLO7 |
| | **Section B:Semester End Examination (SEE): 50 Marks** | | |
| 04. | **Chapter Four: The Umayyads *Khilafah* (661 A.D-750 A.D):** A brief introduction to Umayyads *Khilafah*, Credit and Achievements of Muawiah (R), Administrative reforms of Abdul Malik, Expansion of Islamic empire under Walid bin Abdul Malik, Umar bin Abdul Aziz and his Administrative Reforms. Central and Provincial Administration, Social Condition. Umayyads contribution towards the development of civilization & education, and Fall of the Umayyads. | 6 | CLO4 |
| 05. | **Chapter Five: The Abbasids *Khilafah* (750 A.D-1258 A.D):** Golden Age of the Abbasids- Abul Abbas as Saffah, Abu Zafar al-Mansur, Harun or-Rashid, Al-Mamun, Abbasids Society, Rights of Women and non-Muslims in Muslim Society, Scientific and Literary development, Education, Development of Art and Architecture. Abbasids Administration- Civil, Military, Judicial and Revenue Administration and Fall of Baghdad. | 6 | CLO4<br>CLO7 |
| 06. | **Chapter Six:**A BriefAnalysis on the Umayyads *Khilafah* of Spain and *FatimidsKhilafah* of Egypt and North Africa. | 2 | CLO4<br>CLO5 |
| 07. | **Chapter Seven:**Muslim contribution to different fields of civilization:<br>a) Geography; | 4 | CLO5<br>CLO6 |

| | | | |
|---|---|---|---|
| | b) Medical Sciences and Medicine;<br>c) Chemistry;<br>d) Mathematics;<br>e) Astronomy;<br>f) Historiography;<br>g) Art and literature; and<br>h) Painting and Calligraphy | | |

**Text Book:**

P.K. Hitti, *History of the Arabs*, Macmillan edition, 1970, London.
K. Ali, *A Study of Islamic History*, Adam Publishers & Distributors, 2006, Dhaka.
Mofizullah Kabir, *An Outline of Islamic History*, Dhaka.

**Reference:**

S.A.Q. Hussaini, *The Arab Administration*, 1956, Lahore.
Syeed Ameer Ali, *A Short History of Saracens*, Macmillan edition, 1916, London.
T.I. Arnold, *The Caliphate*, Oxford, 1924, London.
Muhammad Ali, *The Early Caliphate*, Cambridge, 1936, London.
W. Muir, *Caliphate, Its Rise, Decline and fall*, Edinburg, 1934.
B, Lewis, & P.M. Holt (ed.), *Cambridge History of Islam*, 1947.
Syeed Ameer Ali, *The Spirit of Islam*, Christophers, 1891, London.
Thomas Arnold, *The Legacy of Islam*, Oxford, 1931, London.
Joseph Hell, *The Arab Civilization,* W. Heffer & sons, limited, 1926, London.
Hamilton GibbA.R. *Studies on the Civilization of Islam*, Princeton, 1982, London.
R. Levy, *The Social Structure of Islam*, Cambridge 1979, London.
R.A. Nicholson, *A Literary History of the Arabs*, Cambridge 1930, London.
A.M.A. Shushtery, *Outline of the Islamic Culture*, The Bangalore Printing & Publishing Co. Ltd., 1954, India.
S.M. Imamuddin, *Arab Muslim Administration*, 1976, Karachi.
*Encyclopedia of Islam*
S. KhudaBaksh, *Islamic Civilization*vol 1-2, IdaraIslamiyat-e-Diniyat, or Kitab Bhavan, 1984, Delhi.
H.K. Sherwani, *Studies in Muslim Political Thought and Administration*, Muhammad Ashraf, 1945, Lahore.
M.A. Shabon, *The Abbasid Revolution*, Cambridge, 1970, London.
M.A. Shabon, *Islamic History; A New Interpretation*, 1971, London.
R.H. Turner, *Science in Medieval Islam: An Illustrated Introduction*. 1995, Austin: University of Texas Press.
M.Iqbal, *The Reconstruction of Religious Thought in Islam*. 1986, Institute of Islamic Culture, Lahore.
M.N. Roy, *The Historical Role of Islam*, Ajanta Publications, 1981, Delhi.
Musa Ansari, *Moddhojuger Muslim Sovvota o Sonskriti*, Bangla Academy, 1999, Dhaka.
Board of Researchers, *Scientific Indications in the Holy Quran*, Islamic Foundation Bangladesh, 2004, Dhaka.
R.M. Savory, *Introduction to Islamic Civilization*, Cambridge University Press, 1977, London.
Franz Rosenthal, *A History of Muslim Historiography*, Leiden, 1952.
CobbS., *Islamic Contributions to Civilization*, Avalon Press, Washington, 1963.
Ziauddin Sardar, *Science, Technology and development in the Muslim World*, Croom Helm, 1977, London.
M. AkborAli, *Bigghane Musalmander Obodan* (Muslim Contribution to science) Volume 1-12, 1936, Dhaka.

