MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE,
MADANAPALLE
(UGC-AUTONOMOUS)
www.mits.ac.in

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Academic regulations
Course structure
AND
Detailed SYLLABI

For the students admitted to

B.Tech. Regular Four Year Degree Programme from the academic year 2014-15

and

B.Tech. Lateral Entry Scheme from the academic year 2015-16

B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING

VISION AND MISSION OF THE INSTITUTION

Vision

To become a globally recognized research and academic institution and thereby contribute to technological and socio-economic development of the nation

Mission

To foster a culture of excellence in research, innovation, entrepreneurship, rational thinking and civility by providing necessary resources for generation, dissemination and utilization of knowledge and in the process create an ambience for practice-based learning to the youth for success in their careers.

VISION AND MISSION OF THE DEPARTMENT

Vision

To become a Department recognized for its ability to provide quality education to the students and make them excel in the domain of electrical & electronics engineering, with research proficiency and ethics, to meet the challenges from society.

Mission

- To impart quality education and advancements in program of studies for producing engineers with scientific temperament and moral values in the field of electrical & electronics engineering
- To create and develop research culture with deep sense of commitment, so as to enable the industries to adopt the research outputs
- To enhance the technical dexterity, so as to find the suitable solutions in their respective domain, for welfare of the society

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Programme Educational Objectives of the B. Tech Electrical & Electronics Engineering are:

The graduates will

PEO1: Acquire a successful career in electrical industries, allied fields and entrepreneurship with profound knowledge in core engineering.

PEO2: Pursue higher education and involve in research activities to gain in-depth knowledge in electrical and electronics engineering.

PEO3: Exhibit intellectual skills, ethics and pursue life-long learning to cater the societal needs.

PROGRAM OUTCOMES (POs)

At the end of the programme, graduate will be able to

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialisation for the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: 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.

PO6: The engineer and society: 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.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norm of the engineering practice.

PO9: Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with t h e 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.

PO11: Project management and finance: 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.

PO12: Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

The Electrical and Electronics Engineering Graduates will be able to

PSO 1: Facilitate technical solutions for different power issues to maintain the stability and reliability of Power Systems.

PSO 2: Control the various power electronics converters, electrical machines / drives used in industry.

PSO 3: Understand various computational tools / methods for the design and analysis of various electrical systems.

PRELIMINARY DEFINITIONS AND NOMENCLATURES

Academic Council: The Academic Council is an apex academic body of the Institution and is responsible for the maintenance of standards of instruction, education and examination within the Institution. Academic Council is an authority as per UGC regulations and it has the right to take decisions on all academic related matters.

Academic Autonomy: Means freedom to an Institute in all aspects of conducting its academic programmes, granted by the UGC/University for Promoting Excellence.

Academic Year: It is the period necessary to complete an actual course of study within a year. It comprises two consecutive semesters i.e., Even and Odd semester.

AICTE: Means All India Council for Technical Education, New Delhi.

Audit Course: It is a non-credit course, which has no external evaluation.

Autonomous Institute: An institute / college designated as autonomous by University Grants Commission (UGC), New Delhi in concurrence with Jawaharlal Nehru Technological University, Ananthapuramu (JNTUA) and State Government.

Backlog Course: A course is considered a backlog course if the student has obtained a Letter grade (F).

Basic Sciences: The courses of foundational nature in the areas of Mathematics, Physics, Chemistry etc., are offered in this category.

Board of Studies (BoS): BoS is an authority as defined in UGC regulations. Each department is responsible for curriculum design and updating the syllabi from time to time in respect of all programmes, offered by the departments.

Branch of Study: It is a branch of knowledge, an area of study or a specific program (like Civil Engineering, Electrical and Electronics Engineering, Mechanical Engineering, Electronics & Communication Engineering and Computer Science & Engineering)

Programme: Means specialization. Ex: B.Tech in Civil Engineering, M.Tech in Computer Science and Engineering etc.

Certificate Course: Institution offers certain certificate courses (beyond the curriculum) to make a student gain hands-on expertise and skills required for holistic development.

Choice Based Credit System (CBCS): The credit based system that provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching.

Compulsory Course: Course required to be undertaken for the award of the degree as per the program.

Commission: Means University Grants Commission (UGC), New Delhi.

Continuous Internal Assessment: The internal assessment is made through Mid-term tests, assignments, slip tests, surprise tests, quizzes etc.

Course: A course is a subject offered by the Institution for learning in a particular semester.

Course Outcomes: The essential skills that need to be acquired by every student through a course.

Credit: A credit is a unit that gives weight to the value, level or time requirements of an academic course.The number of 'Contact Hours' in a week of a particular course determines its credit value.

Credit point: It is the product of grade point and number of credits for a course.

Cumulative Grade Point Average (CGPA): It is a measure of cumulative performance of a student over all the completed semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

Curriculum: Curriculum incorporates the planned interaction of students with instructional content, materials, resources, and processes for evaluating the attainment of Programme Educational Objectives.

Degree: A student who fulfills all the Programme requirements is eligible to receive a degree.

Degree with Specialization: A student who fulfills all the programme requirements of her/his discipline and successfully completes a specified set of professional elective courses in a specialized area is eligible to receive a degree with specialization like ECE, CSE, EEE etc.

Department: An academic entity that conducts relevant curricular and co-curricular activities, involving both teaching and non-teaching staff and other resources.

Elective Course: A course that can be chosen from a set of courses. An elective can be Discipline (Professional) and/or Open Elective.

Evaluation: Evaluation is the process of judging the academic work done by the student in her/his courses. It is done through a combination of continuous internal assessment and end semester examinations.

Foundation Course: Foundation courses are the courses based upon the content that leads to Enhancement of skill and knowledge and is value-based and is aimed at man-making education.

Grade: It is an index of the performance of the students in a said course. Grades are denoted by Alphabets.

Grade Point: It is a numerical weight allotted to each letter grade on a 10 - point scale.

Institute: Means Madanapalle Institute of Technology & Science, Madanapalle unless indicated otherwise by the context.

Massive Open Online Course (MOOC): MOOC courses inculcate the habit of self learning, through online education.

Pre-requisite: A course, the knowledge of which is required for registration into higher level course.

Professional Core: The courses that are essential constituents of each engineering discipline are categorized as professional core courses for that discipline.

Professional or Discipline Elective: A course that is discipline centric. An appropriate choice of minimum number of such electives as specified in the program will lead to a degree with specialization.

Programme: Means, Bachelor of Technology (B.Tech) degree programme or UG Degree Programme.

Program Educational Objectives: The broad career, professional, personal goals that every student will achieve through a strategic and sequential action plan.

Project work: Course that a student has to undergo during his/her final year which involves the student to undertake a research or design, which is carefully planned to achieve a particular aim. It is a credit based course.

Registration: Process of enrolling into a set of courses in a semester of the Programme.

Regulations: The regulations are common to all B.Tech programmes conducted at the Institute of Madanapalle Institute of Technology & Science, Madanapalle and shall be called "MITS Regulations R-14" and are binding on all the stakeholders.

Semester: It is a period of study consisting of 17 weeks of academic work equivalent to normally 90 working days (525 contact hours) excluding examination and preparation holidays. The odd Semester starts usually in the month of July and even semester during December.

End Semester Examinations: It is an examination conducted at the end of a course of study.
S/he: Means "she" and "he" both.

Student Outcomes: The essential skill sets that need to be acquired by every student during her/his programme of study. These skill sets are in the areas of employability, entrepreneurial, social and behavioral.

University: Means the Jawaharlal Nehru Technological University Anantapur, Ananthapuramu.

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ACADEMIC REGULATIONS

For the students admitted to

B.Tech. Regular Four Year Degree Programme from the academic year 2014-15

and

B.Tech. Lateral Entry Scheme from the academic year 2015-16

Applicable for students admitted to B.Tech. (Regular) from 2014-15 batch onwards

1. Admission Procedure

As per the norms of A.P. State Council of Higher Education (APSCHE), Government of Andhra Pradesh, admissions are made to the first year of Four year B.Tech. Degree programme as given below:-

a) As per the norms of Government of Andhra Pradesh, A-Category (based on the rank obtained in EAMCET) seats will be filled by the Convener, EAMCET.

b) As per the norms of Government of Andhra Pradesh, B-Category seats will be filled by the management.

2. Programmes of Study

With the approval from AICTE & JNTUA, the following B. Tech. Degree programmes are offered at present.

Sl. No	Specialization	Code
1.	Civil Engineering	01
2.	Electrical & Electronics Engineering	02
3.	Mechanical Engineering	03
4.	Electronics and Communication Engineering	04
5.	Computer Science & Engineering	05

3. Programme Pattern

3.1 The medium of instruction, examinations and project reports shall be English.

3.2 The entire programme of study is for four academic years. All four academic years shall be on semester pattern.

3.3 A student admitted to a programme should complete it within a period equal to twice the prescribed duration of the programme from the date of admission.

3.4 The minimum instruction days for each Semester shall be 90.

3.5 A student eligible to appear for the end examination in a course, but absent or has failed in the end examination may appear for that course at the next supplementary examination when offered.

3.6 When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfillment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

3.7 The curriculum of B.Tech. programme is designed to have a total of 180 credits for the award of B.Tech. degree.

3.8 Each course is assigned certain number of credits which will depend upon the number of lecture per week. In general, credits are assigned to the courses based on the following contact hours per week per semester.

a. For Theory Courses: One credit for each Lecture hour.

b. For Practical Courses: One credit for two hours of Practical OR
Two credits for three (or max. of four) hours of Practical.

4. Award of B.Tech. Degree

A student will be declared eligible for the award of the B.Tech. Degree if he/she fulfils the following academic regulations:

4.1 Pursue a programme of study for not less than four academic years and in not more than eight academic years.

4.2 Register for 180 credits and secure all 180 credits.

4.3 Students, who fail to fulfill all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. programme and their admission stands cancelled.

5. Attendance Requirements

5.1 A student shall be eligible to appear for Semester End examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the courses in a semester.

5.2 Shortage of Attendance below 65% in aggregate shall in NO case be condoned.

5.3 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.

5.4 Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.

5.5 A student will not be promoted to the next semester unless he/she satisfies the attendance requirements of the present semester, as applicable. They may seek readmission for that semester when offered next.

5.6 A stipulated fee shall be payable towards condonation of shortage of attendance to the Institution.

6. Relative Weightage for Internal Evaluation and End Semester Examination

a. The performance of a student in each semester shall be evaluated course-wise.
b. Performance evaluation in each course (theory/ practical) shall be based on a total of 100 marks, of which the relative weightage for internal evaluation and end semester examination shall be 40% and 60% respectively.
c. However, Audit courses shall be evaluated entirely on the basis of internal evaluation.

6.1 Internal Evaluation

6.1.1 The total internal weightage for theory courses is 40 marks with the following distribution.

a. 30 marks for Mid-term tests.
b. 10 marks for Assignments.

6.1.2 For all theory courses including audit courses (except NSS Programme) there shall be two mid-term tests in each semester. The duration of mid-term test shall be 1 hour and 30 minutes. Student shall answer six short answer questions of one mark each and three (out of five) long answer questions of 8 marks each. First mid-term test shall be conducted for I, II units of syllabus and second mid-term shall be conducted for III, IV & V units. The average marks secured from I & II mid-term tests shall be the final mid-term test marks.

6.1.3 In case any student is not able to appear for any one of the mid-term tests in any theory course for genuine reasons (for example; medical), the Principal at his discretion, on the recommendation of Head of the department and the faculty concerned, shall permit to conduct one additional mid-term test. This shall be conducted after the second mid-term test of that course(s), only on submission of supporting evidence.

6.1.4 The 10 marks allotted to assignments in each theory course shall be based on evaluation of two assignments (5marks each), on topics relevant to that particular course. The first assignment is to be submitted before I mid-term test and the second assignment is to be submitted before II mid-term test.

6.2 End Semester Examination

6.2.1 End semester examination of theory courses shall have the following pattern:

6.2.1.1 There shall be 6 questions and all questions shall be compulsory.

6.2.1.2 Question "1" shall contain 10 compulsory short answer questions, one mark each. There shall be two short answer questions from each unit.

6.2.1.3 In each of the questions from 2 to 6, there shall be either-or type questions of 10 marks each. Student shall answer any one of them.

6.2.1.4 Each of these questions from 2 to 6 shall cover one unit of the syllabus.

6.2.1.5 The duration of Theory/practical end semester examination is 3 hours.

6.2.1.6 End examination of theory courses consisting of two parts of different courses, for ex: Electrical & Mechanical Technology shall have the following pattern:

a. Question paper shall be in two parts viz., Part A and Part B with equal weightage.
b. In each part there shall be 3 either-or type questions for 10 marks each.

6.3 Practical Courses

6.3.1 The internal evaluation for practical courses shall be 40 marks for day to day work based on conduction of experiment/prerequisite work/ record/ Viva.

6.3.2 The end semester examination shall be conducted by the laboratory teacher concerned and one senior teacher of the same department nominated by the Principal.

6.3.3 In a practical course consisting of two parts (ex: Electrical & Mechanical Lab), the end semester examination shall be conducted for 60 marks in each part and final marks shall be arrived by considering the average of marks obtained in the two parts. Internal examination shall be evaluated as above for 40 marks in each part and final internal marks shall be arrived by considering the average of marks obtained in the two parts.

6.4 Audit Courses

An audit course is an educational term for the completion of a course of study for which a nominal assessment of the performance of the student is made without awarding grades. In this case, 'audit' indicates that the individual merely has received teaching and achieved a given standard of knowledge of the subject, rather than being evaluated. A student who audits a course does so for the purpose of self-enrichment and academic exploration.

Regulations for Audit Courses:

6.4.1 Institution intends to encourage the students to do any two audit courses – one in each of II and III years of their programme. The students shall have the choice to opt for one audit course from list-1 and another from list-2 given by the college.

6.4.2 Audit Courses shall bear no credits.

6.4.3 The details of audit courses shall be reflected in Grade card of the successful students

6.4.4 Attendance for audit courses is compulsory and shall be considered while calculating the aggregate attendance.

6.4.5 There shall be only internal assessment/evaluation for audit courses. The student shall be declared passed in audit courses when he/she secures 40% marks or above in the internal evaluation. If any student does not attain the required pass percentage, the student needs to reappear for the mid-term tests, as and when the college conducts them in subsequent semesters.

6.4.6 For practical oriented audit courses like NSS, evaluation shall be based on practical work, as judged by the coordinator of NSS, without any compulsory internal examination.

6.5 Massive Open Online Courses (MOOCS)

The college in line with the developments in Learning Management Systems (LMS) intends to encourage the students to do online courses in MOOCs, offered internationally. The main intension to introduce MOOCs is to obtain enough exposure through online tutorials, self-learning at one's own pace, attempt quizzes, discuss with professors from various universities and finally to obtain certificate of completion of the course from the MOOCs providers.

Regulations for MOOCs:

6.5.1 Institution intends to encourage the students to do one MOOC in each semester, from II year II Semester to IV year I Semester of the B.Tech. Programme.

6.5.2 The MOOC(s) shall be offered for the existing course titles (discipline core or discipline electives) in the respective B.Tech. Structure.

6.5.3 The respective departments shall give a list of **standard** MOOCs providers among edx, Udacity, Coursera, NPTEL or any other standard providers, whose credentials are endorsed by the HoD.

6.5.4 In general, MOOCs providers provide the result in percentage. In such case, the departments shall follow the grade table given below, while providing CGPA for the MOOCs. If MOOCs provider declares a student as passed, the institution shall consider the same.

Letter Grade	Grade points	Percentage obtained in MOOCs
O (Outstanding)	10	90 - 100
A+ (Excellent)	9	80 - 89
A (Very Good)	8	70 - 79
B+ (Good)	7	60 - 69
B (Above Average)	6	50 - 59
C (Average)	5	45 - 49
P (Pass)	4	40 - 44
F (Fail)	0	< 40
Ab (Absent)	0	

6.5.5 In case of any deviation from the clause 6.5.4, the committee appointed by the Principal shall take a decision for converting MOOC results in to the relevant grade points.

6.5.6 The Credits for MOOC(s) shall be same as given for the respective discipline core or discipline electives.

6.5.7 Each department shall appoint Coordinators/Mentors and allot the students to them who shall be responsible to guide students in selecting online courses and provide guidance for the registration, progress and completion of the same.

6.5.8 A student shall choose an online course (relevant to his/her programme of study) from the given list of MOOCS providers, as endorsed by the teacher concerned, with the approval of the HoD.

6.5.9 In case a student fails to complete the MOOCs he/she shall re-register for the same with any of the providers from the list provided by the department. Still if a student fails to clear the course/s, the Institution shall evaluate for the said course/s for 60 marks (scaled up to 100 marks), as per the MOOCs syllabi during the final year.

6.5.10 In case a provider fails to offer a MOOC in any semester, then in all such cases the college shall conduct the end semester examinations for the same as per the college end semester examination pattern. The syllabi for the supplementary examinations shall be same as that of MOOCs.There shall be no internal assessment however the marks obtained out of 60 shall be scaled upto 100 marks and the respective letter grade shall be allotted.

6.5.11 In case any provider discontinues to offer the course, Institution shall allow the student to opt for any other provider from the list provided by the department, for completion of the same course

6.5.12 The details of MOOC(s) shall be displayed in Grade card of a student, provided he/she submits the proof of completion of it or them to the department concerned though the Coordinator/Mentor, before the end semester examination of the particular semester.

6.5.13 The Provisional Degree Certificate and/or consolidated grade sheet shall be issued only to those students, who have submitted proof of completion of MOOC(s), for the courses they have registered with.

6.6 Choice Based Credit System (CBCS)

The CBCS provides choice for students to select from the prescribed courses (core, elective or minor or soft skill courses). The CBCS provides a 'cafeteria' type approach in which students can take courses of their choice, learn at their own pace and adopt an interdisciplinary approach to learning.

Regulations for CBCS:

6.6.1 The CBCS, also called as Open Electives (OEs) will be implemented in the college.

6.6.2 It is mandatory for Under Graduate (UG) students to study 4 CBCS courses during III and IV Years of their programme by taking one course in each semester.

6.6.3 A student shall opt for any 4 courses from the list given by the institute from time to time, complying with the requirement of the prerequisite course(s), if any.

6.6.4 In any given semester, a CBCS course shall be offered by a department, only when there are a minimum number of students opting for that course, as defined by that department.

6.6.5 A student, pursuing or has already completed a course under core/discipline elective is not eligible to pursue the same under CBCS / Open Electives category.

6.7 Special clauses for certain courses

6.7.1 Design and/or drawing, Building Drawing

6.7.1.1 Related software tools like Autocad shall be used for drawing

6.7.1.2 For courses such as Engineering Drawing, Machine Drawing, Building Drawing and Estimation, the relative weightage for internal evaluation and end semester examination shall be 40% and 60% respectively.

6.7.1.3 For internal evaluation day to day work shall be evaluated for 20 marks by the course teacher concerned based on the reports/submissions prepared in the class. The remaining 20 marks shall be awarded on the basis of two mid-term tests of duration 2hours each with equal weightage.

6.7.1.4 In the end semester examination pattern for Engineering Drawing/ Engineering Graphics& Building Drawing, there shall be 5 questions, either-or type, of 12 marks each. There shall be no short answer type questions.

6.7.1.5 The end semester examination pattern for Machine Drawing is as follows;

a. The duration will be for 4 hrs.

b. Q1 Questions set on section I of the syllabus 2 out of 3 or 2 out of 4 to be answered with a weightage of 4 marks each-8 marks.

c. Q2 Questions set on section II of the syllabus 2 out of 3 to be answered with a weightage of 8 marks each-16 marks.

d. Q3 Drawing of assembled views of section III items of syllabus with a weightage of 36 marks

6.7.2 Soft Skills

6.7.2.1 The relative weightage for internal evaluation and end semester examination shall be 40% and 60% respectively.

6.7.2.2 Out of 40 marks allotted for internal evaluation, the day to day oral presentations of the students during practice hours, shall be evaluated for 20 marks by the course instructor concerned. The remaining 20 marks shall be awarded on the basis of two mid-termtests.The duration of mid-term test shall be 1 hour and 30 minutes. Student shall answer four questions (out of six) each carrying five marks. First mid-term test shall be conducted for I& II units of syllabus and second mid-term test shall be conducted for III, IV & V units. The average marks secured from I & II mid-term tests shall be the final mid-term marks.

6.7.2.3 In the end semester examination there shall be 5 questions, either-
or type, of 12 marks each. 5 Questions shall cover one unit each with internal choice. The duration of External exam shall be 3 hours.

6.8 Mini Project (2 credits)

Students shall take a Mini Project or Field Work (for Civil Engineering) during their IV Year I Semester for 2 credits. Students shall submit a Report in 3 copies to the department concerned after the work. The work shall be evaluated for 100 marks, out of which 40 marks for work execution, 20 marks for report submission and 40 marks for internal viva-voce. The evaluation shall be made by the Internal Departmental Committee (IDC), comprising of HoD, internal guide and 2 to 3 senior faculty members.

6.9 Project work

Every student shall be required to undertake a suitable project in Department / Industry / Research organization in consultation with Head of the department and faculty guide and submit the project report thereon at the end of the semester in which the student is registered on dates announced by the college/department.

The project work submitted to the department shall be evaluated for 200 marks, out of which 80 marks are for internal evaluation and 120 marks for external viva-voce. The internal evaluation shall be made by the internal departmental committee (IDC), on the basis of three reviews given by each student on the topic of his project. Student shall submit 5 hard copies of the project report. The viva-voce shall be conducted by a committee consisting of HOD, Project Supervisor and an External Examiner nominated by the Principal at the end of the Semester.