**Course Assessment Pattern (Theory courses):**

| **Bloom's Category** | | **Evaluations out of 100 marks** | | | |
|---|---|---|---|---|---|
| | | **CIE (50 marks)** | | | **SEE (50marks)** |
| Cognitive learning | Affective Learning | Mid-term: (30) | Assignment/ Class Test: (10) | Attendance Marks (:10) | Written Exam: (50) |

| | | | | | |
|---|---|---|---|---|---|
| Remember | - | - | - | - | 5 |
| Understand | - | 5 | 5 | - | 5 |
| Apply | - | 5 | - | - | 10 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 10 |
| Create | - | 5 | - | - | 10 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. | | | | |

**Note: CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination.
**Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,
**Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment. Mid-Term &Semester End Exam. Project evaluation & Viva.

**Course Code:** URBS – 4802. **Course Title:** Bangladesh Studies.
**Credit Hours:** 2 (two) C.H. **Contact Hours:** 2 (two) C.H. (per week)

**Course Description**: The course is designed to help the students in obtaining comprehensive knowledge about the History and Heritage, Geography and Environment, People and Society, Politics and Constitutional Development, Foreign Policy and International Relations, Economics and Natural Resources, Education and Literature, Philosophy and Religion, Art and Culture of Bangladesh and such other conceptions and ideas that are significantly related to the people and society of Bangladesh. This course will deepen students understanding of complex interconnection of historical events which lead to the formation of Bangladesh, current trend in political and economic development thereby improving critical thinking along with their written and oral communication skills, quantitative skills and technical literacy. It will also enhance their understanding of current phenomena in the light of history which will make them responsible global citizen.

**Course Learning Outcomes**: At the end of the course, the students will be able to-

| | |
|---|---|
| CL01 | Understand basic geographical characteristics of Bangladesh and its impact on the life and society, ethnology of its people and population distribution. |
| CL02 | Identify specific stages of Bangladesh's political history, through the ancient, medieval, colonial and post-colonial periods and critically analyzesocio-cultural plurality in Bangladesh. |
| CL03 | Have a comprehensive concept about the historical developments of Bengali nation until the emergence of Bangladesh as an independent country in 1971. |
| CL04 | Critically analyze and present cogent argument on why tensions and contestations between and among social groups may emerge within and among states both in written and oral forms. |
| CL05 | Critically analyze how different constitutional bodies and socio-political institutions operate and how their behavior impact on political governance. |
| CL06 | Evaluate the political, constitutional and administrative developments in Modern Bangladesh. |
| CL07 | Appreciate any significant national issue in context of demand of time and future integrities. |
| CL08 | Explain the economy and patterns of economic changes through qualitative and quantitative analysis. This will increase their awareness on global issues of development processes and the nature of environmental challenges including ways to address them effectively. |

| SL.NO | **CONTENT OF COURSE (as Summary)** | Hrs. | CLOs |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 01. | **Outline study of Bangladesh Geography**: Location, Area, Boundary, Physiographic features, River System, Forest, Climate and Environmental Challenges of Bangladesh. Geographical Impact on the People and Society. | 06 | |
| 02. | **The People of Bangladesh:** Ethnology of the People, Tribal Communities, Population Growth, Composition and Distribution, Population Challenges and Prospects for Bangladesh. | 03 | |
| 03. | **History and Society of Ancient Bengal:** Early settlement and territorial identity, Sasanka (The first independent king), Matsyanyayam and its comparison with the present situation, Pala and Sena dynasty. | 06 | |
| 04. | **History and Society of Bengal under Muslim Rule (1204-1757):** Advent of Islam in Bengal and Its Impact, Composition of Muslim Society in Bengal, Role of Sufism, Foundation of Bengali Nationalism, Educational and Literary Development, Evaluation of the Impact of Muslim Rule on Bengal Society and Civilization. | 06 | |
| 05. | **History and Society of Bengal under British Rule (1757-1947):** Introduction of British Colonial Rule in Bengal, British Policy towards Economy and Education, Socio-Religious Reform Movements and the Struggles for Freedom from British Colonialism, Intellectual Movements, Partition of Bengal, Role of Congress and Muslim League, Rising of Nationalism Movements and the Emergence of Pakistan, Impact of British Administrative Policy on the Society of Bengal. | 06 | |
| 06. | **History and Society of Bangladesh during Pakistan Rule (1947-1971):** National disintegration between East and West Pakistan, political mobilization and successive national movements leading to the independence of Bangladesh. | 03 | |
| 07. | **Political Development in Modern Bangladesh:** Formation and Role of Major Political Parties, Regime Analysis of Modern Bangladesh, Issues of Bangladesh Politics, and Challenges of Democracy. | 03 | |
| 08. | **Constitutional and Administrative Development of Bangladesh:** The Constitution of Bangladesh, its historical background, characteristics, contents, constitutional organizations, amendments and administrative structure. | 03 | |
| 09. | **Foreign Policy and International Relations of Bangladesh:** Principles of Foreign Policy, International Relations of Bangladesh, Role of Bangladesh in International Organizations such as the UN, OIC, SAARC, ASEAN, BIMSTEC etc. | 03 | |
| 10. | **Concept of Development and Sector wise Development in Bangladesh:** Definitions of Development, The Birth of the Human Development Index, MDGs, SDGs, Sector wise development scenario in Bangladesh (Education, Economy, Health, Agriculture, Women Empowerment, Environment) Minerals and Resources, Socio-economic and cultural problems and prospects of Bangladesh. | 06 | |

## Text Book:

Muhammad ShamsulHuq, *Bangladesh in International Politics*, (Dhaka: The University Press Limited, 1995).
Sirajul Islam (ed.), *Banglapedia: National Encyclopedia of Bangladesh*, Vol. 1-14, (Dhaka: Asiatic Society of Bangladesh, 2014).
Md. Thowhidul Islam and others, *Bangladesh Studies*. (Dhaka: Bangladesh Institute of Islamic Thought-BIIT, 2017).

## Reference Books:

Harun Er Rashid, *Geography of Bangladesh*, (Dhaka: University Press Limited, 1991).
Mohar Ali, *History of the Muslims of Bengal.* Vol – 1-3, (Dhaka: Islamic Foundation Bangladesh, 2003).
Azizur Rahman Mallick, *British Policy and the Muslims in Bengal*, (Dhaka: Asiatic Society of Pakistan, 1961).

Shaikh Maqsud Ali, *From East Bengal to Bangladesh: Dynamics and Perspectives,* (Dhaka: The University Press Ltd., 2009).
Rounaq Jahan, *Bangladesh Politics: Problems and Issues,* (Dhaka: The University Press Limited, 2005).
Md. Abdul Halim, *Constitution, Constitutional Law and Politics: Bangladesh Perspective,* (Dhaka: BCC Foundation, 1998).

**A Sample Question Assessment Pattern (Theory courses):**

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

Note: CIE=Continuous Internal Evaluation Marks, SEE= Semester End Examination Marks

# G. Non-Engineering Skills Courses

**Course Code: ACC-2401** **Course Title: Financial and Managerial Accounting,**
**Credit Hours**: **2** **Contact Hours: 2 per week**

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives**: In this course student will learn about 'Financial and Managerial Accounting' in regards to accounting and financial statement. book keeping system, errors correction in the trial balance, bank reconciliation statement, budget and planning.

| S/N | **CourseLearning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | **Explain** the basic concept of financial accounting, cost accounting and management accounting. | PLO-11 | Cognitive/ Understanding |
| CLO-2 | **Analyze** the basic concept of Cost Accounting and preparation of Cost Sheet. | PLO-11 | Cognitive/ analyzing |
| CLO-3 | **Apply** the tools from accounting and cost accounting this would facilitate the decision making i.e. Budgeting, Make or Buy decision. | PLO-11 | Affective/ Organization |
| CLO-4 | **Compare** the different business situations and suggest to best solution with analytical abilities **for an organization.** | PLO-11 | Cognitive/ Evaluating |

**Section –A (Mid-term Exam. 30 Marks)**

1. **Preliminaries:** Introduction to Accounting, History and development of accounting thought, types of accounting, Accounting Principles & ethics, Accounting Equation & Transaction Analysis.
2. **Introduction to Financial Statements**: Recording Business Transactions, The Accounts & their types.
3. **Double-Entry Book keeping System**; Invoice, discount from purchase price, purchase return and allowances, Sale of inventory, sales discount, sales returns and allowances; Journals, ledger & Trial balance.

**Section- B (SEE: 50 Marks)**
**Group- A (20-Marks)**

4. **Correcting errors in the trial balance:** The Adjusting and Closing Procedure: The adjusting process, Accrual versus cash basis Accounting, Preparation of Adjusted trial balance and financial statements, Closing entries & Reversing entries.
5. **Using accounting information in decision-making**. Accounting in practice, Worksheet. Purchase book, sales book, cashbook, patty cashbook, etc. Control accounts and subsidiary accounts. Bank reconciliation statement.

**Group-B (30 Marks)**

6. **Cost In General: C**ost in general: objectives & classifications; Costing Journals; Job order costing, Process costing & Overhead costing, cost sheet; Cost of goods sold statement.
7. **Marginal & Relevant costing**: Marginal costing tools and techniques, cost-volume-profit analysis.
8. **Guidelines for Decision-Making**: Budget, Capital budgeting; Planning, evaluation & control of capital expenditures.
9.

**Recommended Reference:**

1. Charles T. Horngren & walter T. Harrison, Accounting.

2. Adolph Matz & Milton F. Usry, Cost Accounting- Planning and Control
3. Sankar Prasad Basu & Monilal Das, Practice in Accountancy
4. Jerry J. Weygandt, D E. Kieso & Paul D. Kimmel, Accounting Principles :
5. Jay M Smith & K Fred Skousen, Intermediate Accounting.

**A Sample Question Assessment Pattern (Theory courses):**

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:** **CIE**=Continuous Internal Evaluation ,**SEE**= Semester End Examination

**Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

**Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment. Mid-Term &Semester End Exam. Project evaluation & Viva

**Course Code: ECON-3501** **Course Title: Principles of Economics**
**Credit Hours:** 2 **Contact Hours:** 2 per week

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives**: In this course student will learn about 'Principle of Economics' in regards to the basic idea in micro and macroeconomics, production and market, economic policy, economics of development and planning.

| S/N | **Course Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | **Explain** the knowledge of the fundamental concepts and theories of micro and macro-economics. | PLO-11 | Cognitive/ Understanding, |
| CLO-2 | **Analyze** the key indicators of economic growth. | PLO-11 | Cognitive/ Analyzing |
| CLO-3 | **Compare** the economic theories and concepts to analyze behavior of individuals, firms and nations to act as a responsible citizen. | PLO-11 | Cognitive/ Analyzing |

**Section –A (Mid-term Exam: 30 Marks)**

**1. Introduction:** Definition of economics, Scope and utility of studying economics.
**2. Micro-economics:** The theory of demand and supply and their elasticity, Price determination, Nature of an economic theory, applicability of economic theories to the problems of developing countries. Indifference curves technique, Marginal utility analysis,
**3. Production:** Production function, types of productivity, The nature of Isoquants and Isocosts, Rational region of production of an engineering firm. Euler's theorem.