In case a student fails in viva voce he /she shall reappear as and when B.Tech. IV Year II Semester supplementary examinations are conducted.

6.10 Technical Seminar

Atechnical seminar carrying 2 credits is common for both FSI and conventional study during IV Year II Semester. Each student shall collect information on a specialized topic. He/she shall submit 3 copies of the report and deliver a seminar on the same. The report and the presentation shall be evaluated for 100 marks by a departmental committee consisting of Head of the Department, seminar supervisor and a senior faculty member. The seminar shall be conducted anytime during the semester as per the convenience of the department committee and the student. There shall be no external examination for seminar.

7. Supplementary Examinations

a. At the end of each Semester there will be regular examinations for the current Semester. Those students who could not clear their courses in their previous attempt can appear for the examinations under supplementary category along with the regular students after registering themselves at the examination section. Supplementary examinations for all other Semesters, other than the current one will be conducted during the same period.

b. Provided that for those candidates who have been detained in either the first or second semester of academic year 2014-15, they have to study and pass either the course Advanced Calculus (14MAT11T01) or Linear Algebra & Complex Analysis (14MAT12T02), which ever the course they have not passed earlier.

8. Minimum Academic Requirements

Students need to acquire necessary credits to get promoted to the subsequent academic yearin addition to the attendance requirements mentioned in section no.5.

8.1 The minimum letter grade required for pass in each theory/practical/Seminar/Project work is "**P"** (internal evaluation + End Semester Examination). However a minimum of 40% marksin each theory/practical in the end semester examination have to be secured.

8.2 If a student found to be guilty due to malpractice in the end semester examinations, he/she shall be awarded a letter grade "**F".**

8.3 A student shall be promoted from II to III year only if he/she acquires 40% of the credits from the courses that have been studied up to II year I semester from the following examinations, irrespective of whether the candidate takes the end semester examination or not as per the normal course of study.

a. One regular and three supplementary examinations of I Year I Semester.
b. One regular and two supplementary examinations of I Year II Semester.
c. One regular and one supplementary examination of II year I semester

8.4 A student shall be promoted from III to IV year only if he/she acquires 40% of the credits from the courses that have been studied up to III year I semester from the following examinations, irrespective of whether the candidate takes the end semester examination or not as per the normal course of study.

a. One regular and five supplementary examinations of I year I semester.
b. One regular and four supplementary examinations of I year II semester.
c. One regular and three supplementary examinations of II year I semester.
d. One regular and two supplementary examinations of II year II semester.
e. One regular and one supplementary examination of III year I semester.

8.5 In case a student is detained due to lack of required credits for promotion to the next academic year, he/she needs to obtain the same by taking the supplementary examinations.

8.6 Students, who fail to earn 180 credits as indicated in the course structure within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. Programme and their admission shall stand cancelled.

9. Transitory Regulations

Discontinued, detained or failed candidates are eligible for readmission as and when the semester is offered after fulfillment of academic regulations. Candidates who are detained due to shortage of attendance or for not fulfilling academic requirements or failed after having undergone the programme in earlier regulations or have discontinued and wish to continue the programme are eligible for admission into unfinished Semester from the date of commencement of class work with the same or equivalent courses as and when such courses are offered, subject to section 4.3 and they will be in the academic regulations into which they get readmitted.

10. Withholding of Results

If the candidate has any dues to the institution or any case of indiscipline or malpractice pending against him/her, the result of the candidate shall be withheld and he/she shall not be allowed/ promoted to the next semester. The issue of awarding degree is liable to be withheld in such cases.

11. Grading System

11.1 Letter Grade

11.1.1 Based on the student's performance during a given Semester, the students are awarded a final letter grade at the end of the Semester in each course. The letter grades and the corresponding grade points are as follows:

Letter Grade	Grade points	Absolute marks
O (Outstanding)	10	90 - 100
A+ (Excellent)	9	80 - 89
A (Very Good)	8	70 - 79
B+ (Good)	7	60 - 69
B (Above Average)	6	50 - 59
C (Average)	5	45 - 49
P (Pass)	4	40 - 44
F (Fail)	0	< 40
Ab (Absent)	0	

11.1.2 A student is considered to have completed a course successfully and earned the credits if he/she secures a letter grade other than F and Ab in that course. A letter grade F or Ab in any course implies that the candidate is yet to clear that course.

11.1.3 A course successfully completed cannot be repeated.

11.1.4 A Semester Grade Point Average (SGPA) will be computed for each semester.
The SGPA shall be calculated as follows:

$$SGPA = \frac{\sum_{i=1}^{n} c_i g_i}{\sum_{i=1}^{n} c_i}$$

Where 'n' is the number of courses registered and cleared for the semester, 'ci' is the number of Credits allotted to a particular course, and 'gi' is the grade points carried by the letter corresponding to the grade awarded to the student for the course. SGPA will be rounded off to the second place of decimal and recorded as such. The SGPA would indicate the performance of the student in the semester to which it refers.

Starting from the second semester at the end of each semester S, a Cumulative Grade Point Average (CGPA) will be computed for every student as follows:

$$CGPA = \frac{\sum_{i=1}^{m} c_i g_i}{\sum_{i=1}^{m} c_i}$$

Where 'm' is the total number of courses the student has registered and cleared from the first semester onwards up to and including the semester S, 'ci' is the number of Credits allotted to a particular course 'si' and 'gi' is the grade-point carried by the letter corresponding to the grade awarded to the student for the course 'si'. CGPA will be rounded off to the second place of decimal and recorded as such.

The CGPA would indicate the cumulative performance of the student from the first semester up to the end of the semester to which it refers.

The CGPA, SGPA and the grades obtained in all the courses in a semester will be communicated to every student at the end of every semester.

When a student gets the grade 'F' in any course during a semester, the SGPA and the CGPA from that semester onwards will be tentatively calculated, taking only 'zero point' for each such 'F' grade. After the 'F' grade(s) has/have been substituted by better grades during a subsequent semester, the SGPA and the CGPA of all the semesters, starting from the earliest semester in which the 'F' grade has been updated, will be recomputed and recorded to take this change of grade into account.

11.1.5 Cumulative grade point average [CGPA] averaged over all the courses are calculated for the award of class.

11.2 Award of Class

The following Class is awarded to the student on successful completion of the B.Tech. Degree Programme depending upon the CGPA obtained;

Class	CGPA	Based on the

First Class with Distinction	≥ 7.5 & 10.0	aggregate of grades secured from the total Credits.
First Class	≥ 6.5 &< 7.5	
Second Class	≥ 5.5 &< 6.5	
Pass Class	≥ 4.0 &< 5.5	

11.3 In case of a specific query by students/employers regarding Semester Grade Point Average (SGPA)/ Cumulative Grade Point Average (CGPA) into percentage, the following formulae will be adopted for **notional conversion of SGPA/CGPA** into percentage.

SGPA to Percentage = (SGPA – 0.5) x 10

CGPA to Percentage = (CGPA – 0.5) x 10

12. Award of Ranks

- Ranks are awarded based on the CGPA secured by the candidates for all the courses from first to final year,

Provided the candidate has:

- Completed the entire programme in the college itself (excluding MOOCs).
- Passed all the courses in first attempt only.
- Not discontinued the programme for any period during the course of study.
- Not been awarded any punishment for being involved in malpractice or indiscipline during the course of study in the Institute.
- In case, more than one student secures same CGPA, then first rank shall be awarded based on:
- Student who secured more number of letter grade "O"," A+" and so on in decrementing order of grades.
- After applying the above clause, if a tie still exists, then all such students shall be awarded the same rank.
- Certificate and medal/award shall be given to such students as an appreciation for their achievement.

13. Student transfers

Student transfer shall be as per the guidelines issued by the Government of Andhra Pradesh from time to time.

14. General

14.1 The academic regulations should be read as a whole for purpose of any interpretation.

14.2 Malpractice rules nature and punishments are appended.

14.3 Where the words "he", "him", "his" occur in the regulations, they also include "she", "her", "hers", respectively.

14.4 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.

14.5 The Institute, with the approval of the Academic Council, may change or amend the academic regulations / structure / credits / syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the Institute.

Applicable for students admitted to B.Tech. (Lateral Entry Scheme) from 2015-16 batch onwards

1. Admission Procedure

1.1 Candidates qualified in ECET and admitted by the Convener, ECET.

1.2 20% of the sanctioned strength in each programme of study shall be filled by the Convener, ECET as lateral entry students.

2. Programme Pattern

2.1 The medium of instruction (including examinations and project reports) shall be English

2.2 The entire programme of study is for three academic years. All three academic years shall be on semester pattern.

2.3 The minimum instruction days including examinations for each Semester shall be 90.

2.4 A student eligible to appear for the end examination in a course, but absent or has failed in the end examination may appear for that course at the next supplementary examination when offered.

2.5 When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfillment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

2.6 The curriculum of B.Tech. programme is designed to have a total of 134 credits for the award of B.Tech. degree.

Each course is assigned certain number of credits which will depend upon the number of contact hours (lectures & tutorials) per week. In general, credits are assigned to the courses based on the following contact hours per week per semester.

a. One credit for each Lecture / Tutorial hour.

b. One credit for two hours of Practicals.

c. Two credits for three (or more) hours of Practicals.

3. Award of B.Tech. Degree

A student will be declared eligible for the award of the B.Tech. Degree if he/she fulfils the following academic regulations:

3.1 Pursue a course of study for not less than three academic years and in not more than six academic years.

3.2 Register for 134 credits and secure all 134 credits.

3.3 Students, who fail to fulfill all the academic requirements for the award of the degree within six academic years from the year of their admission, shall forfeit their seat in B.Tech. programme and their admission stands cancelled.

4. Minimum Academic Requirements

Students need to acquire necessary credits to get promoted to the subsequent academic yearin addition to the attendance requirements mentioned in section no.5 of B.Tech regular stream.

4.1 The minimum letter grade required for pass in each theory/practical course is P grade (internal evaluation + End Semester Examination). However a minimum of 40% (theory/practical) in end semester examination have to be secured.

4.2 A student shall be promoted from III to IV year only if he/she acquires 40% of the credits from the courses that have been studied up to III year I semester from the following examinations, irrespective of whether the candidate takes the end semester examination or not as per the normal course of study.

a. One regular and three supplementary examinations of II year I semester.

b. One regular and two supplementary examinations of II year II semester.

c. One regular and one supplementary examination of III year I semester.

4.3 In case a student is detained due to lack of required credits for promotion to the next academic year, he/she needs to obtain the same by taking the supplementary examinations.

4.4 Students, who fail to earn 134 credits as indicated in the course structure within six academic years from the year of their admission, shall forfeit their seat in B.Tech. Programme and their admission shall stand cancelled.

5. All other regulations remain the same as that of B.Tech.regular stream.

Disciplinary Action for Malpractices / Improper Conduct in Examinations

	Nature of Malpractices/Improper conduct	**Punishment**
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers, blue tooth or any other form of material concerned with or related to the course of the examination (theory or practical) in which he/she is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the course of the examination)	Expulsion from the examination hall and cancellation of the performance in that course only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the examination hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the candidates involved. In case of an outsider, he/she will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester/year. The Hall Ticket of the candidate is to be cancelled.

3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred for four consecutive semesters from class work and all end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the courses of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that Semester/year. The candidate is also debarred for four consecutive Semesters from class work and all Semester end examinations if his involvement is established. Otherwise the candidate is debarred for two consecutive semesters from class work and all end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he/she will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that Semester/year. The candidate is also debarred for two consecutive Semesters from class work and all Semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course.
6.	Refuses to obey the orders of the any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that Semester. If candidate physically assaults the invigilator or/ officer in charge of the examination, then the

	written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	candidate is also barred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the examination hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that Semester/year. The candidate is also debarred for two consecutive Semesters from class work and all Semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that Semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that Semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.

10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that Semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that course and all other courses the candidate has appeared including practical examinations and project work of that Semester examinations depending on the recommendation of the committee.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Principal for further action to award suitable punishment.	

Note: Whenever the performance of a student is cancelled in any course/ courses due to Malpractice, he/she has to register for the End semester examination in that particular course/s consequently and has to fulfill all the norms required for award of Degree.

Curriculum – B.Tech.Electrical &Electronics Engineering

Breakup of Courses

Sl. No.	Category	No. of Theory Courses	No. of Practical Courses	Project Work	Seminar	Curriculum Credits	Weightage (%)
1	Foundation Courses	10	5	--	--	46	26
2	Programme Core Courses	24	10	1+1	1	110	61
3	Discipline Electives	4	--	--	--	12	6.7
4	Open Electives	4	--	--	--	12	6.7
5	Audit Courses	2	--	--	--	--	--
	Total	**42**	**15**	**2**	**1**	**180**	**100**

Curriculum Structure

Year	First Semester			Second Semester		
	Course Code	**Course Name**	**Credits**	**Course Code**	**Course Name**	**Credits**
I	14ENG11T01	Functional English	4	14ENG12T02	Technical Report Writing	3
	14MAT11T01	Advanced Calculus	4	14MAT12T02	Linear Algebra & Complex Analysis	4
	14PHY12T01	Engineering Physics	4	14CHE11T01	Engineering Chemistry	4
	14CHE11T02	Environmental Science	2	14CSU12T01	Computer Programming	4
	14EEE12T01	Basic Electrical & Electronics Engineering	3	14ME11T01	Engineering Graphics	4
	14PHY12P01	Engineering Physics Practicals	2	14CHE11P01	Engineering Chemistry Practicals	2
	14CSU11P01	Computing Practicals	2	14CSU12P02	Computer Programming Practicals	2
	14ME12P01	Workshop Practice	2			
		Total	**23**		**Total**	**23**

Year	First Semester			Second Semester		
	Course Code	**Course Name**	**Credits**	**Course Code**	**Course Name**	**Credits**
II	14MAT103	Differential Equations & Laplace Transforms	3	14MAT104	Probability & Statistics	3
	14HUM101	Principles of Economics	3	14HUM102	Principles of Management	3
	14EEE102	Network Analysis	3	14EEE106	Electromagnetic Theory	3
	14EEE103	Electrical Machines	3	14EEE107	Microprocessors & Interfacing	3
	14EEE104	Digital Design	3	14EEE108	Control Systems	3
	14EEE105	Electronic Devices	3	14EEE109	Analog Electronics	3
					Audit Course - I	-
	14EEE201	Electric Circuits Practicals	2	14EEE203	Microprocessors & Interfacing Practicals	2
	14EEE202	Electronics Practicals	2	14EEE204	Electrical Machines Practicals	2
		Total	**22**		**Total**	**22**

Year	First Semester			Second Semester		
	Course Code	**Course Name**	**Credits**	**Course Code**	**Course Name**	**Credits**
III	14EEE110	Object Oriented Programming	3	14ENG103	Soft Skills	3
	14EEE111	Electrical Measurements & Instrumentation	3	14EEE115	Special Electrical Machines	3
	14EEE112	Power Systems	3	14EEE116	Power System Analysis and Control	3
	14EEE113	Power Electronics	3	14EEE117	Digital Signal Processing	3
	14EEE114	Signals & Systems	3		**Discipline Elective - I**	3
		Open Elective - I	3		**Open Elective - II**	3
					Audit Course - II	-
	14EEE205	Control Systems Practicals	2	14EEE207	Power Electronics Practicals	2
	14EEE206	Analog Electronics Practicals	2	14EEE208	Object Oriented Programming Practicals	2
		Total	**22**		**Total**	**22**

Year	FirstSemester			SecondSemester		
	Course Code	**CourseName**	**Credits**	**Course Code**	**CourseName**	**Credits**
IV	14EEE118	Electrical Drives	3			
	14EEE119	Engineering Optimization	3		**DisciplineElective-IV**	3
	14EEE120	Electric Power Utilization and Illumination	3		**OpenElective-IV**	3
		DisciplineElective-II	3	14EEE502	Project Work	14
		DisciplineElective-III	3	14EEE601	Technical Seminar	2
		OpenElective-III	3			
	14EEE209	Digital Signal Processing Practicals	2			
	14EEE210	Power systems Practicals	2			
	14EEE501	MiniProject	2			
		Total	**24**		**Total**	**22**

List of Discipline Core Courses
(All Courses Carry Equal Marks (100)

Sl. No.	Course Code	Course Name	Credits
	Theory Course		
1.	14EEE102	Network Analysis	3
2.	14EEE103	Electrical Machines	3
3.	14EEE104	Digital Design	3
4.	14EEE105	Electronic Devices	3
5.	14EEE106	Electromagnetic Theory	3
6.	14EEE107	Microprocessors & Interfacing	3
7.	14EEE108	Control Systems	3
8.	14EEE109	Analog Electronics	3
9.	14EEE110	Object Oriented Programming	3
10.	14EEE111	Electrical Measurements & Instrumentation	3
11.	14EEE112	Power Systems	3
12.	14EEE113	Power Electronics	3
13.	14EEE114	Signals & Systems	3
14.	14EEE115	Special Electrical Machines	3
15.	14EEE116	Power System Analysis and Control	3
16.	14EEE117	Digital Signal Processing	3
17.	14EEE118	Electrical Drives	3
18.	14EEE119	Engineering Optimization	3
19.	14EEE120	Electric Power Utilization and Illumination	3
	Practical Courses		
1.	14EEE201	Electric Circuits Practicals	2
2.	14EEE202	Electronics Practicals	2
3.	14EEE203	Microprocessors & Interfacing Practicals	2
4.	14EEE204	Electrical Machines Practicals	2
5.	14EEE205	Control Systems Practicals	2
6.	14EEE206	Analog Electronics Practicals	2
7.	14EEE207	Power Electronics Practicals	2
8.	14EEE208	Object Oriented Programming Practicals	2
9.	14EEE209	Digital Signal Processing Practicals	2
10.	14EEE210	Power systems Practicals	2
		Total Credits	77

List of Discipline Electives

Discipline Elective – I		
Sl. No.	**Course Code**	**Course Name**
1.	14EEE401	Modern Control Systems
2.	14EEE402	Communication Systems
3.	14EEE403	Computer Architecture
4.	14EEE416	Non-Conventional Energy Resources

Discipline Elective – II		
Sl. No.	**Course Code**	**Course Name**
1.	14EEE404	Switch gear and Protection
2.	14EEE405	Digital Image Processing
3.	14EEE406	Operating Systems

Discipline Elective – III		
Sl. No.	**Course Code**	**Course Name**
1.	14EEE407	Power Quality
2.	14EEE408	Introduction to MEMS
3.	14EEE409	Mobile Telecommunication Networks
4.	14EEE410	HVDC & FACTS
5.	14EEE415	Design Of Photovoltaic Systems

Discipline Elective – IV		
Sl. No.	**Course Code**	**Course Name**
1.	14EEE411	Power Apparatus & Networks
2.	14EEE412	Wind Electrical Systems
3.	14EEE413	Robotics
4.	14EEE414	High Voltage Engineering

List of Open Electives (CBCS)
(All Courses Carry Equal Marks (100) & Credits (3))
Refer UG Regulations Clause: 6.6

Open Elective – I				
Sl. No.	**Course Code**	**Course Name**	**Offered by the Department of**	**Prerequisite Course Code / None**
1.	14HUM401	Professional Ethics	Humanities	None
2.	14MAT401	Numerical Analysis	Mathematics	14MAT12T02
3.	14CHE401	Introduction to Nano Science and Technology	Chemistry	None
4.	14PHY401	Physics of Laser and Applications	Physics	None
5.	14ECE401	Optical Communication	ECE	14ECE110
6.	14ECE402	Digital Image processing	ECE	14ECE105
7.	14ECE403	Electronic measurements & Instrumentation	ECE	14ECE103
8.	14ME401	Composite Materials & Design	ME	14ME103, 14ME105
9.	14ME402	Power Plant Engineering	ME	14ME104, 14ME102, 14ME109
10.	14ME403	Computational Fluid Dynamics & Applications	ME	14ME102, 14ME112, 14MAT103
11.	14CSU401	Service Oriented Architecture	CSE	None
12.	14CSU402	Artificial Intelligence	CSE	14CSU12T01
13.	14CSU403	Multimedia Computing	CSE	14CSU12T01
14.	14CE401	Pavement Design, Maintenance and Management	CE	14CE109
15.	14CE402	Rural water supply and sanitation	CE	14CE102, 14CE107
16.	14CE403	Green Buildings and Energy Conversion	CE	None

Open Elective – II				
Sl. No.	**Course Code**	**Course Name**	**Offered by the Department of**	**Prerequisite Course Code / None**
1.	14HUM402	Human Resource Development	Humanities	None
2.	14MAT402	Engineering Optimization	Mathematics	None
3.	14CHE402	Green Chemistry and Catalysis for Sustainable Environment	Chemistry	None
4.	14PHY402	Optical Physics and Applications	Physics	None
5.	14ECE404	Introduction to MEMS	ECE	14ECE104
6.	14ECE405	Robotics	ECE	None
7.	14ECE406	Virtual Instrumentation	ECE	None
8.	14ECE407	Pattern Recognition and its Applications	ECE	None
9.	14ME404	Introduction to MEMS	ME	None
10.	14ME405	Mechanical Vibrations	ME	14ME106, 14MAT103
11.	14ME406	Fluid Power Systems	ME	14ME102
12.	14ME407	Automation and Robotics	ME	None
13.	14CSU404	Computer Graphics	CSE	14CSU12T01
14.	14CSU405	Human Computer Interaction	CSE	None
15.	14CSU406	Mobile Computing	CSE	None
16.	14CE404	Design of Pre-stressed Concrete Structure	CE	14CE105,14CE112,14CE113
17.	14CE405	Design Advanced Concrete Structures	CE	14CE113
18.	14CE406	Introduction to Bridge Engineering	CE	14CE105,14CE112,14CE113

Open Elective – III				
Sl. No.	**Course Code**	**Course Name**	**Offered by the Department of**	**Prerequisite Course Code / None**
1.	14ECE408	Digital communication Techniques	ECE	14ECE110
2.	14ECE409	Biomedical Imaging	ECE	None
3.	14ECE410	Operating systems	ECE	None
4.	14ECE411	Machine Vision	ECE	None
5.	14ME408	Solar Thermal Process Engineering	ME	14ME104, 14ME112
6.	14ME409	Refrigeration and Air Conditioning	ME	14ME104, 14ME112
7.	14ME410	Production Planning & Control	ME	None
8.	14ME411	Non Destructive Testing	ME	None
9.	14CSU407	Cryptography and Network Security	CSE	114CSU12T01, 14CSU113
10.	14CSU408	Research Methodologies	CSE	None
11.	14CSU409	Mobile Application Development	CSE	None
12.	14CSU413	Big Data Technologies	CSE	None
13.	14CE407	Construction Equipment, planning & Management	CE	None
14.	14CE408	Principles of Geographical Information Systems	CE	None
15.	14CE409	Geotechnical Earthquake Engineering and Machine Foundations	CE	14CE115,14CE119

Open Elective – IV				
Sl. No.	**Course Code**	**Course Name**	**Offered by the Department of**	**Prerequisite Course Code / None**
1.	14ECE412	Satellite communication	ECE	14ECE110
2.	14ECE413	Reconfigurable computing	ECE	14ECE104
3.	14ECE414	Software for embedded systems	ECE	14ECE106
4.	14ECE415	IOT Networks	ECE	Computer Networks, Microprocessor
5.	14ECE416	RF Integrated Circuits	ECE	
6.	14ME412	Entrepreneurship	ME	None
7.	14ME413	Automotive Technology	ME	None
8.	14ME414	Total Quality Management	ME	None
9.	14ME415	Product Lifecycle Management	ME	None
10.	14CSU410	Distributed Databases	CSE	14CSU12T01, 14CSU106
11.	14CSU411	Cloud Computing	CSE	14CSU12T01
12.	14CSU412	Software Project Management	CSE	None
13.	14CE410	Environmental Impact Assessment	CE	14CHE11T02,14CE116
14.	14CE411	Introduction to Finite Element Methods	CE	14CE105,14CE112
15.	14CE412	Ground Improvement Techniques	CE	14CE115,14CE119

List of Audit Courses
(No Credits & End Exam – Only Internal Evaluation)
Refer UG Regulations Clause: 6.4

Audit Course - I				
Sl. No.	**Course Code**	**Course Name**	**Offered by the Department of**	**Prerequisite Course Code / None**
1.	14ENG301	Effective Public Speaking	English	None
2.	14ENG302	Creative Writing	English	None
3.	14HUM301	Entrepreneurship Development	Humanities	None
4.	14HUM302	Introduction to Intellectual Property Rights	Humanities	None
5.	14CSE301	Data Analysis Using R	CSE	None

Audit Course - II				
Sl. No.	**Course Code**	**Course Name**	**Offered by the Department of**	**Prerequisite Course Code / None**
1.	14ENG303	Phonetics and Spoken English	English	None
2.	14ENG304	Introductory Psychology	English	None
3.	14CSE302	Ethical Hacking	CSE	None
4.	14MBA301	Business Ethics and Corporate Governance	Management Studies	None
5.	14HUM303	National Service Scheme (NSS)*	Humanities	None

- **NSS is a field oriented course, has no internal & external evaluation**

Semester-wise Marks& Credits

Sl. No.	Year/Semester	Total Marks	Credits
1.	I/I	700	22/23
2.	I/II	800	24/23
3.	II/I	800	22
4.	II/II	800	22
5.	III/I	800	22
6.	III/II	800	22
7.	IV/I	900	24
8.	IV/II	500	22

FOUNDATION COURSES

Things do not happen.
Things are made to happen.
John. F. Kennedy

B.Tech. I Year I Semester

14ENG11T01 FUNCTIONAL ENGLISH

L	T	P	C
3	0	2	4

Course Prerequisite: None

Course Description:
The course content focuses on LSRW skills and vocabulary building to enrich their command over language. Relevant task based activities are also carried out to enhance their communication skills.

Course Objectives:
1. The syllabus has been designed to enhance communication skills of the students of Engineering & Technology.
2. The course enables students to communicate in English for academic and social purpose and helps them improve their grammatical accuracy and vocabulary.
3. It enhances LSRW skills and also inculcates the habit of reading for pleasure.

UNIT I:
Units from the Textbook
1. Present Past and Future
2. Communicating
3. Making things clear

Grammar – Tenses – Clauses –Phrases – Common Verbs
Vocabulary – Idioms – Word Building – Learn a Language
Listening & Reading Activities
Writing – Job Application – Describe a scene
Phonetics - Intonation

UNIT II:
Units from the Textbook
1. Sports & Games
2. Set in the Past
3. Do it yourself

Grammar – Articles – Past Events – Reporting Verbs – Relative Clauses – ing forms – Adjectives
Vocabulary- Issues in Sports – Idioms – Guessing unknown Words – Prefix
Listening & Reading Activities
Writing – Linking Events in a Story
Phonetics – Rising & Falling Tone, Stress

UNIT III:

Units from the Textbook

1. Working it Out
2. In the Market – Place
3. Possibilities

Grammar – Modals – Conditionals – Indirect Questions – Probability – Common Verbs
Vocabulary- Jobs – Career – Advertisement – Idioms
Listening & Reading Activities
Writing – Giving Reasons – Weighting up Alternatives

UNIT IV:

Units from the Textbook

1. Life, the Universe and everything
2. Evaluating
3. Yourself & Others

Grammar- Adjectives & Nouns–Time Comparison-Structures-Pronouns -Common Verbs
Vocabulary–Environment-Idioms-Adjectives-Relationships
Listening & Reading
Writing-Summary-Organizing Information-Draft Making

UNIT V:

Units from the Textbook

1. Right and Wrong
2. Body and Mind
3. Using the Passive
4. World Affairs

Grammar-Modals-Degrees of Comparison-Passive Forms-Reporting Verbs-Common Verbs
Vocabulary-Forms of Medical Treatment-World Affairs-Idioms
Listening & Reading Activities
Writing-Causes & Results
Pronunciation-Disagreeing politely

Course Outcomes:

At the end of the course, students will able to

1. Develop communication skills especially in the field of Engineering and Technology.
2. Construct their grammatical accuracy and vocabulary.
3. Understand the language for academic and social purpose
4. Obtain the habit of reading for pleasure.
5. Use an effective language required by the employers.

Text Book:

Adrian Doff and Christopher Jones, 2000. Language in use– Classroom Book (Upper – Intermediate), Cambridge University Press.

References:

1. Raymond Murphy's Intermediate English Grammar with CD, Raymond Murphy, Cambridge University Press, 2012.
2. Communication Skills, Sanjay Kumar &Pushpalatha, Oxford University Press, 2012.
3. Writing Tutor. Advanced English Learners' Dictionary, 9th Edition, Oxford University Press, 2015.
4. Powerful Vocabulary Builder, AnjanaAgarwal, New Age International Publishers, 2011
5. Keep Talking, F. Klippel, Cambridge University Press, 2013.
6. Listening Extra, Miles Craven, Cambridge University Press, 2008.
7. Reading Extra, Liz Driscoll, Cambridge University Press, 2004.
8. Writing Extra, Graham Palmer, Cambridge University Press, 2004.
9. Speak Well, JayashreeMohanraj et al, Orient Blackswan, 2013.

Mode of Evaluation: Written Examination, Day-to-day Assessment

B.Tech. I Year I Semester

14MAT11T01 ADVANCED CALCULUS

L	T	P	C
4	1	0	4

Course Prerequisite: The basic knowledge of Trigonometry, Geometry & Calculus.

Course Description:
Functions and Graphs; limit and continuity; applications of derivative and integral.Conics; polar coordinates; convergences of sequences and series.Maclaurin and Taylor series.Partial Derivatives. Vector Calculus in R^n , vector analysis; theorems of Green's,Stoke's and Gauss's.

Course Objectives:
1. To avail the basic concepts of polar Graphing and Conic section.
2. To familiarize the knowledge of functions of several variables and theirDerivatives, extreme values.
3. To emphasize the role of Double and Triple integrals in dealing with area and volume of the regions.
4. To analyze the line integral, surface integral & volume integrals through the vector integral theorems.
5. To introduce Sequences & Series for convergence of various tests and power series expansions.

UNIT I: POLAR COORDINATES AND CURVATURE
Polar coordinates, Graphing, polar equations of conic Sections, Integration, properties of limits, infinity as a limit, continuity and differentiability of vector functions , arc length, velocity and unit tangent vector, Curvature, Normal vector, Torsion and Binormal vector, Tangential and normal components of velocity and acceleration.

UNIT II: FUNCTIONS OF SEVERABLE VARIABLES
Functions of severable variables, level curves, Limits, Continuity, Partial derivatives, chain Rule, Directional derivative, gradient vectors, Tangent planes & normal line, Maximum, Minimum & Saddle points of functions of two or three variables, Constrained Maxima & Minima, Method of Lagrange multipliers.

UNIT III: MULTIPLE INTEGRALS
Double Integrals, Area, Change of integrals to Polar Coordinates, Change of order of integration, Triple Integral, Integral in Cylindrical and Spherical Coordinates.

UNIT IV: VECTOR CALCULUS
Line integral, work, circulation, flux, path independence, potential function, conservative fields; Green's theorem in the plane, Surface area & Surface Integral; Stokes'theorem ,Gauss divergence theorem.

UNIT V: SEQUENCES AND SERIES
Sequence of real numbers frequently occurring limits, infinite series different tests of Convergence, series of non-negative terms, absolute & conditional convergence, alternating series, Power series, Maclaurin series, Taylor series of functions.

Course Outcomes:

At the end of this course, students should be able to

1. Describe polar graphing and curvature to trace the geometric shapes of various polar curves along with limits and continuity.
2. Solve engineering problems which are modelled as functions of several variables.
3. Apply techniques of integration to compute areas and volumes of various regions in the field of engineering.
4. Evaluate line, surface and volume integrals by vector integral theorems.
5. Analyze the concepts of sequence and series, and also various tests of convergence of series.

Text Book:

Weir, MD, Hass J, Giordano FR: Thomas' Calculus Pearson education 12^{th} ED, 2015.

References:

1. Erwin Kreyszig - Advanced Engineering Mathematics, 8^{th} Edition Wiley-India, 2007
2. James Stewart - Calculus, 5e, Cengage learning, 2003.
3. Monty J. Strauss, Gerald L. Bradley, & Karl J. Smith – Calculus 3^{rd} Edition, Pearson 2007.

Mode of Evaluation: Assignments, Internal Mid Examinations, External End Examination.

B. Tech. I Year I Semester

14PHY12T01 ENGINEERING PHYSICS

L	T	P	C
4	1	0	4

Course Prerequisite: None

Course Description:
Mechanics, Waves and Oscillations are a basic physics course, which will cover Mechanics, Vibrations and Waves and Optics.

Course Objectives:
1. Expose students to the fundamental principles and laws of mechanics in physics and understanding the basic laws of nature through physics.
2. Educate students to think and participate deeply, creatively, and analytically in applying various kinds of forces in day today life.
3. Demonstrate the ability to identify and apply the appropriate analytic, numerical, computational and other mathematical reasoning, to situations of the physical world.
4. Analyze and understand the subjects Mechanics, Oscillations, Waves and Optics in preparing the students for advanced level courses.
5. Adaptability to new developments in science and technology by successfully completing or pursuing graduate education in engineering.
6. Expose students to theoretical and mathematical aspects of Interference and Diffraction techniques for mechanical testing of materials.

UNIT I: VECTORS AND KINEMATICS AND NEWTONIAN MECHANICS
Vectors and Kinematics: Introduction, Vectors, Vector multiplication, Velocity and Acceleration, Motion in Plane, Polar Co-ordinates.
Newtonian Mechanics: Introduction, Newton's Laws, Applications of Newton's laws and everyday forces of Physics (Self reading), Constraint equations and applications.

UNIT II: MOMENTUM, WORK AND ENERGY
Momentum: Introduction, Dynamics of a system of particles, conservation of momentum, Impulse and restatement of the momentum relation, flow of mass, momentum transport.
Work and Energy: Introduction, Equations of motion in one-dimension and several dimensions, work energy theorem and applications, Potential energy, force, small oscillations in bound system, non-conservative forces, power, conservation laws and particle collisions.

UNIT III: ANGULAR MOMENTUM & INTRODUCTION TO SHM
Angular Momentum: Introduction, Angular momentum of particle, torque, fixed axis rotation. Dynamics of pure rotation about an axis.
Simple Harmonic Motion: Introduction, Displacement, velocity and acceleration in SHM. Damped Harmonic oscillator, Forced Harmonic oscillations.

UNIT IV: SIMPLE HARMONIC MOTION & TRANSVERSE WAVE MOTION

Simple Harmonic Motion: Energy of a simple harmonic oscillator. Superposition of vibrations along same direction and in perpendicular directions, Lissajous figures.

Transverse wave motion: Introduction, Waves, solution of wave equation, reflection and transmission, standing waves, energy of vibrating string, standing wave ratio, wave group and group velocity.

UNIT V: PHYSICAL OPTICS

Physical optics: Introduction - Interference, Newton's rings, interference from two and more sources. Diffraction, intensity distribution, Fraunhoffer diffraction, Transmission diffraction grating.

Course Outcomes:

Upon successful completion of this course, the students should be able to:

1. Describe and explain the fundamental physical principles and laws of Mechanics in Physics.
2. Explain the role of the different realms of physics and their applications in both scientific and technological systems.
3. Apply the physical principles, together with logical and mathematical reasoning, to situations of the physical world.
4. Analyze a problem and develop the problem solving skills.
5. Define and evaluate the fundamentals of mechanical testing of materials using Interference and Diffraction techniques.

Text Books:

1. An Introduction to Mechanics, by D. Kleppner and R. Kolenkow, Tata McGraw-Hill Edition, 2007.
2. French Anthony P, Vibrations and Waves, CBS, 1987.

References:

1. The Physics of Vibrations & Waves, by H. J. Pain, 6th edition, John Wiley & Sons, Inc., 2005.
2. Physics Vol I & II, Halliday/Resnick/Krane 5th Edition, John Wiley, 2003.
3. Berkeley Physics Course Volume I, Tata-McGraw Hill.

Mode of Evaluation: Assignment, Written Examination.

B. Tech I Year I Semester

14CHE11T02 ENVIRONMENTAL SCIENCE

L	T	P	C
2	1	0	2

Course Prerequisite: Basic knowledge about sciences up to intermediate or equivalent level.

Course Description:
The course deals with basic concepts of environment, its impact on human, universe, consumption of energy sources, effects, controlling methods for pollution and the environmental ethics to be followed by human beings.

Course Objectives:
1. To make the students aware about the environment and its inter-disciplinary nature and to emphasize the importance of the renewable energy sources.
2. To familiarize the concept of Ecosystem and their importance.
3. To bring the awareness among students about the importance of biodiversity and the need for its conservation.
4. To make the students understand the adverse effects of environmental pollution, its causes and measures to control it.
5. To introduce the environmental ethics and emphasize the urgency of rain water harvesting along with water shed management.

UNIT I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES
Definition, Scope and Importance– Need for Public Awareness. Renewable energy Resources, Solar energy-solar cells, solar batteries, wind energy, wind mills, ocean energy, tidal energy and non-renewable energy resources: LPG, water gas, producer gas. World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

UNIT II: ECOSYSTEMS
Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem. b. Grassland ecosystem c. Desert ecosystem d. Aquatic – Lake Ecosystems.

UNIT III: BIODIVERSITY AND ITS CONSERVATION
Introduction, Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India –Value of biodiversity: consumptive use, Productive use, social, ethical and aesthetic values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT IV: ENVIRONMENTAL POLLUTION

Definition, Cause, effects and control measures of : a. Air Pollution, b. Water pollution, c. Soil pollution, d. Marine pollution, e. Noise pollution, f. Nuclear hazards. Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Disaster management: floods, earthquake, cyclone and landslides.

UNIT V: SOCIAL ISSUES AND THE ENVIRONMENT

From unsustainable to sustainable development – Urban problems related to energy – Water conservation, rain water harvesting and watershed management –Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies Population growth, variation among nations.Population explosion.

Course Outcomes:

At the end of the course, the students will be able to

1. Know about various Ecosystems, Biodiversity and its conservation.
2. Know about effects of Environmental pollution.
3. Understand various social issues regarding Environment
4. Understand human population and environment.
5. Understand about our natural resources and multidisciplinary nature of environmental studies.

Text Book:

Text book of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission, Universities Press, 2005.

References:

1. Environmental Science & Engineering by Dr. A. Ravikrishnan, Hitech Publishing Company Pvt. Ltd. 2013.
2. Perspectives in Environmental Studies, Second edition, AnubhaKoushik and C.P. Koushik, New Age International (P) Limited, Publishers, 2004.

Mode of evaluation: Assignments, Internal Mid examinations and External semester end examination.

B.Tech. I Year I Semester

14EEE12T01 BASIC ELECTRICAL & ELECTRONICS ENGINEERING

L	T	P	C
3	1	0	3

Course Prerequisite: None

Course Description:
This course is designed to provide basic understanding on electrical and electronic engineering. The course material can be used as a starting point for further study in individual disciplines or topics. This need will come for non-electrical or electronic students at a later stage in their carrier growth.
Course covers basic passive and active circuit elements, network analysis, network theorems, introduction to single-phase and three-phase AC Systems, magnetic circuits, transformers, electrical machines, semi-conductor diodes and their applications, transistors and their applications.

Course Objectives:
1. To learn the basics of the D.C. and A.C. electrical circuits
2. To learn basic magnetic circuits
3. To learn the construction and operation of transformers, D.C. and A.C. rotating machines
4. To learn basics of semiconductor devices

UNIT I: DC CIRCUIT ANALYSIS
Voltage and current sources, resistors and ohm's law, KCL, KVL, Independent and Dependent sources, Instantaneous power, Nodal and Mesh Analysis, Linearity and Superposition application in circuit analysis, Source transformation, Inductors and capacitors and their integral relationships, First order circuits.

UNIT II: AC CIRCUIT ANALYSIS
A.C. Voltage & Current, Complex numbers, Frequency-domain analysis, Power and Power-factor, first order circuits, Poly-phase circuits.

UNIT III: MAGNETIC CIRCUITS AND TRANSFORMERS
Magnetic circuits and materials.Introduction, Ideal transformer, Equivalent circuit, Non-ideal transformer, Regulation and efficiency.

UNIT IV: DC AND AC ROTATING MACHINES
DC machine Construction, Armature reaction and commutation, Methods of excitation and speed control, Principle of operation of Induction motor and Synchronous motor.

UNIT V: INTRODUCTION TO SEMICONDUCTOR DEVICES
V-I characteristics of junction diode, Ideal diode, Non ideal diode, clipper Half wave rectifier, Full wave rectifier, bridge rectifier. PNP and NPN transistors and the operating zones, BJT as amplifier and biasing techniques.

Course Outcomes:

Upon successful completion of the course, students will be able to:

1. explain the D.C. electrical circuits
2. discuss the concepts of A.C. electrical circuits
3. describe the components of magnetic circuits and transformers
4. analyze the operation of rotating electrical machines and their operation.
5. identify electronic components and their use in practical circuits.

Text Book:

Leonard S. Bobrow: Fundamentals of Electrical Engineering, Oxford University Press, Second Edition, 2005.

Reference:

Hughes: Electrical and Electronic Technology, Pearson Education, Ninth Edition, 2008.

Mode of Evaluation: Assignment, Written Examination

B.Tech. I Year I Semester

14PHY12P01 ENGINEERING PHYSICS PRACTICALS

L	T	P	C
0	0	3	2

Course Prerequisite: None

Course Description:
Experiments on Principles of Mechanics and Optics, Measurement of Magnetic field and studying Resonance using LCR Circuit.

Course Objectives:
1. Elucidate the concepts of Physics through involvement in the experiment by applying theoretical knowledge.
2. Illustrate the basics of mechanics, waves and optics to analyze the behavior and characteristics of various materials for its optimum utilization.
3. Develop an ability to apply the knowledge of physics experiments in the later studies.

List of Experiments: (Any 10 Out of 12)
1. Error Analysis and Graph Drawing
2. Spring constant - Coupled Pendulums
3. Frequency of the tuning fork - Melde's apparatus
4. Magnetic field along the axis of a current carrying coil - Stewart Gees' Apparatus
5. Study of resonance effect in series and parallel LCR circuit
6. Determination of radius of curvature of a curved surface - Newton's Rings
7. Width of single slit - Diffraction due to Single Slit
8. Wavelength of the spectral lines - Diffraction Grating
9. Dispersive power of prism – Spectrometer.
10. Wavelength of a laser - Diffraction Grating
11. Thickness of a given wire - Wedge Method.
12. Energy gap of a material of p-n junction.

Course Outcomes:
Upon successful completion of this course, the students should be able to:
1. Apply the scientific process in the conduct and reporting of experimental investigations.
2. Know about the characteristics and the behaviour of various materials in a practical manner and gain knowledge about various optical technique methods.
3. Understand the characteristics and the behaviour of various materials in a practical manner and gain knowledge about various experimental techniques and their usage.
4. Verify the theoretical ideas and concepts covered in lecture by completing a host of experiments.
5. Acquire and interpret experimental data to examine the physical laws.