**Section- B (SEE: 50 Marks)**

**Group- A (20-Marks)**

**4. Market**: Concepts of market and market structure. Cost analysis and cost function. Small scale production and large-scale production, Optimization, Theory of distribution.
**5. Macroeconomics:** Savings, investment, employment, National income analysis, Inflation.

**Group-B (30 Marks)**

**6. Economic Policy:** Monetary policy, Fiscal policy and trade policy with reference to Bangladesh.
**7. Economics of development:** Dimensions of development, Relevance of theory, the employment problem, Human resource development
**8. Economics of planning:** Planning and market, Policy models, Planning experience.

**Recommended Reference:**


1. Richard Leftwich, The Price System and Resource Allocation
2. P.A. Samuelson, Economics
3. P.A. Samuelson & Nordhaus, Economics
4. G.J. Stigler, The Theory of Price
5. McConnell &L.Brue, Economics (Principles, Problems and Policies)


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. | | | | |

**Note:CIE**=Continuous Internal Evaluation ,**SEE**= Semester End Examination.

**A. Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,
**B.Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment. Mid-Term &Semester End Exam. Project evaluation & Viva

**Course Code: MGT-3601** **Course Title: Industrial Management**
**Credit Hours: 2** **Contact Hours: 2 per week**

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |

| | | |
|---|---|---|
| | **SEE: Semester End Examination** | **50 Marks** |

**Objectives:** In this course student learn about 'Industrial Management' in regards to the importance of management, manpower planning and development, cost & financial management, marketing and production management, industrial law and professional practice**.**

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corresponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO-1 | **Explain** the theories and principles of modern management and apply the concepts to the management of organizations in private and public sector. | PLO-11 | Cognitive/ Creating |
| CLO-2 | **Understand** how managers can effectively plan in today's dynamic environment, | PLO-11 | Cognitive/ Understanding |
| CLO-3 | **Identify** what strategies organizations might use to become more innovative and explain how the industrial company markets, price it's products and also how the company deal with its social environment. | PLO-6 | Cognitive/ Analyzing |

**Section –A (Mid-term Exam: 30 Marks)**

**1. Preliminaries:** Definition, Importance of management, Evolution, Functions of management, Introduction to Industry & organizational management.

**2. Organization and it's Environment**: Environmental context of the Organization.

**3. Organizing & stuffing:** Theory & structure, Co-ordination, Span of control, Authority delegation, Formal & Informal Groups, Committee and task force, Manpower planning & Development.

**Section- B (SEE: 50 Marks)**

**Group- A (20-Marks)**

**4. Cost & Financial Management:** Investment analysis, benefit-cost analysis & it's implications in decision making. Cost planning & Price Control, budget &budgetary control, development planning process.

**5. Marketing management:** Concepts, strategy, sales promotion, Transportation & Storage. Technology management: Management of innovation & changes, technology lifecycle.

**5. Marketing management:** Concepts, strategy, sales promotion, Transportation & Storage. Technology management: Management of innovation & changes, technology lifecycle.

**Group-B (30 Marks)**

**7. Industrial law**: Law of contract, sale of goods, Hire and purchase, Negotiable instrument Act, patent right and validity. Factories act, Industrial relations ordinance, workmen's compensation act.

**8. Professional Practice:** Tender documentation, General conditions of tender, Tech. Specification, Purchase & procurement rules-2004, Technical evaluation, Copyright, Intellectual property right.

**Recommended Reference:**


1. Ricky W. Griffin, Management
2. Heinz Weihrich & Harold Koontz, Management A Global Perspective
3. W.J. Stevenson, Management Science
4. Terry & Frankin, Principle of Management
5. Edwin B. Flippo, Personnel Management.
6. Arun Monappa, Industrial Relations
7. Naceur Jabnoun, Islam & Management
8. F.R. Faridi, Islamic Principles of Business Organization and Management
9. Leon G. Schiffman & L.L. Kanuk, Consumer Behavior
10. W.J. Stevenson, Management Science
11. Herold Koontz, Management


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective Learning | Mid-term: (30) | Assignment/ Class Test: (10) | Attendance Marks (:10) | Written Exam: (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| | Responding | x | x | 10 | |
| | Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed to during the semester. | | | | |

**Note:** **CIE**=Continuous Internal Evaluation Marks, **SEE**= Semester End Examination Marks.

**Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

**Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment. Mid-Term &Semester End Exam. Project evaluation & Viva

**Course Code: LAW-4725 Course Title: Professional Ethics and Environmental Protection Law**

**Credit Hours: 2 Contact Hours: 2 per week**

| | | | |
|---|---|---|---|
| **Course Assessments** | **CIE: Continuous Internal Evaluation** | **Attendance** | **10 Marks** |
| | | **Class test/ Assignment/ Quizzes** | **10 Marks** |
| | | **Mid-term** | **30 Marks** |
| | **SEE: Semester End Examination** | | **50 Marks** |