Lab Manual: Laboratory Manual for Engineering Physics.

References:

1. Advanced Practical Physics for students, B.L.Worsnop and H.T. Flint, Metheun London, 1942.
2. Fundamentals of Optics, F. A. Jenkins and H. E. White, 4th edition, McGraw-Hill Inc., 1981.
3. Optics, A. Ghatak, 4th Edition, Tata McGraw-Hill, New Delhi 2011.

Mode of Evaluation: Continuous Internal Evaluation, Practical Examination.

B.Tech. I Year I Semester

14CSU11P01 COMPUTING PRACTICALS

L	T	P	C
0	0	3	2

Course Prerequisite: None

Course Description:
This course introduces how to solve problems using flowcharts and programming concepts. The focus is on developing students to understand and apply the concepts of programming using python. A practical introduction to computing that will build students confidence and familiarity with computer programming.

Course Objectives:
1. To make the student understand problem solving techniques and their applications
2. Students will be able to understand the syntax and semantics of python.
3. Get acquaintances with classes and objects, stacks and queues using python.

List of Experiments:

Week 1
a) Develop animated models using scratch tool.

Week 2
a) Develop the flowchart for finding a number is even or odd.
b) Develop a flowchart for displaying reversal of a number.
c) Develop a flowchart for finding biggest number among three numbers.

Week 3
a) Develop a flowchart for swapping two values using functions.
b) Develop a flowchart to sort the list of numbers.
c) Develop a flowchart to find largest element in an array.

Week 4
a) Implement Python script to read person's age from keyboard and display whether he is eligible for voting or not.
b) Implement Python script to find biggest number between two numbers.

Week 5
a) Implement Python Script to generate prime numbers series up to n.
b) Implement Python Script to check given number is palindrome or not.
c) Implement Python script to print factorial of a number.

Week 6
a) Implement Python Script to perform various operations on string using string libraries.
b) Implement Python Script to check given string is palindrome or not.

Week 7

a) Define a function max_of_three() that takes three numbers as arguments and returns the largest of them.
b) Write a program which makes use of function to display all such numbers which are divisible by 7 but are not a multiple of 5, between 1000 and 2000.

Week 8

a. Define a function which generates Fibonacci series up to n numbers.
b. Define a function that checks whether the given number is Armstrong.

Week 9

a) Write a program which accepts a sequence of comma-separated numbers from console and generate a list and a tuple which contains every number.
Suppose the following input is supplied to the program:34,67,55,33,12,98. Then, the output should be: ['34', '67', '55', '33', '12', '98'] ('34', '67', '55', '33', '12', '98').
b) With a given tuple (1,2,3,4,5,6,7,8,9,10), write a program to print the first half values in one line and the last half values in one line.

Week 10

a) Write a python script to perform basic dictionary operations like insert, delete and display.
b) Write a python script to find frequency of words in a file using dictionaries.

Week 11

a) Write Python script to display file contents.
b) Write Python script to copy file contents from one file to another.

Week 12

a) Define a class named Rectangle which can be constructed by a length and width. The Rectangle class has a method which can compute the area.
b) Define a class named Circle which can constructed by radius. The derived classes Area, Circumference uses methods called calArea(), calCirc() respectively to calculate area, circumference of circle.

Week 13

a) Implement Python script to develop stack ADT and its operations.
b) Implement Python script to evaluate postfix expression.

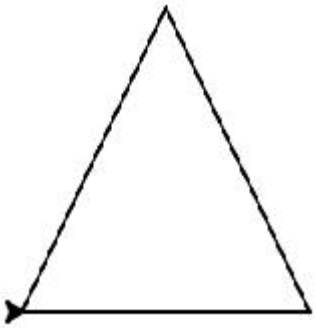
Week 14

a) Implement Python script to develop queue ADT and its operations.
b) Implement Python script to perform tree traversals.

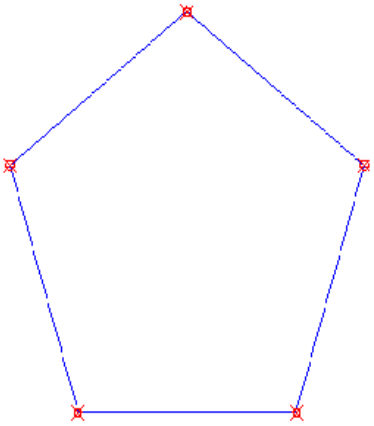
Week 15

Write a python script to display following shapes using turtle.

a)



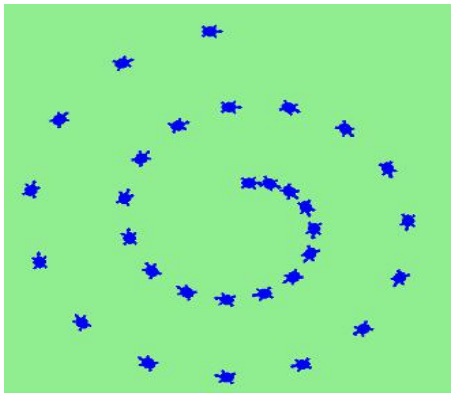
b)



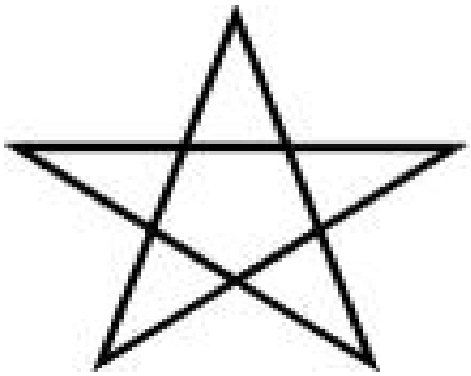
Week 16

Write a python script to display following shapes using turtle.

a)



b)



NOTE: Concepts related to Lab programs will be covered in Lecture hours.

Course Outcomes:

After Completion of this course students will be able to

1. Understand problem solving techniques.
2. Use python programming to implement solutions.
3. Identity the stacks and queues for a given problem or application.
4. Analyze and design logic for a given program.
5. Create classes and objects using python.

Mode of Evaluation: Practical

B.Tech. I Year I Semester

14ME12P01 WORKSHOP PRACTICE

L	T	P	C
0	0	3	2

Course Prerequisite: None

Course Description:
Introduction to Casting, metal forming, forging, welding and brazing, metal cutting machines e.g., lathe, shaper, drilling, grinding; laboratory exercise involving machining, fitting and joining.

Course Objectives:
1. The objective of this course is to learn how the physical things we use are manufactured and gain technical knowledge and skills.
2. The concept based knowledge will be useful in all the disciplines the students are going to specialize.
3. The students are exposed to all the manufacturing processes i.e Machining, Casting, Joining processes, metal forming, and Sheet metal work.
4. The students are exposed to resources in manufacturing and usage of computers in manufacturing.
5. Also brief review of the properties and heat treatment of common engineering materials and of measuring and gauging tools are also included.

Trades:
1. Carpentry
2. Welding
3. Fitting
4. Foundry
5. Black smithy
6. Sheet metal
7. Machine shop
8. Metrology
9. CNC programming
10. Manufacturing simulation

Course Outcomes
At the end of the course, students will able to
1. Understand the various manufacturing processes.
2. Identify the related manufacturing processes, tools, machines and inspection tools to manufacture the products.
3. Make the models by using all the manufacturing processes.
4. Operate all the machines in all the trades i.e. Carpentry, Machine Shop & CNC Machine etc.
5. Measure dimensions or measure profiles using measuring instruments and also simulation studies can also be done.

Text Book:
B S NagendraParashar and R K Mittal, Elements of Manufacturing Process, Prentice Hall of India, 2008, 6th print.

Reference:
Campbell J.S., Principles of Manufacturing Materials and Processes, Tata Mc-Graw-Hill, New Delhi, 1999 print.

Mode of Evaluation: Practical

B.Tech. I Year II Semester

14ENG12T02 TECHNICAL REPORT WRITING

L	T	P	C
2	0	3	3

Course Prerequisite: 14ENG11T01

Course Description:
Today's Professional world demands effective transfer of technical Report Writing in the form of correspondence, talks, discussions, and documents more than ever before. Such forms of Communication not only reflect the knowledge and achievements of engineers, scientists, and other professionals but also act as the public face for organizations, reflecting their policies and achievements. Technical Communication is essentially formal, and hence requires a standard format for disseminating technical messages.

Course Objectives:
1. To get the required training in documentation, presentation, discussions, and develop communicative competence.
2. To do Critical reading and comparing texts and their viewpoints.
3. To do Effective writing using Sentence structures.
4. To draft Technical and Business style of writing
5. To prepare Questionnaire for preparing the report which will assist them for doing research work.

UNIT I:
Communication Process - Communication networks- formal and informal - Barriers to communication.

UNIT II:
Reading - Surveyingatext - reading for important points - makinginferences - identifyingtext structure - readinggraphics - comparing sources - criticalreading - comparingviewpoints.

UNIT III:
Writing - Effective Writing - Elements- Choice of Words and Phrases - Sentence Construction and Length - Technical Style of Writing -Business Style of Writing.

UNIT IV:
Report Writing - Basic Business communication - Types of Reports.

UNIT V:
Data Collection - PreparatorySteps - Sources of Data Methods of Data Collection - Mail Questionnaire - Report Structure - Data Analysis & Illustrations - Editing and proofreading - using technical tools for effective technical writing.

Course Outcomes

At the end of the course, students will able to

1. Upon completion of this course the students shall be able to get the required training in documentation, presentation, discussions, and develop communicative competence.
2. Able to do Critical reading and comparing texts and their viewpoints.
3. Able to do Effective writing using Sentence structures.
4. Able to draft Technical and Business style of writing
5. Able to prepare Questionnaire for preparing the report which will assist them for doing research work.

Text Book:

1. Sharma, R.C. and K. Mohan. 2011. Business Correspondence and Report Writing. Fourth Edition. New Delhi: Tata McGraw Hill and Post-lecture reading material.

References:

1. Raman, Meenakshi and Sangeeta Sharma, 2011. Technical Communication: Principles and Practice, 2/e. New Delhi: Oxford University Press.
2. Gerson, Sharon J and Steren M. Gerson. 2011. TechnicalWriting : Process and Product. Third Edition. India : Pearson Education Asia.
3. Mishra, Sunita and C. Muralikrishna. 2004. Communication Skills for Engineers. Delhi: Pearson Education Pte. Ltd.
4. Krishna Mohan and Meenakshi Raman. 2010. Advanced Communicative English. New Delhi : Tata McGraw Hill
5. Eric H. Glendinning, Beverly Holmström Study Reading: A Course in Reading Skills for Academic Purposes, Cambridge University Press, 2004
6. Liz Hamp-Lyons, Ben Heasley Study Writing: A course in writing skills for academic purposes Cambridge University Press 2006
7. Thomas N Huckin and Olsen Technical Writing & Professional Communication McGraw-Hill, 1991
8. William Strunk Elements of Style B N Publishing 2007 (E book available)
9. Dorothy E Zemach and Lisa A Rumisek College Writing: From Paragraph to Essay Macmillan 2003 (e-book available).

Online Sources:

1. http://owl.english.purdue.edu/
2. http://www.uefap.com/
3. http://www.nicenet.com

Mode of Evaluation: Written Examination, Day-to-day Assessment

B. Tech. I Year II Semester

14MAT12T02 LINEAR ALGEBRA & COMPLEX ANALYSIS

L	T	P	C
4	1	0	4

Course Prerequisite: 14MAT11T01

Course Description:
The course is meant as an introduction to Linear Algebra and Theory of Complex variable functions and their applications. Vector spaces, Basis and Dimension of vector spaces.Linear transformations, Range and Kernel.Elementary row operations, System of linear equations.Eigenvalues and Eigenvectors. Complex functions and their analyticity. Elementary complex functions, Complex integration. Taylor and Laurent series expansions.Calculus of Residues and their applications.

Course Objectives:
1. To introduce System of linear equations, Vector spaces, basis and dimension etc.
2. To emphasize the role of Linear transformations, Elementary row operations, Eigen values and Eigenvectors.
3. To analyze the Functions of Complex variables and their analyticity.
4. To familiarize the knowledge of Elementary complex functions, complex integration.
5. To avail the basic concepts of Laurent series expansions. Calculus of residues and their applications.

UNIT-I: MATRICES & VECTOR SPACES
Solutions of linear systems of equations, The inverse of a matrix, Vector spaces, subspaces, linear independence, basis and dimension. Rank and inverse of a matrix and applications.Co-ordinates and change of basis.

UNIT-II: LINEAR TRANSFORMATIONS
Definition and examples, kernel and range of linear transformation.The matrix of a linear transformation, Composite and invertible linear transformations, Eigen values and Eigenvectors.

UNIT-III: FUNCTIONS OF COMPLEX VARIABLES
Complex numbers, Functions of a complex variables, Limit and continuity, Derivative, CR-equations, analytic functions.

UNIT-IV: ELEMENTARY FUNCTIONS & COMPLEX INTEGRATION
Exponential, trigonometric and hyperbolic functions, Logarithmic functions, Complex exponents, inverse functions, Contour integrals, anti-derivatives.Cauchy-Goursat theorem, Cauchy Integral formula, Morera's theorem (No proof).

UNIT-V: LAURENT SERIES & THEORY OF RESIDUES
Fundamental theorem of algebra, Liouville's theorem, Laurent series (No proof), Residues, Cauchy Residue theorem, Improper real integrals.

Course Outcomes:

At the end of this course, students should be able to

1. Solve the system of linear equations and analyze applications of matrices in various fields and vector space properties.
2. Find the powers of a matrix using Eigen values and Eigenvectors and analyze the nature of linear transformations
3. Examine the concepts of complex functions using CR-equations.
4. Determine the roots of complex elementary functions and evaluate complex contour integrals by various techniques.
5. Compute the residues by Laurent series and also evaluate improper integrals.

Text Books:

1. Elementary linear Algebra by Stephen Andrilli and David Hecker, 4th Edition, Elsevier, 2010
2. Complex variables and applications by R. V Churchill and J. W. Brown, 8th edition, 2008, McGraw-Hill.

References:

1. Linear Algebra and its Applications by D.C. Lay, 3rd edition, Pearson Education, Inc.
2. Complex Variables with Applications by A. D. Wunsch, 3rd edition, Pearson Education, Inc.

Mode of Evaluation: Assignments, Internal Mid Examinations, External End Examination.

B. Tech I Year II Semester

14CHE11T01 ENGINEERING CHEMISTRY

L	T	P	C
4	1	0	4

Course Prerequisite: Basic Chemistry at Intermediate or equivalent level.

Course Description:
It deals with basic principles of various branches of chemistry like physical, organic, analytical and material chemistry.

Course Objectives:
1. To analyse water impurities and determine its hardness, alkalinity and dissolved oxygen content.
2. To understand the basic concepts of thermodynamics and chemical kinetics.
3. To introduce the basic concepts of IR spectroscopy and its applications in study of progress of various organic reactions.
4. To familiarize the basic concepts of electrochemistry and its influence in corrosion.
5. To impart the importance of various engineering materials and to get familiarity with their applications in day to day life.

UNIT 1: WATER, WASTE WATER CHEMISTRY AND ANALYSIS
Impurities in water, Hardness of water, determination of hardness by EDTA Method and Numerical Problems, alkalinity, Chemical analysis of water: Dissolved Oxygen, Chlorides, Softening of water by Ion Exchange and Reverse Osmosis method. Water treatment for drinking purpose-coagulation, sedimentation, filtration, sterilization- chlorination and ozonization.Concept of break point chlorination.

UNIT II: THERMODYNAMICS AND CHEMICAL KINETICS
Thermodynamics: Thermodynamic Systems, State Functions, Thermal Equilibrium and Temperature, Work, Internal Energy and Heat Transfer, Heat Capacity. Natural and Reversible Processes, Entropy and Second Law, Entropy Changes in (a) accompanying change of phase, isothermal and (c) isobaric processes. Standard free energy change in chemical reactions. Chemical Kinetics: Rate Laws, Order, Rate Constants, Arrhenius Equation, Rate-determining step, Reaction mechanisms.

UNIT III: INSTRUMENTAL METHODS OF ANALYSIS AND POLYMERS
Instrumental methods: Infrared spectroscopy-principle and applications. Chromatography– classification (paper, thin layer and gel permeation) and uses.Nucleophilic substitution reactions (both SN1 and SN2) of alkyl halides. Elimination reaction of alkyl halides; Addition reactions to >C=C< bond. Classification of Polymers, Types of polymerization, Molecular weight of polymers- number average and weight average molecular weights, plastics, some important commercial thermoplastics: polyvinyl chloride, Teflon / Poly Tetra Fluoro Ethylene (PTFE), Nylon, Poly Ethylene Terephthalate (PET), Poly Ethylene (PE) or Polythene, Poly Styrene (PS) and thermosetting resins: Bakelite, Elastomers: Polyisoprene, Polyurethane, Synthetic rubbers: Buna-S Rubber, Buna-N Rubber, Polyurethane (or) Isocyanate rubber, Thiokol rubber, Silicon rubber.

UNIT IV: ELECTROCHEMISTRY AND CORROSION

Types of electrolytes, Electrochemical cells, Electrode potential, Galvanic cells, Nernst equation, Measurement of EMF, types of electrodes, concentration cells, Batteries- Lead-acid, Ni-Cd, Lithium and Lithium ion batteries. Hydrogen-oxygen fuel cell-principle and applications. Corrosion: Types of corrosion, Factors influencing rate of corrosion, Corrosion control methods, Protective coatings.

UNIT V: ENGINEERING MATERIALS & NANO SCIENCE

Cementing materials - Lime, Cement, Gypsum, Refractories, Abrasives, Insulators, Liquid crystals – classification and applications.Lubricants – definition, classification, Extreme pressure lubrication mechanism, important properties – viscosity, viscosity index, saponification number, flash point and pour point.Introduction to nanoscience and nanomaterials, synthesis – sol-gel and hydrothermal methods, characterization by powder XRD (Scherrers equation) and photo-catalytic application – dye degradation.

Course Outcomes:

At the end of the course, the students will be able to

1. Understand the impurities in water and can determine its hardness, alkalinity and dissolved oxygen content.
2. Be familiarized with thermodynamic systems, work done, internal energy, entropy and Standard free energy change in chemical reactions.
3. Understand the principles and applications of IR, Paper Chromatography, TLC, GPC /SEC.
4. Get the knowledge of electrochemical cells, lead acid batteries, Ni-Cad batteries, lithium ion Batteries, lithium batteries, and methanol oxygen fuel cells.
5. Obtain exposure to the basic engineering materials such as cementing, lubricants, Refractories, Abrasives, Insulators, Liquid crystals and nanomaterials.

Text Books:

1. P.W. Atkins & Julio de Paula, 'The Elements of Physical Chemistry', Fifth edition (Oxford University Press, Oxford 2009).
2. T. W. Graham Solomons and Craig B. Fryhle, 'Organic Chemistry', 10th Edition, John Wiley & Sons, Inc. NewYork, 2011.
3. Dr S. S. Dara and Dr S. S. Umare, A Text book of Engineering Chemistry, S. Chand& Company Ltd, 2000 1st Ed.

References:

1. D. W. Ball, 'Physical Chemistry', First Edition, India Edition (Thomson, 2007).
2. L. G. Wade, Jr. and M. S. Singh, 'Organic Chemistry', 6th Edition, Pearson Education Inc., 2006.
3. Perry and Green, Perry's Chemical Engineers' Handbook, 9th Edition, Section 2, McGraw Hill
4. DrSuba Ramesh and others, Engineering Chemistry, Wiley India, , 2011,1st Ed
5. K. N Jayaveera, G. V. Subba Reddy and C. Rama Chandraiah, Engineering chemistry, 1st Ed. 2013, McGraw Hill education.

Mode of Evaluation: Assignments, Internal Mid Examinations and external semester end examination.

B.Tech. I Year II Semester

14CSU12T01 COMPUTER PROGRAMMING

L	T	P	C
4	1	0	4

Course Prerequisite: None

Course Description:
This course is an introduction to the theory and practice of computer programming, the emphasis of this course is on techniques of program development within the structure and object-oriented paradigm. Topics include C program basics, control structures, arrays, files, pointers, objects, classes, inheritance, and data structures.

Course Objectives:
1. To make the student understand problem solving techniques and their applications
2. Students will be able to understand the syntax and semantics of C programming language
3. Get acquaintances with data structures, searching and sorting techniques using C++ generic programming.

UNIT I: C PROGRAMMING
Structure of C Program, C Tokens: Variables, Data types, Constants,Identifiers, key words and Operators, Expressions. **Control Structures**: Conditional Statements (Simple if, if-else, Nested -if-else, Switch). Iterative Statements (for, While, Do-While), Jump Statements (break, Continue).

UNITII: FUNCTIONS
Functions Introduction, User defined function, accessing a function, Function prototypes, storage classes **Arrays**: Defining an array, processing an array, one dimensional arrays, two dimensional arrays **Searching:** Linear and Binary. **Sorting:** Bubble Sort, Insertion Sort, Selection Sort, Merge Sort, and Quick Sort.**Pointers**: Fundamentals, Pointer Declarations, Pointers and one dimensional array, Dynamic memory allocation.

UNITIII: STRINGS
Declaring and Defining a string, Initialization of strings, , Strings Library functions **Structures:** Defining a structure, Processing a structure Files: File Definition, Opening and closing a data file, Reading and Writing a data file, Files I/O Functions.

UNITIV: C++ PROGRAMMING
Objects, Class Definition, Class Members, Access Control, Constructors and destructors, parameter passing methods, , dynamic memory allocation and deal location (new and delete), Generic Programming- Function and class templates, Inheritance basics, base and derived classes, inheritance types, base class access control

UNITV: DATA STRUCTURES

Classification of Data Structures.**Stacks and Queues**: Stacks, Stacks Operations, Stack Implementation by using arrays, Queues, Queues Implementation by using arrays, Types of Queues. **Linked Lists**: Single Linked lists, Operations

Course Outcomes:

After Completion of this course students will be able to

1. Apply problem solving techniques in designing the solutions for a wide-range of problems.
2. Choose appropriate data structure and control structure depending on the problem to be solved.
3. Use existing data structures and design new data structures appropriate to the problem to be solved.
4. Modularize the problem and also solution.
5. Use appropriate searching and sorting technique to suit the application.

Text Books:

1. The C Programming Language, Kernighan and Ritchie, 2 ndEdition, Prentice Hall, India, 1988.(UNITS-I, II, III)
2. C++: The Complete Reference. Third Edition. Herbert Schildt. Osborne McGraw-Hill. Berkeley New York St. Louis San Francisco. Auckland Bogotá Hamburg .(UNIT-IV)
3. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition,Universities Press Orient Longman Pvt. Ltd.(UNIT-V)

References:

1. Programming in ANSI C, E. Balagurusamy, Sixth Edition, Tata Mc-Graw Hill Publishing Co.Ltd.-New Delhi
2. Problem Solving & Program Design in C, Hanly, Jeri R and Elliot. B Koffman, Pearson Education, 5th edition, 20007.
3. Fundamentals of Data Structures in C++ by Ellis Horowitz, SartajSahni, DineshMehta, Universities Press, Second Edition.
4. Lipmen C++ Book.

Mode of Evaluation: Assignment, Written Examination.

B.Tech. I YearII Semester

14ME11T01 ENGINEERING GRAPHICS

L	T	P	C
2	1	4	4

Course Prerequisite: None

Course Description:
Introduction to AutoCAD commands, simple drawings, orthographic projections, projection of points, lines, planes; auxiliary projections; projections and sections of solids; development and intersection of surfaces; isometric projections.

Course Objectives:
1. Engineering Graphics is the primary medium for development and communicating design concepts.
2. Through this course the students are trained in Engineering Graphics concepts with the use of AutoCAD.
3. The latest ISI code of practice is followed while preparing the drawings using AutoCAD.
4. Computerized drawing is an upcoming technology and provides accurate and easily modifiable graphics entities.
5. Storage and Retrieval of Drawings is also very easy and it takes very less time to prepare the drawings. Also enhances the creativity.

UNIT I: INTRODUCTION TO AUTO CAD
Introduction to AutoCAD commands, simple drawings, Orthographic Projections-Theory, techniques, first angle projections, multi view drawing from pictorial views.

UNIT II: PROJECTIONS OF POINTS & LINES
Projections of points: Positions, notation system and projections.
Projections of lines: positions, terms used, different cases, traces of lines and finding true lengths, auxiliary projections.

UNIT III: PROJECTIONS OF PLANES & SOLIDS
Projections of planes: positions, terms used, different cases and projections procedure
Projections of Solids: Projections of Regular Solids inclined to one planes.

UNIT IV: SECTIONS AND DEVELOPMENTS OF SOLIDS
Section Planes and Sectional View of Right Regular Solids-Prism, cylinder. True shapes of the sections.
Development of Surfaces of Right Regular Solids-Prism, Cylinder and their Sectional Parts.

UNIT V: INTERSECTIONS & ISOMETRIC PROJECTIONS
Intersections of surfaces of solids: Intersection between: Line-plane, Plane-plane, line-solid, solid-solid.
Isometric Projections: Theory of isometric drawing, construction of isometric projection from orthographic.

Course Outcomes:

At the end of the course, students will able to

1. Understand and apply commands and concepts of CAD for engineering graphics
2. Using CAD commands able to draw points and lines in systematically and different projection.
3. Using CAD commands able to draw planes and solids in systematically and different projection
4. Understand the concepts of section of solids and developments using drawing tools
5. Understand concepts to draw 3D to 2D or 2D to 3D using cad tools.

Text Book:

D.M. Kulkarni, A.P. Rastogi and A.M. Sarkar., Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi 2009.

References:

1. Dhananjay A Jolhe, Engineering Drawing: with an introduction to AutoCAD, Tata McGraw Hill, 2008.
2. Warren J. Luzadder& Jon M. Duff Fundamentals of Engineering Drawing, 11th edition, Prentice Hall of India, New Delhi.ss

Mode of Evaluation: Assignment and Written Examination

B. Tech I Year II Semester

14CHE11P01 ENGINEERING CHEMISTRY PRACTICALS

L	T	P	C
0	0	3	2

Course Prerequisites: Basic Chemistry at Intermediate or equivalent level.

Course Description:
It deals with basic principles of various volumetric and instrumental analytical methods.

Course Objectives:
1. To impart students a better training in analysis of chemical and instrumental methods.
2. To develop skill in analysis and estimation of a given sample by chemical and instrumental methods.
3. To bridge theoretical concepts and their practical engineering applications, thus highlighting the role of chemistry in engineering.

Volumetric Analysis
1. Estimation of total, permanent and temporary hardness of water by EDTA method.
2. Estimation of Copper (II) in water by Iodometry.
3. Estimation of Dissolved Oxygen by Winkler's method.
4. Estimation of alkalinity of water sample.
5. Estimation of Acidity of water sample.
6. Estimation of Iron (II) in waste water by dichrometry.
7. Estimation of copper ion by using standard EDTA.

Instrumental Method of Analysis
1. Determination of unknown strength of an acid solution by conductometric titration (Neutralisation Titration)
2. Conductometric titration of BaCl2 Vs Na2SO4 (Precipitation Titration)
3. Dissociation constant of weak electrolyte by Conductometry
4. Determination of manganese by colorimetry
5. Estimation of ferrous ion by potentiometric titration (Redox Titration).

Course Outcomes:
After the completion of the practicals, students will be able
1. To impart students a better training in analysis of chemical and instrumental methods.
2. Would have acquired the practical skill to handle the analytical methods with confidence.
3. Would be in a position to technically address the water related problems.
4. Would be confident in handling energy storage systems and would be able combat chemical corrosion.
5. To bridge theoretical concepts and their practical engineering applications.

Lab Manual:
Engineering Chemistry Lab Manual, Dept. of Chemistry, Madanapalle Institute of Technology and Science, Madanapalle – 517325, Chittoor Dist., Andhra Pradesh, India.

Mode of evaluation: Continuous cumulative evaluation of the lab experiments, record, Viva-voce and external lab examination.

B.Tech. I Year II Semester

14CSU12P02 COMPUTER PROGRAMMING PRACTICALS

L	T	P	C
0	0	3	2

Course Prerequisite: None

Course Description:
This course is to apply the concepts of computer programming in a practical approach; the emphasis of this course is on techniques of program development within the structure and object-oriented paradigm. Implementation of program include C program basics, control structures, arrays, files, pointers, objects, classes, inheritance, and data structures.

Course Objectives:
1. To make the student learn C Programming language.
2. To make the student solve problems, implement those using C & C++ programming languages.
3. To strengthen the ability to identify and apply the suitable data structure for the given real world problem.

List of Experiments:
1. a) Write a C program to swap the two numbers.
b) Write a C program to find the roots of a quadratic equation.
c) Write a C program to compute the factorial of a given number.
2. a) Write a C program to find the series of prime numbers in the given range.
b) Write a C program to generate Fibonacci numbers in the given range.
3. a) Write a C program to check for number palindrome.
b) Write a C program to generate Pascal Triangle.
4. Implement the following operations on matrices using C
a) Sum of Two Matrices b) Product of Two matrices c) Transpose of Matrix
5. Write a C program to find Factorial, GCD, fibonacci, towers of hanoi, sum of digits, base conversions, reversal of numbers. (Using recursion).
6. Write a C program to implement all string operations(strlen(), strcpy(), , strcmp(), strcat(), strrev(), strstr(), strchr()) without using standard string library functions.
7. Write a C program to find the student grade by using structures.
8. Write a C program to perform the operations addition, subtraction, multiplication of complex numbers using structures.
9. Write a C program to copy the file contents from one file to another file(pass file names as command line arguments).
10. Implement the following searching techniques using C++ templates (Generic Programming)
a) Linear Search b) Binary Search
11. Implement the following sorting techniques using C++ templates
a) Bubble Sort b) Selection Sort c) Insertion Sort
12. Implement the following sorting techniques using C++ templates
a) Merge sort b) Quick sort.

13. Implement the following Data Structures using C++ templates
a) Stack ADT b) queue ADT c) Circular queue ADT
14. Write a C++ Program to convert infix to postfix expression and its evaluation.
15. Implement Singly linked list ADT and operations(Insertion, Deletion, Traversing

Course Outcomes:
After Completion of this course students will be able to
1. Apply problem solving techniques to find solutions to problems.
2. Use C & C++ languages features effectively and implement solutions using C & C++ languages.
3. Identity the appropriate data structure for a given problem or application.
4. Improve logical and programming skills.
5. Write Data Structures using C++ templates.

References:
1. "Programming with C", Byron Gottfried, Third Edition, Schaum's Outlines, McGrawHill.
2. "Fundamentals of Data Structures in C", Horowitz, Sahni, Anderson-freed, SecondEdition, Universities Press.
3. "The C Programming Language", Brian W. Kernighan, Dennis M. Ritchie, Pearson.
4. "Classic Data Structures", Samantha, PHI
5. Fundamentals of Data Structures in C++ by Ellis Horowitz, SartajSahni, DineshMehta, Universities Press, Second Edition.
6. "Pointers in C", YeswantKanetkar, BPB publications.

Mode of Evaluation: Practical

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PROGRAMME CORE COURSES

If opportunity doesn't knock,
Build a door.
Milton Berle

B.Tech. II Year I Semester

14MAT103 DIFFERENTIAL EQUATIONS & LAPLACE TRANSFORMS

L	T	P	C
3	2	0	3

Course Prerequisite: 14MAT11T01& 14MAT11T02

Course Description:
This course reviews and continues the study of differential equations with the objective of introducing classical methods for solving boundary value problems. This course serves as a basis of the applications for differential equations, Fourier series and Laplace transform in various branches of engineering and sciences. This course emphasizes the role of orthogonal polynomials in dealing with Sturm-Liouville problems.

Course Objectives:
1. To prepare students for lifelong learning and successful careers using mathematical concepts of ordinary differential equations
2. To avail knowledge of system of first order equations and power series solutions
3. To train the students in the applications of Second order equations and to emphasize the role of special functions.
4. To familiarize the knowledge of Laplace transform
5. To introduce Fourier series and the classical methods for solving boundary value problems

UNIT I: DIFFERENTIAL EQUATIONS
Introduction-General Remarks on Solutions-Families of Curves-Orthogonal Trajectories - Growth, Decay, Chemical Reaction and Mixing-Falling Bodies and other Motion Problems-Homogeneous Equations- Exact Equations-Integrating Factors-Linear Equations-Bernoulli's Equation.
Introduction of Second Order Linear Equations-General solution of the Homogeneous Equation - Wronskian-The Homogeneous Equation with constant Coefficients, Euler's Equi-dimensional equation-The Method of Variation of Parameters-Higher Order Linear Equations-Operator Methods for Finding Particular Solutions.

UNIT II: SYSTEM OF FIRST ORDER EQUATIONS AND POWER SERIES SOLUTIONS
General remarks on Systems -Linear Systems-Homogeneous Linear Systems with Constant Coefficients. A Review of Power Series-Series Solutions of First Order Equations- Second order Linear Equations- Ordinary Points-Regular Singular Points -Frobenius method.

UNIT III: APPLICATIONS OF SECOND ORDER EQUATIONS &SPECIAL FUNCTIONS
Applications of Second order equations - Legendre polynomials-Properties of Legendre polynomials-Gamma Functions -Bessel Functions-Properties of Bessel functions.

UNIT IV: LAPLACE TRANSFORMS
Introduction- Remarks on Theory-Applications to Differential Equations-Derivatives and Integrals of Laplace Transforms – Convolutions -Unit Step and Impulse function.

UNIT V: FOURIER SERIES AND PARTIAL DIFFERENTIAL EQUATIONS

The Fourier coefficients-The problem of Convergence-Even and Odd functions-Cosine and Sine Series-Extension to Arbitrary intervals.

Eigen values, Eigen functions and one dimensional wave equation-Heat equation-Laplace's equation – Strum-Liouville theorem for Boundary value problems.

Course Outcomes:

At the end of the course, students will able to

1. Work in differential equations provides mathematical solutions to various engineering problems.
2. Explain the system of first order equations and Power Series solutions relevant to the field of Engineering.
3. Explain the application of Second order equations & Special Functions.
4. Analyze the applications of Laplace Transforms is useful to solve complex problems.
5. Explain the Fourier series and efficiency to apply tools for Boundary value problems necessary for engineering problems.

Text Book:

Simmons G.F., Differential Equations with Applications and Historical Notes, Tata McGraw Hill Edition 2003, Eighteenth reprint 2010

References:

1. Kreyszig E., Advanced Engineering Mathematics, 9th edition, Wiley, 2013.
2. Kreider D.L. and Others: An Introduction to Linear Analysis, Addison Wesley, 1966.
3. Shepley L. Ross: Differential Equations, John Wiley & Sons, 1984.
4. William E. Boyce., Richard C. Diprima., Elementary Differential Equations and Boundary Value Problems, John Wiley & Sons, Inc.7th edition, 2001

Mode of Evaluation: Assignments, Internal Mid Examinations, External End Examination.

B.Tech. II Year I Semester

14HUM101 PRINCIPLES OF ECONOMICS

L	T	P	C
3	0	0	3

Course Prerequisite: None

Course Description:
The course aims to provide an insight into production, distribution and consumption of wealth, analysis of market structure, input pricing, public finance and economics of development and macroeconomic issues including international trade with emphasis upon use of analytical tools. The course is designed to give emphasis on the application of real life examples on various fundamental issues of economics.

Course Objectives:
The course is intended to

1. Describe the nature of economics in dealing with the issue of scarcity;
2. Perform supply and demand analysis to analyze the impact of economic events on markets;
3. Discuss about demand elasticity, marginal utility and indifference theory;
4. Analyze the behaviour of consumers in terms of the demand for products;
5. Evaluate the factors affecting firm behaviour, such as production and costs;
6. Analyze the performance of firms under different market structures;
7. Explain about the concept of markets and its application in the price and output determination in operations of the firm;
8. Discuss the concept of equilibrium and efficiency of perfect competition;
9. Make the students understand the concept of income distribution and public finance; and
10. Analyze elements of macroeconomics and explain the role played by various sectors of the economy.

UNIT I: INTRODUCTION
Why study Economics- The Scope and method of Economics- Understanding the problem of scarcity and choice and the concepts of comparative advantage along with various economic systems- The Economic Problem: Scarcity & Choice.

UNIT II: DEMAND& SUPPLY
Elements of market Economy- Demand, Supply and Market Equilibrium- Applications of Demand & Supply- Elasticity- MU & Indifference Theory- Household Behavior and Consumer Choice- Analysis of Production-The Production Process: The behavior of profit maximizing firms.

UNIT III: COST ANALYSIS & MARKETS
Cost Analysis- Cost Structure of Firms and output decision- Input pricing: Land, Labor, Capital and Investment- Input demand: The labour and land market, the Capital Market and the Investment Decision-Market mechanism: Perfect Competition- General Equilibrium and the efficiency of perfect competition- Monopoly, and Monopolistic Competition- Imperfect Competition- Monopoly, and Monopolistic Competition- Imperfect Competition.

UNIT IV: ECONOMICS OF PUBLIC GOODS

Economics of Public Goods, Externalities, Public Goods, Imperfect Information and Social Choice- Externalities. Poverty & impact of income distribution- Income distribution and poverty -Basic concepts of public finance- Public Finance: The economics of Taxation.

UNIT V: MACRO ECONOMICS

Elements of Macroeconomics, Measurement of Macroeconomic Variables- Macroeconomic concepts and National Income accounting. Role of Money, Banking and Credit creation - Money Supply & The Central Bank- Economic Basis for trade- International Trade and comparative advantage.

Course Outcomes:

At the end of the course, students will able to

1. Understand various principles of economics.
2. Analyze the concepts of demand, elasticity, markets, supply and its essence in floating of an organization.
3. Compare different market structures and cost Analysis to identify suitable market.
4. Assess the income distribution, public finance and taxation to evaluate the different projects in the practical situation.
5. Apply the measurement methods of macro-economic variables.

Text Book:

Case E. Karl & Ray C. Fair, "Principles of Economics", Pearson Education, 8th Edition, 2007

References:

1. Lipsey, R. G. & K. A. Chrystal , "Economics", Oxford University Press, 11th Edition, 2007
2. Samuelson P. A. &Nordhaus W. D. "Economics", Tata McGraw-Hill 18th Edition, 2007

Mode of Evaluation: Assignment, Seminar, Written Examination.

B.Tech. II Year I Semester

14EEE102 NETWORK ANALYSIS

L	T	P	C
3	1	0	3

Course Prerequisite: 14MAT11T01, 14EEE12T02 & 14PHY12T01

Course Description:
This course is developed to understand the concept of network analysis. Course covering the network theorems & coupled circuits, three phase circuits, transient response, two port networks

Course objectives:
1. To introduce electric circuits and its analysis
2. To impart knowledge on solving circuits using network theorems
3. To introduce the phenomenon of resonance in coupled circuits.
4. To educate on obtaining the transient response of circuits.
5. To Phasor diagrams and analysis of three phase circuits

UNIT I: NETWORK THEOREMS & COUPLED CIRCUITS
Fundamentals of Thevinin's& Norton's theorem, Maximum power transfer theorem, compensation theorem, Millman's theorem, reciprocity theorem- measurement of self, mutual inductance, co-efficient of coupling, coupled circuits, locus diagram-series resonance, parallel resonance-problems.

UNIT II: THREE PHASE CIRCUITS
Phase sequence- Star and delta connection-Relation between line and phase voltages and currents in balanced systems-Analysis of balanced three phase circuits- Measurement of Active and Reactive power in balanced three phase systems. Analysis of three Phase unbalanced circuits-Loop Method-Application of Millman's Theorem- Star-Delta transformation technique-Two Wattmeter Method of measurement of three phase power.

UNIT III: TRANSIENT RESPONSE
Transient response of R-L, R-C, R-L-C series circuits for D.C excitation-Initial conditions-solution method using differential equation and laplace transforms, Transient response of R-L, R-C, R-L-C series circuits for sinusoidal excitations-Initial conditions-Solutions method using differential equations and laplace transforms

UNIT IV: TWO PORT NETWORKS
Two port network parameters-Z, Y, ABCD and hybrid parameters and their relations-Interconnection of two port networks-image parameters-terminated two port networks-concept of transformed networks-two port network parameters using transformed variables-cascaded networks.

UNIT V: FREQUENCY DOMAIN OF A.C. CIRCUITS
Fourier theorem-Trigonometric form and exponential form of Fourier series –conditions of symmetry-line spectra and phase angle spectra-Analysis of Electrical Circuits to Non sinusoidal periodic waveforms- Laplace transforms-Properties, Laplace transform applications to circuit analysis

Course outcomes:

At the end of the course, students will able to

1. Apply circuit theorem concepts to various circuits.
2. Analyze poly-phase circuits.
3. Analyze transient behaviour of circuits comprises various passive components when subjected to different inputs.
4. Compute the two port network parameters.
5. Analyze the frequency response of AC circuits.

Text Book:

Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley, McGraw Hill Company, 6^{th}edition

References:

1. Network Theory by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill publications, first edition.
2. Network Ananlysis by N.C. Jagan, C.LakshmiNarayana, BS Publications, 2^{nd} edition
3. Network Analysis; Van Valkenburg; Prentice-Hall of India Private Ltd.

Mode of Evaluation: Assignment, Written Examination

B.Tech. II Year I Semester

14EEE103 ELECTRICAL MACHINES

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE12T01 & 14PHY12T01

Course Description:
This course is designed to obtain thorough knowledge on performance and control of transformers, induction machines, dc machines, fractional HP and miniature motors during normal and extreme working conditions. Course covers Theory, performance, testing, applications and control of electromechanical energy converters like Transformers, Induction machines, DC machines, synchronous machines, Fractional HP and miniature motors. To have hands-on experience by testing transformers and electric machines to evaluate their performance.

Course Objectives:
1. To study the working principles of DC machines as Generator types, determination of their no load/load characteristics, starting and methods of speed control of motors.
2. To familiarize the constructional details, the principle of operation, prediction of performance, the methods of testing the transformers and three phase transformer connections.
3. To impart knowledge on Construction, principle of operation and performance of induction machines.
4. To impart knowledge on Construction and performance of synchronous generators and synchronous motor.
5. To impart knowledge on Construction, principle of operation of special machines.

UNIT I: DC MACHINES
Characteristics of various types of DC Motors and Generators- Starting of DC motors- Braking of DC motors & applications- Speed control of DC motor- Performance evaluation of DC machines.

UNIT II: TRANSFORMER
Operation, equivalent circuit, phasor diagrams, voltage regulation, efficiency, No-load, full-load, Sumpner's test, Auto transformer, Three phase transformer: Connections, Phasor groups, Applications and Harmonics- Parallel operation and load sharing- No load and Onload tap changers- Voltage and current transformers.

UNIT III: INDUCTION MOTOR - I
Construction, MMF wave, Slip and frequency of rotor currents- Circuit model, Power across air gap, Torque and power output, losses and efficiency, Torque slip characteristics.