**Objectives:** In this course student learn about 'Professional Ethics and Environmental Protection Law' in regards to nature and concept of law, company law, labour law, history and development of engineering ethics, ethical expectations and cyber law.

| S/N | **Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to | Corres-ponding PLOs | Bloom's taxonomy domain/level |
|---|---|---|---|
| CLO -1 | Identify the legal problems in social and environmental contexts commonly encountered by engineers in their professional fields/industries. | PLO-2, | Cognitive/ Analyzing, |
| CLO -2 | Understand the impact of knowledge about Constitutional provisions for the protection of environment need for development. | PLO-7 | Cognitive/ Understanding |
| CLO -3 | Demonstrate analytical skills through investigation and evaluation of ethical problems in engineering settings. | PLO-8 | Cognitive/ Analyzing |
| CLO -4 | Communicate effectively about their duties and responsibilities as professionals through gaining knowledge of the philosophies of ethics, professional practice, and world culture | PLO-10 | Affective/ Responding |

**Section-A (Mid-term Exam: 30 Marks)**

**1.** Law Basics: Nature and concept of law. Schools of Jurisprudence: Analytical, Historical, Philosophical, Sociological & Natural. Administration of Justice: Theories of punishment. Sources of Law: Custom, Precedent and Legislation. Rights and Duties. Legal Personality. Ownership and Possession. Definition and theories of

Law, Principles of law of contract, agency, partnership, sale of goods negotiable instruments, insurance and insolvency.

**2.** Company law: The companies act with special reference to the amendments and ordinances applicable to Bangladesh. Law regarding formation, Incorporation, Management and winding up of companies.

**3.**Labor Law: The scope and sources of labor law. Law in relation to wages, hours, health, safety andother condition to work. The legislation effecting employment in factories. The trade union legislationarbitration, the policy of the state in relation to labor. Elementary principles of labor law.

**Section-B (SEE: 50 Marks)**

**Group-A (20-Marks)**

**4.** History and Development of Engineering Ethics: Study of Ethics in Engineering. Applied Ethics inengineering. Human qualities of an engineer. Obligation of an engineer to the clients and to otherengineers. Measures to be taken in order to improve the quality of engineering profession.

**5.** Ethical Expectations: Employers and Employees inter-professional relationship, maintaining acommitment of Ethical standards. Desired characteristics of a professional code. Institutionalization ofEthical conduct.

**Group-B (30-Marks)**

**6.** Cyber Law Introduction : The need for Cyber Law , Regulation of Technology and Internet , TheInternet and the Problems of Geography and Sovereignty , Freedom of Expression on the Internet,

**7.** The Relationship between Legal and Technological Regulation: Intellectual Property: Copy rights,Trade Marks, Industrial Designs. Electronic and Digital Signature. Embedding Law into Technology.Electronic Contract.

**8.** Liability of Internet Intermediaries: Defamatory Content, Privacy, Copy right, Infringement.Liabilities relating to electronic financial transaction. Nature and scope of cybercrime, Regulation ofCyber Crime. Offences and Punishment of Technology Crimes.

**Recommended Reference:**


1. A. K. Sen, A Hand Book of Commercial Law.
2. A. A. Khan, Labour and Industrial Law.
3. J. D. Mabboth, An Introduction to Ethics
4. Stacey L. Dogan, Copyright in Cyberspace: An Introduction
5. A. B.Siddique, The Law of Contract.
6. Emile Durkheim, Professional Ethics and Civics Morals
7. Jonathan L. Zittrain, , Internet Law: Technological Complements to Copyright
8. Coopers, Outline of Industrial Law.
9. A. Zulfiquar, V A Text Book on the Bangladesh Labour Act-2006.
10. P. Narayanan, Intellectual Property Law.
11. A. R. Khan, Business Ethics
12. G. E. Moore:, Principia Ethicia
13. M. Radar, Ethics and the Auman Community


## A Sample Question Assessment Pattern (Theory courses):

| Bloom's Category | | Evaluations out of 100 marks | | | |
|---|---|---|---|---|---|
| | | CIE (50 marks) | | | SEE (50 marks) |
| Cognitive learning | Affective learning | Mid-term (30) | Assignment/ Class Test (10) | Attendance Marks (10) | Written Exam (50) |
| Remember | - | 5 | - | - | 5 |
| Understand | - | - | 5 | - | 10 |
| Apply | - | 5 | - | - | 05 |
| Analyze | - | 5 | - | - | 10 |
| Evaluation | - | 10 | 5 | - | 15 |
| Create | - | 5 | - | - | 05 |
| x | Responding | x | x | 10 | |
| **Remarks** | Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the | | | | |

| | |
|---|---|
| | semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy. |

**Note:** **CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

**Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

**Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment. Mid-Term &Semester End Exam. Project evaluation & Viva

## 27. Appendix: Summary of Batch-wise Changes in Courses

***Program: B. Sc. Engg. (EEE)***

<table>
<tr><td>Sl.</td><td colspan="3">Semester</td><td>Total Credit</td><td colspan="5">Remarks</td></tr>
<tr><td>1.</td><td colspan="3">Spring-2006</td><td>160</td><td colspan="5">Approved by UGC</td></tr>
<tr><td>2.</td><td colspan="3">Autumn-2006</td><td>160</td><td colspan="5">Same as Spring-2006</td></tr>
<tr><td>3.</td><td colspan="3">Spring-2007</td><td>159</td><td colspan="5">URIH-4701 (1 credit) dropped from syllabus.</td></tr>
<tr><td>4.</td><td colspan="3">Autumn-2007</td><td>159</td><td colspan="5">Same as Spring-2007</td></tr>
<tr><td>5.</td><td colspan="3">Spring-2008</td><td>161</td><td colspan="5">URAL-1202 (1 Credit) and URIS-2405 (1 credit) added to the syllabus.</td></tr>
<tr><td>6.</td><td colspan="3">Autumn-2008</td><td>161</td><td colspan="5">Same as Spring-2008</td></tr>
<tr><td>7.</td><td colspan="3">Spring-2009</td><td>161</td><td colspan="5">Same as Spring-2008</td></tr>
<tr><td>8.</td><td colspan="3">Autumn-2009</td><td>161</td><td colspan="5">URIS-3609 (2 credit) is replaced with URIS-3607 (1 credit) and URIH-4701 (1 credit).</td></tr>
<tr><td>9.</td><td colspan="3">Spring-2010</td><td>161</td><td colspan="5">Chem-2301 (3 credit) is rearranged as Chem-2301 (2 credit) and Chem-2302 (1 credit).</td></tr>
<tr><td>10.</td><td colspan="3">Autumn-2010</td><td>161</td><td colspan="5">Same as Spring-2010</td></tr>
<tr><td>11.</td><td colspan="3">Spring-2011</td><td>161</td><td colspan="5">Same as Spring-2010</td></tr>
<tr><td>12.</td><td colspan="3">Autumn-2011</td><td>161</td><td colspan="5">Same as Spring-2010</td></tr>
<tr><td rowspan="10">13.</td><td colspan="3">Spring-2012</td><td>161</td><td colspan="5">Following changes in courses has been made:</td></tr>
<tr><td rowspan="2">Sl. No.</td><td colspan="4">New Course</td><td colspan="4">Old Course</td></tr>
<tr><td>Course Code</td><td>Course Title</td><td>Credit Hour</td><td>Contact Hour</td><td>Course Code</td><td>Course Title</td><td>Credit Hour</td><td>Contact Hour</td></tr>
<tr><td>1.</td><td>UREL-1103</td><td>Advanced English</td><td>1</td><td>3</td><td>UREL-1103</td><td>Advanced English</td><td>2</td><td>3</td></tr>
<tr><td>2.</td><td colspan="4">Dropped from syllabus</td><td>URAL-1202</td><td>Intermediate Arabic</td><td>1</td><td>3</td></tr>
<tr><td>3.</td><td colspan="4">Dropped from syllabus</td><td>URIS-2405</td><td>Dealings and Behavior in Islam</td><td>1</td><td>1</td></tr>
<tr><td>4.</td><td>URBS-4802</td><td>Bangladesh Studies</td><td>1</td><td>2</td><td>URBS-4802</td><td>Bangladesh Studies</td><td>2</td><td>2</td></tr>
<tr><td>5.</td><td>MATH-1101</td><td>Math I - (Differential and Integral Calculus)</td><td>3</td><td>3</td><td>MATH-1101</td><td>Elementary Mathematics</td><td>1</td><td>3</td></tr>
<tr><td>6.</td><td>MATH-3501</td><td>Math V - (Complex Variable, Laplaces and Fourier Analysis, Z-transform)</td><td>3</td><td>3</td><td>MATH-3501</td><td>Mathematics IV</td><td>2</td><td>3</td></tr>
<tr><td>7.</td><td>STAT-1201</td><td>Statistics</td><td>2</td><td>2</td><td>STAT-1211</td><td>Statistics</td><td>3</td><td>3</td></tr>
<tr><td>8.</td><td>PHY-1102</td><td>Physics I Sessional</td><td>1</td><td>3</td><td>PHY-1104</td><td>Physics I Sessional</td><td>1.5</td><td>3</td></tr>
</table>