UNIT IV: INDUCTION MOTOR - II

No-Load and short circuit tests, determination of parameters, starting - cogging and crawling - speed control, Linear Induction motor: Configuration & characteristics- equivalent circuit, operation & characteristics of single phase induction motor.

UNIT V: SYNCHRONOUS MACHINES

Operation, circuit model, armature reaction, synchronous reactance, determination of synchronous impedance - Synchronizing to infinite bus bar, operating characteristics, efficiency of synchronous machine- Power flow equation- Two reaction model, phasor diagram, power angle characteristics and slip test, construction and operation of brushless DC motor, Stepper motor.

Course Outcomes:

At the end of the course, students will able to

1. Explain the working principles of DC machines as Generator types, determination of their no load/load characteristics, starting and methods of speed control of motors.
2. Analyze the constructional details, the principle of operation, prediction of performance, the methods of testing the transformers and three phase transformer connections.
3. Identify the Construction, principle of operation and performance of induction machines.
4. Identify the Construction and performance of synchronous generators and synchronous motor.
5. Justify the Construction, principle of operation of special machines..

Text Books:

1. Nagrath I J and D P Kothari - Electric Machines – Tata McGraw Hill, 4th edition, 2010.
2. Electrical Machines Laboratory Manual by NagrathI.J&M.R. Poonkuzhali (EDD Notes), 2007.

References:

1. M.G. Say – Performance and Design of AC machines –Pitman.
2. P.S. Bimbhra, Electrical Machinery, Khanna Publishers

Mode of Evaluation: Assignment, Written Examination

B.Tech. II Year I Semester

14EEE104 DIGITAL DESIGN

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE12T01

Course Description:
The objective of the course is to impart knowledge of the basic tools for the design of digital circuits and to provide methods and procedures suitable for a variety of digital design applications. The course also introduces fundamental concepts of computer organization. The course also provides laboratory practice using MSI devices.
This course covers digital systems and binary numbers, Boolean algebra and logic gates, Gate level minimization, Karnaugh map, combinational circuits, synchronous sequential circuit, Memory units and programmable devices and basics of VHDL in realization of digital circuits.

Course Objectives:
1. To study various number systems , simplify the logical expressions using Boolean functions
2. To study implementation of combinational circuits
3. To design various synchronous and asynchronous circuits.
4. To introduce asynchronous sequential circuits and PLCs
5. To introduce digital simulation for development of application oriented logic circuits.

UNIT I: NUMBER SYSTEMS AND DIGITAL LOGIC FAMILIES
Digital Systems and Binary Numbers: Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Complements of Numbers, Signed Binary Numbers, Binary Codes, Binary Storage and Registers and Binary Logic.
Boolean Algebra and Logic Gates: Introduction, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates and Integrated Circuits.

UNIT II: COMBINATIONAL CIRCUITS
Gate Level Minimization: Introduction, Four Variable K-Map, Product of Sums Simplification, Don't Care Conditions, NAND and NOR Implementation, Other Two Level Implementations, Exclusive OR Function and Hardware Description Language.
Combinational Logic: Introduction, Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder–Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders and Multiplexers.

UNIT III: SYNCHRONOUS SEQUENTIAL CIRCUITS
Synchronous Sequential Logic: Introduction, Sequential Circuits, Storage Elements, Clocked Sequential Circuits, State Reduction and Assignment and Design Procedure. Registers and Counters: Registers, Shift Registers, Ripple Counters, Synchronous Counters, Other Counters, Algorithmic State Machines.

UNIT IV: PROGRAMMABLE LOGIC DEVICES

Memory and Programmable Logic: Introduction, Random Access Memory, Memory Decoding, Error Detection and Correction, Read Only Memory, Programmable Logic Array, Programmable Array Logic and Sequential Programmable Devices.

UNIT V: VERILOG HDL

HDL for Combinational Logic circuits -HDL for Sequential Logic- Design at the Register Transfer Level: Introduction, Register Transfer Level Notation, and Register Transfer Level in HDL.

Course Outcomes:

At the end of the course, students will able to

1. Explain the number systems, simplify the logical expressions using Boolean functions.
2. Design and implementation of combinational circuits
3. Design various synchronous and asynchronous circuits.
4. Analyze the asynchronous sequential circuits and PLCs.
5. Validate the digital simulation for development of application-oriented logic circuits.

Text Books:

1. M.Moris Mano and Michael D. Ciletti "Digital Design", PHI, 4th Edition, 2007
2. G Raghurama, TSBSudharshan "Introduction to Computer Organization". EDD notes2007.
3. G Raghurama, et.al, "Laboratory Manual for Digital Electronics and Computer Organization", EDD notes 2007.

References:

1. Donald D. Givonne, "Digital Principles and Design" TMH, 2003.
2. Samir Palnitkar, "Verilog HDL", Prentice Hall; 2 edition, 2003

Mode of Evaluation: Assignment, Written Examination

B.Tech. II Year I Semester

14EEE105 ELECTRONIC DEVICES

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE12T01 & 14PHY12T01

Course Description:
The course provides a comprehensive understanding of the fundamental theory of semiconductors and the operation of commonly used electronic devices such as junction diodes, Field Effect Transistors (FET) and Bipolar Junction Transistor (BJT). The relations between material properties and terminal behaviors of devices are derived. Advanced topics covered include optoelectronic devices.
This course covers Energy Bands and Charge carriers in Semiconductors, Crystal Properties and Growth of Semiconductors, Excess Carriers in Semiconductors, Junction concepts, BJTs, FETs and optoelectronic devices.

Course Objectives:
1. Understand energy band structures in semiconductors using Quantum mechanics.
2. Study of motion of charged particles in electric and magnetic fields.
3. Understand generation of excess carriers by photo excitation.
4. Understand operation of PN Junction diode and BJT.
5. Understand the operation of FET and opto-electronic devices.

UNIT I: SEMICONDUCTOR BASICS
Crystal Lattices, Crystal structure and Diamond Structure-Foundations of Quantum Mechanics for understanding semiconductors- Schrodinger equation- Energy Bands and Band Structure, Effective Mass

UNIT II: CHARGE CARRIERS
Charge Carriers in Semiconductors, Carrier Concentrations, Fermi Level, Drift of Carriers in Electric and Magnetic Fields, Temperature dependence, Interaction of photons with semiconductors.

UNIT III: EXCESS CARRIERS & JUNCTION CONCEPTS
Excess Carriers and Optical absorption, Generation and recombination mechanisms, Luminescence, Carrier Lifetime and Photoconductivity, Diffusion of Carriers, Continuity equation, Quasi Fermi Level-Junctions: Equilibrium Conditions.

UNIT IV: JUNCTIONS & BJT
P-N Junctions, I-V Characteristics, Forward- and Reverse-Biased Junctions, Reverse-Bias Breakdown, Varactor diode, Metal Semiconductor Junctions.
Bipolar Junction Transistors: Generalized Biasing, I-V Characteristics

UNIT V: FIELD EFFECT TRANSISTORS AND OPTOELECTRONIC DEVICES

Field Effect Transistors: The Junction FET, MOSFET, I-V Characteristics.

Optoelectronic Devices: Photodiodes, Light-Emitting Diodes, Lasers, Semiconductor Lasers, Tunnel Diodes

Course Outcomes:

At the end of the course, students will able to

1. Draw energy band diagram for insulators, semiconductors and conductors.
2. Derive the expression of equilibrium electron and hole concentration and conductivity of a semiconductor
3. Compute lifetime of excess carriers.
4. Compute Diode current and I-V characteristics of BJT.
5. Draw I-V characteristics of JFET, MOSFET, LED and LASER diode.

Text Book:

B. G. Streetman, and Sanjay Banerjee, "Solid State Electronic Devices", 6th Ed., PHI, 2006

Reference:

D A. Neaman, "Semiconductor Physics and Devices", 3rd Ed., Tata McGraw Hill

Mode of Evaluation: Assignment, Written Examination

B.Tech. II Year I Semester

14EEE201 ELECTRIC CIRCUITS PRACTICALS

L	T	P	C
0	0	3	2

Course Prerequisite: 14EEE12T01

Course Description:
This course provide practical experience with simulation of electrical circuits and verifying circuit theorems.

Course Objective:
1. To apply circuit theorems and concepts in engineering applications.
2. To design the Series and Parallel Resonance.
3. To measure active Power for Star and Delta Connected Balanced Loads.
4. To measure reactive power for Star and Delta Connected Balanced Loads.
5. To measure the 3-Phase Power by Two Wattmeter Method for Unbalanced Loads.

LIST OF EXPERIMENTS
1. Verification of Thevenin's& Norton's Theorems and their validation using PSPICE
2. Verification of Superposition & Maximum Power Transfer Theorems and their validation using PSPICE
3. Verification of Compensation Theorem and its validation using PSPICE
4. Verification of Reciprocity &Millmann's Theorems and their validation using PSPICE
5. Transient analysis of R-L & R-C series circuits and their validation using PSPICE
6. Series and parallel resonance in R-L-C circuits
7. Determination of self-inductance, mutual inductance and coefficient of coupling
8. Determination of Z-parameter and Y-parameters
9. Determination of Transmission parameters and Hybrid parameters
10. Measurement of active power for Star and Delta connected balanced loads
11. Measurement of reactive power for Star and Delta connected balanced loads
12. Measurement of three-phase power by Two-Wattmeter method for unbalanced loads

Course Outcomes:
At the end of the course, students will able to
1. Apply circuit theorems and concepts in engineering applications.
2. Design the Series and Parallel Resonance.
3. Measure active Power for Star and Delta Connected Balanced Loads.
4. Measure reactive power for Star and Delta Connected Balanced Loads.
5. Measure the 3-Phase Power by Two Wattmeter Method for Unbalanced Loads.

Mode of Evaluation: Practical, Written Examination

B.Tech. II Year I Semester

14EEE202 ELECTRONICS PRACTICALS

L	T	P	C
0	0	3	2

Course Prerequisite: 14EEE12T01

Course Description:
This practical course provide practical experience with semiconductor device based on experimentation and digital circuit design

Course Objective:
1. To conduct experiments using power supplies, DMM, Oscilloscopes, and electronic components like resistors, capacitors, diodes and transistors.
2. To analyze V-I characteristics of PN-Junction diode and Zener Diode.
3. To analyze V-I characteristics of BJT,FET and UJT.
4. To design and implementation of logic gates, Multiplexer and De-multiplexer.
5. Design and implementation of modulo counters and shift registers

LIST OF EXPERIMENTS
1. P-N Junction Diode Characteristics
2. Zener Diode Characteristics
3. Halfwave and Fullwave Rectifiers without and with capacitor filter
4. BJT Characteristics in Common Emitter mode operation
5. JFET/ MOSFET Characteristics
6. UJT Characteristics
7. Study of Basic Digital IC's
8. Implementation of Boolean Functions, Adder/ Subtractor circuits.
9. Implementation of code converter, parity generator, encoder and decoder
10. Study of multiplexer and demultiplexer
11. Design and implementation of 4-bit modulo counters as synchronous and asynchronous types
12. Design and implementation of 4-bit shift registers in SISO, SIPO, PISO, PIPO modes

Course Outcomes:
At the end of the course, students will able to
1. Conduct experiments using power supplies, DMM, Oscilloscopes, and electronic components like resistors, capacitors, diodes and transistors.
2. Analyze V-I characteristics of PN-Junction diode and Zener Diode.
3. Analyze V-I characteristics of BJT,FET and UJT.
4. Design and implementation of logic gates, Multiplexer and De-multiplexer.
5. Design and implementation of modulo counters and shift registers.

Mode of Evaluation: Practical, Written Examination

B.Tech. II Year II Semester

14MAT104 PROBABILITY & STATISTICS

L	T	P	C
3	2	0	3

Course Prerequisites: None

Course Description:
Probability, Conditional probability, Bayes theorem, One dimensional and Two dimensional Random Variables, Mathematical Expectation, Theoretical Discrete and Continuous distributions, Simulating discrete and continuous distributions, Interval Estimation and Testing of Hypothesis, Multiple Linear Regression.

Course Objectives:
The objectives of this course are

1. To revise the elementary concepts of probability and to extend and formalize knowledge of the theory of probability and random variables.
2. To introduce new techniques for carrying out probability calculations and identifying probability distributions.
3. To analyze and interpret basic summary and modeling techniques for Multi-variate data
4. To understand the concepts of the sampling distribution of a statistic and estimation of parameter.
5. To understand the foundations for statistical inference involving confidence intervals and hypothesis testing.

UNIT I: PROBABILITY AND RANDOM VARIABLES
Introduction to Probability, Axioms of probability, Conditional Probability, Independence and Multiplication Rule, Bayes theorem, Random Variable, discrete probability densities, continuous densities, cumulative distribution, Expectation, variance and standard deviation.

UNIT II: DISCRETE AND CONTINUOUS DISTRIBUTIONS
Moment generating function, Binomial distribution, Poisson distribution, Geometric distribution, Hyper geometric distribution, Uniform distribution, Normal distribution, Normal Probability rule, Chebychev's inequality, Normal approximation to Binomial distribution, Gamma distribution, Chi-Square distribution and Exponential distribution, transformation of random variables, Simulating discrete and continuous distributions.

UNIT III: MULTIVARIATE RANDOM VARIABLES
Joint density and Independence, marginal distribution: discrete & continuous, Expectation, conditional densities (omit regression), Transformation of random variables.

UNIT IV: SAMPLING DISTRIBUTION AND ESTIMATION

Random sampling, sample statistics, Point estimation, distribution of $\overline{X}$, Interval estimation and the central limit theorem, interval estimation of variability, Estimating the mean and student's t-distribution.

UNIT V: TESTS OF HYPOTHESIS

Hypothesis testing, Significance testing, hypothesis test on the mean, hypothesis test on the variance, Estimating proportions, testing hypotheses on a proportion, comparing two proportions and its testing. Correlation (omit interval estimation & hypothesis tests on ρ), model and parameter estimation, properties of least square estimators, Least squares procedure for model fitting: A matrix approach to least square.

Course Outcomes:

At the end of the course, students will able to

1. Demonstrate an understanding of the concepts of probability and random variables.
2. Apply discrete and continuous probability distributions in solving various problems in engineering.
3. Get an idea about the density functions, distribution functions to the Random Variables and analyze the multivariate problems of engineering & industry.
4. Devise the concept of the sampling distribution of a statistic, and in particular describe the behavior of the sample mean.
5. Apply the statistical inference in practical data analysis and extend the statistical way of thinking to solve the problems in Science & Technology.

Text Book:

J.S. Milton and J.C. Arnold, Introduction to Probability and Statistics, 4th edition, 2003 Tata McGraw-Hill Publications.

References:

1. Sheldon M. Ross: Introduction to Probability and Statistics for Engineers and Scientists, 4th Edition, Elsevier, Academic Press, 2010.
2. Walpole, R.E., Myers R.H., Myer S.L., Ye. K: Probability and Statistics for Engineers and Scientists, 8th ed., Pearson Education, 2008.
3. Johnson, R.A. Miller Freund's: Probability and Statistics, 7th Edition, PHI, 2005.
4. Sheldon Ross: A First Course in Probability, 6th Edition, Pearson Education, 2002.

Mode of Evaluation: Assignments, Internal Mid Examinations, External End Examination.

B.Tech.IIYear II Semester

14HUM102 PRINCIPLES OF MANAGEMENT

L	T	P	C
3	0	0	3

Course Prerequisite: None

Course Description:
The course provides students with a practical and concrete explanation of management concepts and techniques they will need to manage today's and tomorrow's organizations. The course will follow the "planning, organizing, leading, controlling" format of managerial functions while putting together many small pictures presented by individual modules into one bigger meaningful picture in which managerial knowledge would apply. At the end of the course students are expected to understand role of components of bigger picture and interactions between and among components.

Course Objectives:
The course is intended to

1. To make understanding of basic concepts of Management and their application with organizations around us. Acquainting the students about various theories and approaches of management and their relevance in the new business environment. To learn and understand about the basic concepts of organization and types and structure of organization.
2. Enabling the students to understand the concept of planning, manager as decision makers, foundations of planning and strategic management.
3. To learn and understand about the basic concepts of organization and types and structure of organization. Explaining the students about the various concepts of HRM and their essence in new business environment.
4. Facilitating the students to learn about the leading, managers and communication, motivating employees and managers as leaders.
5. To make aware of the students about controlling, managing operations and functional areas of management-marketing and financial management.

UNIT I: DEFINING THE MANAGER'S TERRAIN
Introduction to Management and Organizations- Management definition, skills, roles, goals and functions of a manager, organization, value of studying management - Management History- Historical background, Classical Approach, Quantitative approach, Behavioral approach, Contemporary approach - Organizational Culture and Environment- Manager: omnipotent or symbolic, organization's culture, current organizational culture issues, specific and general environments - Managing in a Global Environment- Global Perspective, Understanding the global environment, Doing Business globally, managing in a global environment - Social Responsibility and Managerial Ethics- Social responsibility, views of social responsibility, social responsibility and economic performance, greening of management, managers and ethical behavior.

UNIT II: PLANNING

Managers as Decision Makers- The decision-making process, manager as decision maker, Types of decisions and decision making conditions, styles, biases and errors, decision making in today's world - Foundations of Planning- Meaning of planning, why and how managers plan, establishing goals and developing plans, contemporary issues in planning - Strategic Management-Importance of strategic management, strategic management process, types of organizational strategies, current issues in strategic management.

UNIT III: ORGANIZING

Organizational Structure and Design- Designing organizational structure, Mechanistic and organic structures, Common Organizational Designs - Managing Human Resources HRM importance, HRM process, HR planning, recruitment and decruitment, selection, Employee training, Employee Performance Management, Compensation and Benefits, Contemporary issues in HRM - Managing Teams- Understanding Groups, Explaining Work Group Behavior, Turning Groups into Effective Teams, and Current Challenges in Managing Teams - Managing Change and Innovation- Forces for change, two views of the change process, managing organizational change, contemporary issues in managing change, stimulating innovation.

UNIT IV: LEADING

Managers and Communication- Meaning of communication, functions of communication, Inter-personal communication, organizational communication, understanding information technology, communication issues in today's organizations - Motivating Employees- Basics of motivation, early theories of motivation, contemporary theories of motivation, and current issues in motivation - Managers as Leaders - Leaders and Leadership, Early leadership theories, contingency theories of leadership, contemporary views of leadership, leadership issues in the twenty first century.

UNIT V: CONTROLLING

Introduction to Controlling - Basics, importance and process of control, controlling for organizational performance, tools for controlling: feed-forward, concurrent and feedback controls, contemporary issues in control - Managing Operations-What and why of Operations Management, Strategic Role of Operations Management, Value Chain Management and its goal requirements, current issues - Functional Areas of Management- 1. Marketing management 2.Financial management.

Course Outcomes:

At the end of the course, students will able to

1. Understand the various concepts, approaches and theories of management in the real situation.
2. Analyse the concept of planning and apply on the decisions in strategic management.
3. Compare organization structure designs and chart diligently with theoretical learning concepts.
4. Apply communication and theories of motivation in an organization.
5. Understand various tools for controlling organizational performance and apply to achieve the corporate objectives**.**

Text Book:

Stephen P. Robbins, Mary Coulter "Management", Pearson Education, 2010, 10th edition.

References:

1. Gary Dessler, “Management”, Prentice Hall, Inc., 1998, 1st edition.
2. Daft Richard L. ‘Management’ Thomson South Western, 5th edition.
3. Koontz H. and Weihrich H., "Essentials of Management", McGraw Hill Int. ed., 2004, 6th edition.

Mode of Evaluation: Assignment, Seminar, Written Examination.

B.Tech. II Year II Semester

14EEE106 ELECTROMAGNETIC THEORY

L	T	P	C
3	1	0	3

Course Prerequisite: 14PHY12T01& 14EEE12T01

Course Description:
This course is designed to provide basic understanding on electrical and electronic engineering. The course material can be used as a starting point for further study in individual disciplines or topics. This need will come for electrical or electronic students at a later stage in their carrier growth. The concept of field is at the heart of Physics with applications in many branches of Science and Engineering. In Physics-II, which is the second of the two core level physics courses, this concept is introduced through a study of electricity and magnetism with requisite mathematical rigor.
Course covers vector algebra, electrical field intensity, gauss's law, Maxwell's equations, Poisson's equations ,conductors, dielectrics, polarization, biosaverts law ,magnetic field intensity, scalar magnetic potential, vector magnetic potential ,Neumann's formulae, self inductance, mutual inductance ,time varying fields, Pointing Theorem

Course Objectives:
1. To understand the basics knowledge of electromagnetic.
2. To estimate the Electric field intensity, potential and capacitance for different configurations and for different charge distributions.
3. To understand the dipole and dipole moment, torque on dipole in the electric field and behavior of conductors, insulators in electric field.
4. To analyze the Maxwell's equations, neumenns formula

UNIT I: VECTOR ALGEBRA
Gradient, divergence and curl, Line, surface and volume integrals, Curvilinear co-ordinates, Dirac Delta Function, Theory of Vector Fields

UNIT II: ELECTRO STATICS AND CONDUCTORS
Electrostatic fields, Electric potential, work and energy in electrostatics**,** Conductors, induced charges, Capacitors

UNIT III: SPECIAL MATHEMATICAL TECHNIQUES AND POLARIZATION
Laplace's equation, First Uniqueness theorem, Method of images, multipole expansion, Polarization, bound charges, electric displacement, Linear Dielectrics

UNIT IV: MAGNETO STATICS
Lorentz force law, Biot-Savart law, Ampere's law, Magnetic Vector potential, Magnetization, the field of a magnetized object, Ampere's law in magnetized materials, Magnetic susceptibility and permeability, Ferromagnetism

UNIT V: ELECTRO DYNAMICS

Electromotive force, Ohm's law, Electromagnetic Induction, Faraday's law, Maxwell's equations, Boundary conditions, Wave Equation.