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 9. | PHY-1202 | Physics II Sessional | 1 | 3 | PHY-1204 | Physics II Sessional | 1.5 | 3 |
| | 10. | CHEM-2301 | Chemistry | 3 | 3 | CHEM-2301 | Chemistry | 2 | 3 |
| | 11. | CSE-1101 | Computer Fundamentals | 2 | 2 | CSE-1101 | Computer Fundamentals | 1 | 2 |
| | 12. | Dropped from syllabus | | | | EEE2405 | Engineering Electromagnetism | 3 | 3 |
| | 13. | EEE2413 | Instrumentation and Measurement | 3 | 3 | New Course | | | |
| | 14. | EEE-4822 | General Viva-Voce | 1 | 1 | New Course | | | |
| **14.** | Autumn-2012 | | 161 | Same as Spring-2012 | | | | | |
| **15.** | Spring-2013 | | 161 | EEE-4800 (6 credit) replaced with EEE-4858 (4 credit), EEE-4841 (1 credit) and EEE-4842 (1 credit). | | | | | |
| **16.** | Autumn-2013 | | 161 | Same as Spring-2013 | | | | | |
| **17.** | Spring-2014 | | 161 | Following changes in courses has been made: | | | | | |
| | Sl. No. | New Course | | | | Old Course | | | |
| | | Course Code | Course Title | Credit Hour | Contact Hour | Course Code | Course Title | Credit Hour | Contact Hour |
| | 1. | CSE--1203 | Data Structure and Algorithm | 2 | 2 | CSE-1201 | Computer Programming | 3 | 3 |
| | 2. | CSE--1204 | Data Structure and Algorithm Sessional | 1 | 2 | CSE-1202 | Computer Programming Sessional | 1.5 | 3 |
| | 3. | CSE--2302 | Object Oriented Programming | 1.5 | 3 | New Course | | | |
| | 4. | | | | | | | | |
| | 5. | Dropped from syllabus | | | | EEE2413 | Instrumentation and Measurement | 3 | 3 |
| | 6. | Dropped from syllabus | | | | EEE-3503 | Power System I | 3 | 3 |
| | 7. | Dropped from syllabus | | | | EEE-3504 | Power System I Sessional | 1.5 | 3 |
| | 8. | Dropped from syllabus | | | | EEE-4842 | Industrial Attachment/ Internship | 1 | 2 |
| | 9. | Dropped from syllabus | | | | EEE-36XX | Elective II | 3 | 3 |
| | 10. | EEE-2415 | Transmission & Distribution of Electrical Power | 3 | 3 | New Course | | | |
| | 11. | EEE-3519 | Power System Analysis | 3 | 3 | New Course | | | |
| | 12. | EEE-3520 | Power System Analysis Sessional | 1.5 | 3 | New Course | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 13. | EEE-3621 | Engineering Electromagnetism | 3 | 3 | New Course | | | |
| | 14. | EEE-3502 | Continuous Signals and Linear Systems Sessional | 1 | 2 | New Course | | | |
| | 15. | EEE-4721 | Research Methodology | 1 | 1 | EEE-4841 | Research Methodology & Seminar | 1 | 2 |
| | 16. | EEE-4860 | Thesis/Project | 4 | 8 | EEE-4858 | Thesis/Project | 4 | 8 |
| **18.** | Autumn-2014 | | 161 | Same as Spring-2014 | | | | | |
| **19.** | Spring-2015 | | 161 | Same as Spring-2014 | | | | | |
| **20.** | Autumn-2015 | | 161 | Same as Spring-2014 | | | | | |
| **21.** | Spring-2016 | | 161 | Same as Spring-2014 | | | | | |
| **22.** | Autumn-2016 | | 161 | Same as Spring-2014 | | | | | |
| **23.** | Spring-2017 | | 161 | Following changes in courses has been made: | | | | | |
| | Sl. No. | New Course | | | | Old Course | | | |
| | | Course Code | Course Title | Credit Hour | Contact Hour | Course Code | Course Title | Credit Hour | Contact Hour |
| | 1. | PHY-1102 | Physics I Sessional | 1 | 2 | PHY-1102 | Physics I Sessional | 1 | 3 |
| | 2. | PHY-1202 | Physics II Sessional | 1 | 2 | PHY-1202 | Physics II Sessional | 1 | 3 |
| | 3. | CSE-1105 | Computer Programming I | 2 | 2 | CSE-1103 | Computer Basic and Programming | 2 | 2 |
| | 4. | CSE-1106 | Computer Programming I Sessional | 1 | 2 | CSE-1104 | Computer Basic and Programming Sessional | 1 | 2 |
| | 5. | CSE-1205 | Computer Programming II | 2 | 2 | CSE-1203 | Data Structure and Algorithm | 2 | 2 |
| | 6. | CSE-1206 | Computer Programming II Sessional | 1 | 2 | CSE-1204 | Data Structure and Algorithm Sessional | 1 | 2 |
| | 7. | CE-1202 | Engineering Drawing | 1 | 2 | CE-1202 | Engineering Drawing Sessional | 1 | 2 |
| | 8. | EEE-2305 | Numerical Technique | 1 | 1 | New Course | | | |
| | 9. | EEE-2306 | Numerical Technique Sessional | 1 | 2 | EEE-2310 | Numerical Technique Sessional | 1.5 | 3 |
| | 10. | EEE-3508 | Circuit Simulation Sessional | 1 | 2 | New Course | | | |
| | 11. | Dropped from the Syllabus | | | | EEE-3502 | Continuous Signals and | 1 | 2 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Linear Systems Sessional | | |
| | 12. | EEE-3612 | Electrical Service Design Sessional | 1 | 2 | EEE-3610 | Electrical Service Design Sessional | 1.5 | 3 |
| | 13. | EEE-4709 | Research Methodology and Seminar | 1 | 1 | EEE-4721 | Research Methodology | 1 | 1 |
| | 14. | EEE-4753 | VLSI I | 3 | 3 | EEE-4711 | VLSI Design Technique and Modeling | 2 | 2 |
| | 15. | EEE-4754 | VLSI I Sessional | 1.5 | 3 | EEE-4712 | VLSI Design Technique and Modeling Sessional | 1 | 3 |
| | 16. | Dropped from the Syllabus | | | | CSE-2302 | Object Oriented Programming | 1.5 | 3 |

| | | | |
|---|---|---|---|
| **24.** | Autumn-2017 | 161 | Following changes in courses has been made: |

| Sl. No. | New Course | | | | Old Course | | | |
|---|---|---|---|---|---|---|---|---|
| | Course Code | Course Title | Credit Hour | Contact Hour | Course Code | Course Title | Credit Hour | Contact Hour |
| 1. | UREL-1106 | Advanced English | 2 | 3 | UREL-1103 | Advanced English | 1 | 3 |
| 2. | URTE-1101 | Text of Ethics and Morality | 1 | 2 | URFL-1101 | Foreign Language- 01 | 1 | 2 |
| 3. | URED-1201 | Basic Principles of Islam | 2 | 2 | URIS-1101 | Islamic '*Aqidah* | 1 | 1 |
| | | | | | URIS-1203 | Introduction to '*Ibadah* | 1 | 1 |
| 4. | URED-2302 | Sciences of Qur'an and Hadith | 1 | 2 | URIS-2303 | Introduction to *Qur'an* and *Sunnah* | 1 | 2 |
| 5. | URED-2305 | Comparative Religion | 3 | 3 | New Course (equivalent to URED-1201 and URED-2302 for non-Muslims only). | | | |
| 6. | URBL-2401 | Functional Bengali Language | 2 | 2 | New Course | | | |
| 7. | URED-3503 | Introduction to Political Thoughts and Social Behavior | 1 | 2 | URIS-3504 | Introduction to Political Thoughts | 1 | 1 |
| 8. | URED-3604 | Life and Teachings of the Prophet Muhammad (*SAAS*) | 1 | 2 | URIS-3607 | Biography of the Prophet (*SAAS*) | 1 | 1 |
| 9. | URIH-4701 | A Survey of Islamic History and Culture | 1 | 2 | URIH-4701 | History of *Khilafah* and Muslim contribution to world | 1 | 1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | civilization (Up to 1258 A.D.) | | |
| 10. | URBS-4802 | Bangladesh Studies and History of the Independence | 2 | 2 | New Course | | | |
| 11. | Dropped from the Syllabus | | | | URBS-4802 | Bangladesh Studies | 1 | 2 |
| 12. | MATH-1107 | Mathematics -I (Differential & Integral Calculus) | 3 | 3 | MATH-1101 | Math I (Differential and Integral Calculus) | 3 | 3 |
| 13. | MATH-1207 | Mathematics-II (Differential Equation & Geometry) | 3 | 3 | MATH-2303 | Math III (Differential Equations and Partial Differential Equations) | 3 | 3 |
| 14. | MATH-2309 | Mathematics-III (Linear Algebra) | 3 | 3 | New Course | | | |
| 15. | MATH-2409 | Mathematics-IV (Complex Variable and Vector Analysis) | 3 | 3 | New Course | | | |
| 16. | Dropped from the Syllabus | | | | MATH-1202 | Math II (Co-Ordinate Geometry and Higher Trigonometry) | 3 | 3 |
| 17. | Dropped from the Syllabus | | | | MATH-2404 | Math IV (Complex Variable, Lap laces and Fourier Analysis, Z-transform) | 3 | 3 |
| 18. | Dropped from the Syllabus | | | | MATH-3505 | Math V (Linear Algebra, Matrices and Vector Analysis) | 3 | 3 |
| 19. | STAT-2301 | Probability & Statistics | 2 | 2 | STAT-1201 | Statistics | 2 | 2 |
| 20. | PHY-1204 | Physics Sessional | 1.5 | 3 | PHY-1202 | Physics II Sessional | 1 | 2 |
| 21. | CHEM-2304 | Chemistry Sessional | 1.5 | 3 | CHEM-2302 | Chemistry Sessional | 1 | 2 |
| 22. | LAW-4725 | Professional Ethics and Environmental Protection Law | 2 | 2 | LAW-4721 | Law and Professional Ethics | 2 | 2 |
| 23. | Dropped from the Syllabus | | | | PHY- | Physics I | 1 | 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 1102 | Sessional | | |
| | 24. | Dropped from the Syllabus | EEE-2305 | Numerical Technique | 1 | 1 |

| | Semester | Total Credit | | Remarks |
|---|---|---|---|---|
| **25.** | Spring-2018 | 161 | Same as Autumn-2017 | Introduced OBE |
| **26.** | Spring-2019 | 161 | Same as Autumn-2017 | Introduced OBE |
| **27.** | Autumn-2019 | 161 | Same as Autumn-2017 | Introduced OBE |
| **28.** | Spring-2020 | 161 | Same as Autumn-2017 | Updated COs, Mapping etc. |
| **29.** | Autumn-2020 | 161 | Same as Autumn-2017 | Introduced DP, GF, CIE, SEE, CEP, IEEE Ref., &Updated OBE. |
| | Spring-2021 | 162 | **Following changes in courses has been made:** | |

| | **New Course** | | | | **Old Course** | | | |
|---|---|---|---|---|---|---|---|---|
| SL | Course Code | Course Title | Credit Hour | Contact Hour | Course Code | Course Title | Credit Hour | Contact Hour |
| | GEBL-2401 | Bangla Language and Literature | 2 | 2 | URBL-2401 | Functional Bengali Language | 2 | 2 |
| | GEHE-3601 | History of the Emergence of Bangladesh | 2 | 2 | URBS-4802 | Bangladesh Studies and History of the Independence | 2 | 2 |
| 1. | EEE-3608 | Research Methodology and Seminar | 1 | 2 | EEE-4709 | Research Methodology and Seminar | 1 | 1 |
| 2. | EEE-4804 | Industrial Attachment | 1 | 2 | New Course | | | |