Course Outcomes:

At the end of the course, students will able to

1. Estimate the Electric field intensity, potential and capacitance for different configurations and for different charge distributions.
2. Explain the all Maxwell's equations.
3. Find force on a current element in magnetic field and magnetic, electric dipole and dipole moments.
4. Explain the properties and limitations of the scalar and vector magnetic potential.
5. Analyze faraday's laws of electromagnetic induction.

Text Book:

Introduction to Electrodynamics, David J.Griffiths, Third Edition, Pearson Education Inc., 1999.

Reference:

Physics, Vol. 2, David Halliday, RobertResnick and Kenneth S.Krane, Fifth edition, John Wiley & Sons, Inc., 2002.

Mode of Evaluation: Assignment, Written Examination

B.Tech. II Year II Semester

14EEE107 MICROPROCESSORS AND INTERFACING

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE104 & 14EEE105

Course Description:
This course facilitates the students to familiar with Micro Processor (MP) based system design which includes hardware, software and interfacing. After completing this course, the student should be able to design a complete Microprocessor based system for a real-world application.
Course covers the introduction to basic digital devices and microcomputer components, Architecture and programming of 8086 Microprocessors, Interrupts, peripheral interfacing and direct memory access.

Course Objectives:
1. To study the Architecture of 8086 Microprocessor.
2. To study the addressing modes & instruction set of 8086.
3. To introduce the need & use of Interrupt structure 8086.
4. To develop skill in simple applications development with programming 8086.
5. To introduce commonly used peripheral / interfacing

UNIT I: INTRODUCTION
Prelude, Number systems, Basic digital devices, Micro-computer components, Component communication, Bus concept, Typical instruction execution cycle.

UNIT II: 8086 PROCESSOR
80x86 Architecture, Addressing modes, Assembly language programming, Assembly directives, Data and program control instructions, Arithmetic and Logical instructions, String instructions, Procedures.

UNIT III: INTERRUPTS
Interrupts, Interrupt types, Vector tables, Event management with interrupts, Priority Schemes, Memory & I/O Interfacing, Odd and even banks, Hardware architecture 8086, Instruction Cycle, Machine cycles, T- states, wait states, Complete hardware design example.

UNIT IV: PERIPHERAL INTERFACING
8255 – Parallel interface, 8254- Programmable timer interface, 8259-Programmable interrupt controller interface, Analog to digital conversion. ADC interface

UNIT V: DIRECT MEMORY ACCESS
Direct memory access concept, 8237-DMA interface, Case study -1&2, Tools-logic analyzer, emulator, Advances

Course Outcomes:

At the end of the course, students will able to

1. Write assembly language program for basic mathematical and logical operations.
2. Explain the interrupts of 8086 microprocessor.
3. Explain the 8086 based system with programmable peripheral interface, programmable timer interface and Programmable interrupt controller interface.
4. Summarize the concept of peripheral / interfacing.
5. Analyze the 8086 based system with DMA.

Text Book:

Brey Barry B. & C R Sarma The Intel Microproc,: Arch, Prog. & Interfacing Pearson Edu.,8thEdition, 2008

References:

1. The x86 processors, Architecture, programming and interfacing. Lyla B Das, Pearson 2010
2. Morris Mano, Digital Design ,PHI, EE edition
3. 8086_family_Users_Manual, Intel Corporation.

Mode of Evaluation: Assignment, Written Examination

B.Tech. II Year II Semester

14EEE108 CONTROL SYSTEMS

L	T	P	C
3	1	0	3

Course Prerequisite: 14MAT11T01 & 14MAT103

Course Description:

Feedback automatic control systems are an essential feature of numerous industrial processes, scientific instruments and even commercial, social and management situations. A thorough understanding of the elementary principles of this all embracing technology is of great relevance for all engineers and scientists. This course tries to bring out the basic principles of Feedback Control Systems.

Course covers modeling of various physical systems, block diagram reduction techniques, signal flow graph, time domain analysis of continuous systems, role of different controllers, bode plot, Nyquist criterion, lag,lead and lag-lead compensators design using bode plot and root locus, Routh stability criterion, state space representation of continuous systems.

Course Objectives:

1. To understand the use of transfer function models for analysis physical systems and introduce the control system components.
2. To provide adequate knowledge in the time response of systems and steady state error analysis.
3. To accord basic knowledge in obtaining the open loop and closed–loop frequency responses of systems.
4. To introduce stability analysis and design of compensators
5. To introduce state variable representation of physical systems and study the effect of state feedback

UNIT I: SYSTEM MODELING

System and their types- system representation- Analogy between electric and mechanical systems- modeling of Armature and Field controlled DC motor- Synchros-Thermal systems- Block diagram reduction technique- Signal flow graph.

UNIT II: TIME DOMAIN ANALYSIS

Step Response - Impulse Response - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Effect of adding poles and zeros in a system- Steady state response - Steady state errors and error constants – Effects of proportional, integral, derivative Controllers, Design of P, PD, PI, PID Controllers.

UNIT III: FREQUENCY DOMAIN ANALYSIS

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots- Phase margin and Gain margin-Stability Analysis. Compensation techniques – Lag, Lead, Lead-Lag Compensators design in frequency Domain.

UNIT IV: STABILITY ANALYSIS IN FREQUENCY DOMAIN

The concept of stability – Routh's stability criterion – Stability and conditional stability – limitations of Routh's stability. The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci- Compensation techniques – Lag, Lead, Lead-Lag Compensators design in frequency Domain using root locus.

UNIT V: STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, derivation of state models from Schematic models, differential equations, Transfer function, block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties. System response through State Space models.

Course Outcomes:

At the end of the course, students will able to

1. Explain the use of transfer function models for analysis physical systems and introduce the control system components.
2. Analyze the time response of systems and estimate the steady state error.
3. Examine the open loop and closed–loop frequency responses of systems.
4. Design the compensators.
5. Explore the state variable representation of physical systems and study the effect of state feedback.

Text Books:

1. Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 5th edition, 2010.
2. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 5th edition, 2007.

References:

1. Control Systems Engineering - by NISE 5th Edition – John wiley& sons, 2010.
2. Modern Control systems – by Dorf, R. C., and Bishop, R. H., Addison Wesley, 7thedition, 1995.
3. Control Systems by A. NagoorKani- First Edition RBA Publications, 2006.
4. Automatic Control Systems– by B. C. Kuo and FaridGolnaraghi – John wiley and sons, 8th edition, 2003.

Mode of Evaluation: Assignment, Written Examination

B.Tech. II Year II Semester

14EEE109 ANALOG ELECTRONICS

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE104 & 14EEE105

Course Description:
This course aims to introduce the students to operational amplifiers and its usage in Electronic devices. This course covers introduction to operational amplifiers, linear and non-linear applications of operational amplifier, waveform generation, Timer 555 based circuits and Analog and Digital interface circuits.

Course Objectives:
1. To deal with various electronic techniques and building blocks used in analog signal processing.
2. To study discrete and integrated electronic circuits.
3. To impart practical know-how in the usage of analaog electronic circuits.

UNIT I: INTRODUCTION
Fundamental Concepts**:** Introduction, Basic Laws, Circuit Theorems and Devices, Circuit analysis and Design.
Op-amp Basics**:** Op-amp symbols, circuits and characteristics, Ideal Op-amp, Basic configuration of Op-amp, Practical Op-amp and PSPICE models of op-amp.
Special Purpose Linear Op-amp circuits**:** Instrumentation Amplifier, Isolation Amplifier, Programmable Gain Amplifier, Negative feedback Amplifiers

UNIT II: NONLINEAR OP-AMP CIRCUITS
Nonlinear Op-amp circuits: Logarithmic Amplifiers, Analog Multipliers, Applications of Analog Multipliers, Precision Circuits, Comparators and Schmitt Triggers, Timers, Analog Switch, Sample-and-hold circuits, Analog Multiplexers.

UNIT III: SIGNAL GENERATORS AND VOLTAGE REGULATION
Signal Generators: Introduction, sinusoidal oscillators, Non- sinusoidal oscillators, Integrated Circuit Timers, Function Generators and Phase Locked Loop.
Voltage Regulators: Introduction, Performance measures of voltage regulators, Voltage Regulator Circuits and ICs.

UNIT IV: ACTIVE FILTERS & SPECIAL PURPOSE AMPLIFIERS
Active Filters: Basic Theory of filters, Realization of Active filters, IC filters.
Integrated Circuit Power Amplifiers**:** Introduction, Power amplifiers, CMOS power amplifiers, IC Power amplifiers. High Frequency Amplifiers: Introduction, Cascode Amplifiers, High speed High frequency Op-amps, Tuned Amplifiers.

UNIT V: DATA CONVERTERS& APPLICATIONS

Data Converters: Introduction, Digital-to-Analog converters, Analog-to-Digital converters, Data converter ICs, PSPICE simulation.

IC Sensors: Introduction, Evaluation of sensors and MEMS, Classification of sensors, Introduction to MEMS, Typical IC sensors.

Course Outcomes:

At the end of the course, students will able to

1. Explain the basic configuration and operation of Op-amp.
2. Analyze the various Nonlinear Op-amp circuits.
3. Illustrate the operation of signal generators and voltage regulator.
4. Analyze the Active Filters and special purpose amplifiers.
5. Verify the data converters and explain the applications of IC sensors.

Text Books:

1. L.K. Maheshwari, Analog Electronics, PHI, 2005
2. L.K. Maheshwari and M.M.S. Anand, Laboratory Experiments & PSPICE Simulation in Analog Electronics Experiments, PHI, 2005.

Reference:

A.S. Sedra, K.C. Smith, Microelectronic Circuits, 5th Ed., Oxford, 2004

Mode of Evaluation: Assignment, Written Examination

B.Tech. II Year II Semester

14EEE203 MICROPROCESSOR & INTERFACING PRACTICALS

L	T	P	C
0	0	3	2

Course Prerequisite: 14EEE104 & 14EEE105

Course description:
This course provides exposure to microprocessor and it's interfaces.

Course Objectives:
1. To gain hands on experience in testing assembly language programs on 8086 microprocessor.
2. To study serial communication on 8086 microprocessor system.
3. To study various interfaces for 8086 microprocessor based systems.

LIST OF EXPERIMENTS
1. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.
2. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
3. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting,
4. Inserting, Deleting, Length of the string, String comparison.
5. Reading and Writing on a parallel port.
6. Timer in different modes.
7. Serial communication implementation.
8. 8259 – Interrupt Controller: Generate an interrupt using 8259 timer.
9. 8279 – Keyboard Display: Write a small program to display a string of characters.
10. Traffic Controller Interface
11. ADC & DAC Interface
12. 8255- Interface
13. 8251- UART Interfacing

Course Outcomes:
At the end of the course, students will able to
1. Write assembly language program for basic mathematical and logical operations.
2. Write assembly language program for string operations.
3. Write assembly language program for interfacing peripherals with 8086.
4. Evaluate the analog to digital and digital to analog converters with 8086 based systems.
5. Analyze the different modes of Timer.

Equipment required for Laboratory:

1. 8086 μP Kits
2. 8051 Micro Controller kits
3. Interfaces/peripheral subsystems
   a) 8259 PIC
   b) 8279-KB/Display
   c) 8255 PPI
4. 8251 USART
5. ADC Interface
6. DAC Interface
7. Traffic Controller Interface
8. Elevator Interface

Mode of Evaluation: Practical, Written Examination

B.Tech. II Year II Semester

14EEE204 ELECTRICAL MACHINES PRACTICALS

L	T	P	C
0	0	3	2

Course Prerequisite: 14EEE103

Course Objectives:

1. To conduct various test on Transformer.
2. To analyze the Open circuit and load. Characteristics of DC separately and self-excited shunt generator.
3. To conduct and analyze the load test on DC shunt, series and compound motors.
4. To draw the equivalent circuit of single phase induction motor.
5. To estimate the regulation of alternator.

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LIST OF EXPERIMENTS

1. Scott connection.
2. Sumpners test on transformer.
3. OC and SC test of single phase Transformer.
4. Open circuit and load characteristics of D.C. separately and self excited shunt generator
5. Load test on DC shunt, series and compound motors.
6. Hopkinson's test.
7. Swinburne's test and Speed control on DC Motor.
8. V and Inverted V curves of Three Phase Synchronous Motor.
9. Equivalent circuit of single phase induction motor
10. OC and Blocked rotor test and Load test on squirrel cage induction motor.
11. Separation of no load losses of three phase induction motors
12. Regulation of three phase alternator by EMF and MMF methods

Course Outcomes:

At the end of the course, students will able to

1. Conduct various test on Transformer.
2. Analyze the Open circuit and load. Characteristics of DC separately and self-excited shunt generator.
3. Conduct and analyze the load test on DC shunt, series and compound motors.
4. Draw the equivalent circuit of single phase induction motor.
5. Estimate the regulation of alternator.

Mode of Evaluation: Practical, Written Examination

B.Tech. III Year I Semester

14EEE110 OBJECT ORIENTED PROGRAMMING

L	T	P	C
3	1	0	3

Course Prerequisite: 14CSU12T01

Course Description:
Basics of Object Oriented Programming - objects, classes, polymorphism, inheritance, static and dynamic binding. Object Oriented Programming using Java-classes, interfaces, inheritance, polymorphism, method dispatch, features for encapsulation and modularity.

Course Objectives:
1. Study the syntax, semantics and features of Java Programming Language
2. Learn the method of creating Multi-threaded programs and handle exceptions
3. Learn Java features to create GUI applications & perform event handling
4. Learn basics of Java Design Patterns

UNIT I: INTRODUCTION TO OOP CONCEPTS
Introduction to Object Oriented Programming, Java Programming Basics, Sample programs, Data types and operators, Control statements, Arrays, Strings, String Handling.

UNIT II: CLASSES, INHERITANCE AND PACKAGES
Classes: Classes, Objects, Methods, Constructors, This and static keywords, Method and Constructor Overloading, Access modifiers, Polymorphism.
Inheritance: Basics, Usage of Super, Multi level hierarchy, Method overriding, Abstract class, Final keyword.
Packages: Defining, Finding and Importing packages, Member Access. **Interfaces:** Creating, Implementing, Using, Extending, and Nesting of interfaces.

UNIT III: EXCEPTION HANDLING & MULTI-THREADING
Exception Handling: Fundamentals, Types, Multiple catch clauses, Nested try blocks, Thrown Class, Using Finally and Throws, Built-in exceptions, User-defined exceptions. **Multi-threading:** Thread Class, Runnable interface, creating multiple threads, life cycle of thread, thread properties, synchronization, thread communication, suspending, resuming and stopping threads.

UNIT IV: APPLETS & SWINGS
Applets: Basics, Architecture, Skeleton, Initialization and termination, Repainting, Status window, passing parameters.
Swings: Origins of Swings, Swing is Built on the AWT, Features, MVC Connection, Components and Containers, Layout managers, event handling.

UNIT V: SWING PACKAGES & DATABASE ACCESS

Swing Packages – J Label and Image Icon**,** J Text Field, Swing Buttons, J Table Pane, J Scroll Pane, J List, J Combo Box, Trees, J Table

Networking: Basics, Networking classes and interfaces

Database Access: Database Access, Database Programming using JDBC Studying Javax.sql.* Package, JDBC ODBC Connectivity

Course Outcomes:

At the end of the course, students will able to

1. Ability to solve problems using object oriented approach and implement them using Java.
2. Ability to write Efficient programs with multitasking ability and handle exceptions Create user friendly interface.
3. Ability to develop GUI Components.
4. Ability to develop Application Projects.
5. Explain the Basics, Networking classes and interfaces.

Text Book:

The complete Reference Java, 7thEdition, Herbert Schildt, Tata McGraw Hill Publishing

References:

1. "Programming with Java" T.V.Suresh Kumar, B.Eswara Reddy, P.Raghavan
2. Pearson Edition.
3. "Java – How to Program", Paul Deitel, Harvey Deitel, PHI.
4. "Core Java", NageswarRao, Wiley Publishers.
5. "Thinking in Java", Bruce Eckel, Pearson Education.
6. "A Programmers Guide to Java SCJP", Third Edition, Mughal, Rasmussen,Pearson. 6:"Head First Java", Kathy Sierra, Bert Bates, O.Reilly
7. "SCJP – Sun Certified Programmer for Java Study guide" – Kathy Sierra, Bert Bates, McGrawHill

Mode of Evaluation: Assignment, Written Examination

B.Tech. III Year I Semester

14EEE111 ELECTRICAL MEASUREMENTS & INSTRUMENTATION

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE12T01 & 14EEE105

Course Description:
This course introduces the basic principles of all measuring instruments. It deals with the principle and operation of voltage, current, power factor, power and energy meters. It also covers the digital storage oscilloscope, digital meters, active transducers, passive transducers, piezoelectric transducers and RTD.

Course Objectives:
1. To learn basic principles of all measuring instruments.
2. To enumerate the voltage, current, power factor, power and energy meters.
3. To analyze the digital storage oscilloscope and digital meters.
4. To understand the active and passive transducers.

UNIT I: MEASURING INSTRUMENTS & INSTRUMENT TRANSFORMERS
Classification – Deflecting, control and damping torques – Ammeters and Voltmeters – PMMC – Dynamometer – MI instruments – Errors and compensations – Calibration – Extension of range using shunts and series resistance – CT and PT – Ratio, phase angle errors and design considerations for CT and PT.

UNIT II: POWER FACTOR METERS & MEASUREMENT OF POWER AND ENERGY
Power factor meters: Dynamometer and moving iron type – Single-phase and three-phase meters.
Power measurement: Single-phase dynamometer wattmeter – LPF wattmeter – Double element and three element dynamometer wattmeter.
Measurement of Energy: Single-phase induction type energy meter – Driving and braking torques – Errors and compensations – Three-phase energy meter.

UNIT III: POTENTIOMETERS & BRIDGES
Principle and operation of D.C. Crompton's potentiometer – Standardization – Measurement of unknown resistance, current and voltage – A.C. Potentiometers: polar and coordinate type's – Standardization – Applications – Methods of measuring low, medium and high resistance – Wheatstone's bridge – Kelvin's double bridge – Loss of charge method – Measurement of inductance – Maxwell's bridge – Anderson's bridge – Measurement of capacitance and loss angle – De Sauty bridge – Schering Bridge – Wien's bridge.

UNIT IV: DIGITAL STORAGE OSCILLOSCOPE & DIGITAL METERS
DSO: Digital storage oscilloscope – Digital phosphor oscilloscope – Controls of an oscilloscope – Types of probes – Loading – Measurement effects.

Digital meters: Digital voltmeter – Successive approximation, ramp and integrating type – Digital frequency meter – Digital multi-meter – Q-meter.

UNIT V: TRANSDUCERS

Definition of transducers – Classification of transducers – Characteristics and choice of transducers – Principle and operation of resistive, inductive, and capacitive transducers – LVDT and its applications – Strain Gauge – Thermistors – Thermocouples – RTD – Piezo electric transducers – Photo Conductive Cells – Photo Diodes.

Course Outcomes:

At the end of the course, students will able to

1. Describe basic requirements and the concepts of electrical measuring instruments and instrument transformers.
2. Measure the energy and power through energy meter and wattmeter.
3. Measure the resistance, inductance, capacitance and frequency.
4. Explain the principle and operation of DSO and digital meters.
5. Exhibit the classification and working of transducers.

Text Books:

1. Electrical Measurements and measuring Instruments by E.W. Golding and F.C. Widdis, 5thEdition, Reem Publications.
2. Electrical & Electronic Measurement & Instruments by A.K.Sawhney,DhanpatRai& Co. Publications.
3. Electrical & Electronic Measurement & Instrumentation by R. K. Rajput, 2nd Edition, S. Chand& Co.
4. Electronic Instrumentation by H. S. Kalsi, Tata McGrawhill, 3rd Edition.

References:

1. Electrical Measurements by Buckingham and Price, Prentice–Hall.
2. Electrical Measurements: Fundamentals, Concepts, Applications by Reissland, M.U, New AgeInternational (P) Limited, Publishers.

Mode of Evaluation: Assignment, Written Examination

B.Tech. III Year I Semester

14EEE112 POWER SYSTEMS

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE12T01, 14EEE103 & 14EEE106

Course Description:
This course aims at introducing the students to the basic features of the modern power systems, analysis and operation under steady state and transient conditions.
This course covers modeling of the transmission lines (short, medium and long) generator and transformer, corona, cables, load flow studies, symmetrical and unsymmetrical fault analysis, power system stability, automatic generation and voltage control

Course Objectives:
1. To impart knowledge of transmission line parameters
2. To know the Classification of Transmission Lines and analyze the performance of transmission lines.
3. To mechanical design of transmission line and cables.
4. To study the various kind of faults in transmission lines
5. To understand the concept of power system stability.

UNIT I: TRANSMISSION LINE PARAMETERS
Types of Conductors – ACSR, Bundled and Standard Conductors- Resistance For Solid Conductors – Skin Effect- Calculation of Inductance for Single Phase and Three Phase, Single and Double Circuit Lines, Concept of GMR&GMD, Symmetrical and Asymmetrical Conductor Configuration with and without Transposition, Capacitance Calculations for Symmetrical and Asymmetrical Single and Three Phase, Single and Double Circuit Lines, Effect of Ground on Capacitance.

UNIT II: PERFORMANCE OF TRANSMISSION LINES
Classification of Transmission Lines - Short, Medium and Long Line and Their Exact Equivalent Circuits-Nominal-T, Nominal-Pie.Mathematical Solutions to Estimate Regulation and Efficiency of All Types ofLines. Long Transmission Line-Rigorous Solution, Evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations – Surge Impedance and Surge Impedance Loading - Wavelengths and Velocity of Propagation – Ferranti Effect , Charging Current-Numerical Problems.

UNIT III: MECHANICAL DESIGN OF TRANSMISSION LINES AND CABLES
Overhead Line Insulators: Types of Insulators, String Efficiency and Methods for Improvement, Capacitance Grading and Static Shielding. Corona: Corona Phenomenon, Factors Affecting Corona, Critical Voltages and Power Loss, Radio Interference. Sag and Tension Calculations: Sag and Tension Calculations with Equal and Unequal Heights of Towers, Effect of Wind and Ice on Weight of Conductor, Stringing Chart and Sag Template and Its Applications. CABLES: Types of Cables, Construction, Types of Insulating Materials, Calculations of Insulation Resistance and Stress in Insulation, Numerical Problems. Capacitance of Single and 3-Core Belted Cables, Grading of Cables - Capacitance Grading, Numerical Problems, Description of Inter-Sheath Grading.

UNIT IV: FAULT ANALYSIS

Per-Unit System of Representation, Y Bus formulation, Gauss – Siedel& Newton Raphson Method, fast decouple method, Per-Unit Equivalent Reactance Network of a Three Phase Power System, Symmetrical Fault Analysis: Short Circuit Current and MVA Calculations, Fault Levels, Application of Series Reactors, Symmetrical Component Transformation, Positive, Negative and Zero Sequence Components of Voltages, Currents and Impedances. Sequence of Positive, Negative and Zero Networks, Unsymmetrical Fault Analysis: LG, LL, LLG faults with and without Fault Impedance.

UNIT V: POWER SYSTEM STABILITY ANALYSIS

Elementary Concepts of Steady State, Dynamic and Transient Stabilities. Description of: Steady State Stability Power Limit, Transfer Reactance, Synchronizing Power Coefficient, Power Angle Curve and Determination of Steady State Stability and Methods to Improve Steady State Stability. Derivation of Swing Equation.Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation. Solution of Swing Equation by 4th Order Range – Kutta Method (up to 2 iterations) - Methods to improve Stability - Application of Auto Reclosing and Fast Operating Circuit Breakers.

Course Outcomes:

At the end of the course, students will able to

1. Explain the various transmission line parameters and its importance
2. Classify the transmission Lines and analyze the performance of transmission lines.
3. Design the transmission line and cables.
4. Analyze the various kind of faults in transmission lines
5. Explain the concept of power system stability.

Text Books:

1. NagrathI.J. and Kothari D.P., 'Modern Power System Analysis', Tata McGraw-Hill, Fourth Edition, 2011.
2. John J. Grainger and W.D. Stevenson Jr., 'Power System Analysis', Tata McGraw-Hill, Sixth reprint, 2010.
3. P. Venkatesh, B.V. Manikandan, S. Charles Raja, A. Srinivasan, 'Electrical Power Systems-Analysis, Security and Deregulation', PHI Learning Private Limited, New Delhi, 2012.

References:

1. J. Duncan Glover, Mulukutla S. Sarma, Thomas J. Overbye, ' Power System Analysis & Design', Cengage Learning, Fifth Edition, 2012.
2. HadiSaadat, 'Power System Analysis', Tata McGraw Hill Education Pvt. Ltd., New Delhi, 21st reprint, 2010.
3. Kundur P., 'Power System Stability and Control, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 10th reprint, 2010.
4. Pai M A, 'Computer Techniques in Power System Analysis', Tata McGraw-Hill Publishing Company Ltd., New Delhi, Second Edition, 2007.

Mode of Evaluation: Assignment, Written Examination

B.Tech. III Year I Semester

14EEE113 POWER ELECTRONICS

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE12T01 & 14EEE105

Course Description:
This course aims to cover the basics of power semiconductor devices and operational behavior of various power electronic components.
This course covers power semiconductor devices and their characteristics, Single phase half wave controlled rectifier, Single phase and three phase dual converters, step-down chopper buck, boost, buck-boost, cuk, full-bridge converters, inverters, voltage controllers, cyclo converters and static switches.

Course objectives:
1. To get an overview of different types of power semiconductor devices and their switching characteristics.
2. To understand the operation, characteristics and performance parameters of controlled rectifiers
3. To study the operation, switching techniques and basics topologies of DC-DC switching regulators.
4. To learn the different modulation techniques of pulse width modulated inverters and to understand harmonic reduction methods.
5. To study the operation of AC voltage controller and various configurations.

UNIT I: POWER SEMICONDUCTOR DEVICES
Power semiconductor devices their symbols and static characteristics, Characteristics and specifications of switches, types of power electronic circuits operation, steady state and switch characteristics & switching limits of Power Transistor Operation and steady state characteristics of Power MOSFET and IGBTThyristor – Operation V- I characteristics, two transistor model, methods of turn-on Operation of GTO, MCT and TRIAC.

UNIT II: PHASE CONTROLLED CONVERTERS
Single phase half wave controlled rectifier with resistive and inductive loads, effect of freewheeling diode. Single phase fully controlled and half controlled bridge converters, Performance Parameters Three phase half wave converters, Three phase fully controlled and half controlled bridge converters, Effect of source impedance, Single phase and three phase dual converters, Numerical problems.

UNIT III: DC-DC CONVERTERS
Principles of step-down chopper, step down chopper with R-L load Principle of step-up chopper, and operation with RL load, classification of choppers, operation and design issues of buck, boost, buck-boost, cuk, full-bridge converters

UNIT IV: INVERTERS

Types of Inverters, Bridge Inverters, Voltage Source Inverters (VSI), Pulse Width Modulated Inverters, Current Source Inverter AC Voltage Controllers: Types of AC Voltage Controllers, AC Phase Voltage Controllers, Single-Phase Voltage Controller with R-L Load, Harmonic Analysis of Single-Phase Full-Wave Controller with R-L Load

UNIT V: CYCLOCONVERTER & STATIC SWITCHES

Types of Cycloconverter, Single-Phase Cycloconverter, Three-Phase Cycloconverter, speed control of AC motors, operation and design of static switches and relays

Course Outcomes:

At the end of the course, students will able to

1. Explain the different types of power semiconductor devices and their switching characteristics.
2. Analyze the operation, characteristics and performance parameters of controlled rectifiers.
3. Analyze the operation, switching techniques and basics topologies of DC-DC switching regulators.
4. Classify the modulation techniques of pulse width modulated inverters and to understand harmonic reduction methods.
5. Explain the operation of AC voltage controller and various configurations.

Text Books:

1. N. Mohan, T. M. Undeland, and W. P. Robbins, Power Electronics: Converters, Applications, and Design, John Wiley & Sons Inc. 2003, third edition.
2. P.S.Bimbra "Power Electronics" Khanna Publishers, third Edition, 2003.
3. L. Umanand, "Power Electronics Essentials and Applications", Wiley, 2010.

References:

1. Muhammad H Rashid: "Power Electronics: Circuits, Devices, and Applications", 3rd Edition; Pearson
2. P. C. Sen, "Power Electronics" TMH – 2nd Edition.

Mode of Evaluation: Assignment, Written Examination

B.Tech. III Year I Semester

14EEE114 SIGNALS & SYSTEMS

L	T	P	C
3	1	0	3

Course Prerequisite: 14MAT12T02, 14MAT103 &14EEE108

Course Description:
This course is a preparatory course in which the basics of signal processing are covered. It deals with the basic transforms used in signal processing & introduces the analog & digital filters. For practical exposure MATLAB based assignments are included. The students are required to have pre-requisite of following mathematical topics: Calculus, Vector analysis, Fourier series, Laplace Transform, Complex variables and Statistics.
Course covers classification of Signals and systems, Fourier series and Fourier transform, Fast Fourier Transform, Sampling theorem, Z transform and inverse Z transform.

Course Objectives:
1. To understand the basic properties of signal & systems and the various methods of classification
2. To learn Laplace Transform & Fourier transform and their properties
3. To know Z transform & DTFT and their properties
4. To characterize LTI systems in the Time domain and various Transform domains

UNIT I: INTRODUCTION TO SIGNALS AND SYSTEMS
Classification of continuous and discrete time Signals & Signal operations, Classification of Systems.Linear convolution, discrete time convolution.

UNIT II: FREQUENCY DOMAIN REPRESENTATION SIGNALS
Fourier series, Fourier Transforms & its properties, Sampling & reconstruction, Discrete Fourier Transform & its properties.

UNIT III: FFT ALGORITHMS
Fast Fourier Transform: DITFFT, DIFFFT algorithm, Inverse DFT& convolution using FFT.

UNIT IV: ANALYSIS OF CONTINUOUS TIME SYSTEMS
Laplace transform & its properties, Response of continuous time systems, Solution of LTI continuous time systems using Laplace transforms, Introduction to analog filters.

UNIT V: ANALYSIS OF DISCRETE TIME SYSTEMS
Z-transforms & its properties, Inverse Z-transforms, System response using Z-transform
Two Port Networks, Attenuators, Introduction to digital filters.

Course Outcomes:

At the end of the course, students will able to

1. Classification and analysis of various properties of signal & systems
2. Analyze the Laplace transform & Fourier transform and their properties
3. Explain the Z-transform & DTFT and their properties
4. Understand the characteristics of LTI systems in the time domain and various transform domains
5. Comparison Fourier transform with Laplace or Z transform

Text Books:

1. Lathi B P, Principles of Signal Processing & Linear Systems Oxford University Press, 2009.
2. Nagrath I J, Sharan S N, RanjanRakesh& Kumar S, Signals & Systems, Second Edition, TMH, 2001.

Reference:

A V Oppenheim, A S Willsky, Nawab S N, "Signals & Systems", PHI, Second Edition, 2006

Mode of Evaluation: Assignment, Written Examination

B.Tech. III Year I Semester

14EEE205 CONTROL SYSTEMS PRACTICALS

L	T	P	C
0	0	3	2

Course Prerequisite: 14EEE108

Course Description:
This course helps the students to know the control system experiments and do the stability analysis using MATLAB software.

Course Objectives:
1. To identify the system model for real time systems
2. To design the controllers and analyze the stability condition of the controlled system.

LIST OF EXPERIMENTS
1. Programmable Logic Controller – Study and Verification of Truth Tables of Logic Gates, Simple Boolean Expressions and Application of Speed Control of Motor.
2. Transfer Function of DC Machine
3. Effect of Feedback on DC Servo Motor
4. Characteristics of AC Servo Motor
5. Effect of P, PD, PI, PID Controller on a Second Order Systems
6. Lag and Lead Compensation – Magnitude and Phase Plot
7. Temperature Controller Using PID
8. Modeling of DC Motor and validation of its characteristics using SIMULINK
9. Effect of Feedback on disturbance & Control System Design using LABVIEW
10. Open Loop and Closed Loop position control of DC Motor using LABVIEW
11. Speed control of DC motor using LABVIEW
12. Stability Analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant System Using MATLAB

Course Outcomes:
At the end of the course, students will able to
6. Execute the truth tables of logic gates, simple Boolean expressions using PLC.
7. Find the transfer function and analyze the characteristics of AC /DC Machine.
8. Design suitable controller for improving transient and steady state response of the given system.
9. Compare open loop and close loop control system using LABVIEW.
10. Analyze the stability of linear time invariant system Using MATLAB.

Mode of Evaluation: Practical, Written Examination

B.Tech. III Year I Semester

14EEE206 ANALOG ELECTRONICS PRACTICALS

L	T	P	C
0	0	3	2

Course Prerequisite: 14EEE109

Course Description:
This course helps the students to design and test electronic amplifiers, oscillators and filters.

Course Objectives:
1. To design amplifier using transistor.
2. To design amplifier using op-amp
3. To design oscillators.
4. To design filters.

List of Experiments:
1. Common Emitter Amplifier
2. High Input Resistance Transistor Amplifier
3. Basic Configuration of Op-amp
4. Study of Feed Back Amplifiers using Op-amp
5. Instrumentation Amplifier
6. Study of Active Filters (Low Pass, High Pass & Band Pass) using Op-amp
7. Precision Circuit
8. Sinusoidal and Non-Sinusoidal Oscillators
9. Integrated Circuit Timer and Phase Locked Loop
10. IC Fixed and adjustable Voltage Regulators
11. Arithmetic Operation using Op-Amp
12. Magnitude comparator and window detector using Op-Amp

Course outcomes:
At the end of the course, students will able to
1. Design and test amplifiers using transistors and op-amps.
2. Design Analog Active filters using op-amps.
3. Design and testing of Sinusoidal and Non-Sinusoidal Oscillators.
4. Verify the Arithmetic Operation using Op-Amp.
5. Design and test the voltage regulated power supply**.**

Mode of Evaluation: Practical, Written Examination

B.Tech. III Year II Semester

14ENG103 SOFT SKILLS

L	T	P	C
2	0	3	3

Course Prerequisite: 14ENG12T02

Course Description:
This course intends and aims to enhance the confidence of the students by exposing them to various situations and contexts they face in their career. It is imperative forEngineering students to start preparing for the ever growing competition in the Job market. This course focuses on the practical aspects of soft skills relevant to the requirements of the prospective employers in view of globalization.

Course Objectives:
1. To expose the students to those soft skills which are crucial to an employee's ability to work smarter.
2. To enhance Art of Communication, Team Skills, Presentation & GD handling skills and preparing resume &Interview Skills.

UNIT I:
Verbal Communication - Effective Communication - Active listening - Paraphrasing - Feedback
Non Verbal Communication - Body Language - Greetings, Introductions, Small Talk.

UNIT II:
Self Enhancement - Importance of developing assertive skills- developing self-confidence – developing emotional intelligence - Importance of Team work – Team vs. Group - Attributes of a successful team – Barriers involved working with Groups – Dealing with People- Group Decision Making - Leadership skills- Empathy, self-realization(Identifying strengths and weaknesses), Motivation.

UNIT III:
Presentation Skills – Stages involved in an effective presentation – selection of topic, content, aids – Engaging the audience – Time management – Mock Presentations & Feedback - GD skills – Understanding the objective and skills tested in a GD – General types of GDs – Roles in a GD – Do's & Don'ts – Mock GD & Feedback.

UNIT IV:
Types of Resumes – Resume preparation- Tips in writing resume - Interview handling Skills – Self preparation checklist – Grooming tips: do's & don'ts – mock interview & feedback - Goal setting.

UNIT V:
Grooming etiquette – Telephone etiquette – E-mail etiquette, Professional electronic communication – Dining etiquette – Do's & Don'ts in a formal setting – How to impress.

Course Outcomes:

1. Communicate effectively and enhance their interpersonal relationship building skills with renewed self-confidence.
2. Work together in teams and accomplish objectives in a cordial atmosphere.
3. Face presentations and Group Discussions
4. Prepare resume and face interviews.
5. Develop the etiquette necessary to present oneself in a professional setting.

Text Book:

"Soft Skills". Dr K Alex. S Chand Publications, New Delhi

References:

1. The Seven Habits of Highly Effective People by Stephen R. Covey, Covey Leadership Center, 2005.
2. Negotiate to Close by Gary Karnass, Simon and Schuster, 1987.
3. The greatest miracle in the world – OgMandino, Random House Publishing Group, 2009.
4. Working with Emotional Intelligence - Daniel Goleman, A&C Black, 2009.
5. Developing Communication Skills by Krishna Mohan and MeeraBanerji; MacMillan India Ltd., Delhi, 2000.
6. Essentials of Effective Communication, Ludlow and Panthon; Prentice Hall of India, 1993.
7. Effective Presentation Skills (A Fifty-Minute Series Book) by Steve Mandel, Crisp Publications, 1996.
8. "Strategic interviewing" by Richaurd Camp, Mary E. Vielhaber and Jack L. Simonetti – Published by Wiley India Pvt. Ltd, 2007.
9. "Effective Group Discussion: Theory and Practice" by Gloria J. Galanes, Katherine Adams, John K. Brilhart, Tata McGraw-Hill, 2010.

Mode of Evaluation: Written Examination, Day-to-day Assessment

B.Tech. III Year II Semester

14EEE115 SPECIAL ELECTRICAL MACHINES

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE103

Course Description:

This course aims to give the exposures towards special electrical machines such as stepper motor, variable reluctance motor, switched reluctance motor, permanent magnet synchronous motor and permanent magnet DC motor.

Course Objectives:

1. To impart knowledge on Construction, principle of operation and performance of synchronous reluctance motors.
2. To impart knowledge on the Construction, principle of operation, control and performance of stepping motors.
3. To impart knowledge on the Construction, principle of operation, control and performance of switched reluctance motors.
4. To impart knowledge on the Construction, principle of operation, control and performance of permanent magnet brushless D.C. motors.
5. To impart knowledge on the Construction, principle of operation and performance of permanent magnet synchronous motors.

UNIT I: STEPPER MOTOR

Constructional features – Types – hybrid stepping motor – Operating principles – very slow speed synchronous motor for servo control- different configurations for switching the phase windings-control circuits for stepping motor-open loop controller for a 2-phase stepping motor

UNIT II: VARIABLE RELUCTANCE STEPPER MOTOR

Constructional features – Principle of operation – Variable reluctance motor – Single and multi stack configurations – open loop & closed loop control of 3-phase VR step motor-Torque equations – Modes of excitation – Characteristics – Drive circuits – Microprocessor control of stepper motors – Closed loop control–Applications.

UNIT III: SWITCHED RELUCTANCE MOTORS

Constructional features – Rotary and Linear SRM - Principle of operation – Torque production –
Steady state performance prediction- Analytical method -Power Converters and their controllers – Methods of Rotor position sensing – Sensor less operation – Characteristics and Closed loop control– Applications.

UNIT IV: PERMANENT MAGNET BRUSHLESS D.C. MOTORS

Permanent Magnet materials – Minor hysteresis loop and recoil line-Magnetic Characteristics – Permeance coefficient -Principle of operation – Types – Magnetic circuit analysis – EMF and torque equations –Commutation - Power Converter Circuits and their controllers – Motor characteristics and control– Applications.

UNIT V: PERMANENT MAGNET SYNCHRONOUS MOTORS

Principle of operation – Ideal PMSM – EMF and Torque equations – Armature MMF – Synchronous Reactance – Sine wave motor with practical windings - Phasor diagram – Torque/speed characteristics - Power controllers - Converter Volt-ampere requirements Applications.

Course Outcomes:

At the end of the course, students will able to

1. Analyze the Construction, principle of operation, control and performance of stepper motors.
2. Analyze the Construction, principle of operation and performance of variable reluctance stepper motors.
3. Analyze the Construction, principle of operation, control and performance of switched reluctance motors.
4. Analyze the Construction, principle of operation, control and performance of permanent magnet brushless D.C. motors.
5. Analyze the Construction, principle of operation and performance of permanent magnet synchronous motors.

Text Books:

1. K.Venkataratnam, 'Special Electrical Machines', Universities Press (India) Private Limited, 2008.
2. T.J.E. Miller, 'Brushless Permanent Magnet and Reluctance Motor Drives', Clarendon Press, Oxford, 1989.
3. T. Kenjo, 'Stepping Motors and Their Microprocessor Controls', Clarendon Press London, 1984.

References:

1. R.Krishnan, 'Switched Reluctance Motor Drives – Modeling, Simulation, Analysis, Design and Application', CRC Press, New York, 2001.
2. P.P. Aearnley, 'Stepping Motors – A Guide to Motor Theory and Practice', Peter Perengrinus London, 1982.
3. T. Kenjo and S. Nagamori, 'Permanent Magnet and Brushless DC Motors', Clarendon Press, London, 1988.
4. E.G. Janardanan, 'Special electrical machines', PHI learning Private Limited, Delhi, 2014.

Mode of Evaluation: Assignment, Written Examination

B.Tech. III Year II Semester

14EEE116 POWER SYSTEM ANALYSIS AND CONTROL

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE112

Course Description:
This course is designed to provide basic understanding of analysis and control of power system. This course covers representation of power system elements essential characteristics of a good algorithm, graph theory, formation of Y bus and Z bus of a Power System, modeling of turbines, generators and automatic controllers. It emphasizes on single area and two area load frequency control.

Course Objectives:
1. To learn the basics of the power system network matrices
2. To learn mathematical modelling of steam turbines and speed governors
3. To learn block diagram representation of steam turbines and speed governors
4. To learn load frequency control of single area and two area system

UNIT I: INTRODUCTION TO POWER SYSTEM ANALYSIS
Representation of Power system elements, Essential characteristics of a good Algorithm, Steps involved in solving a problem using Digital computer - Graph Theory: Definitions, Bus Incidence Matrix, Ybus formation by Direct and Singular Transformation Methods, Numerical Problems.

UNIT II: POWER SYSTEM NETWORK MATRICES
Formation of Z Bus: Partial network, Algorithm for the Modification of ZBus Matrix for addition element for the following cases: Addition of element from a new bus to reference, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference and Addition of element between two old busses (Derivations and Numerical Problems).- Modification of ZBus for the changes in network.

UNIT III: MODELLING OF TURBINE AND GOVERNOR
Modelling of Turbine: First order Turbine model, Block Diagram representation of Steam Turbines and Approximate Linear Models.Modelling of Governor: Mathematical Modeling of Speed Governing System – Derivation of small signal transfer function – Block Diagram.

UNIT IV: LOAD FREQUENCY CONTROL
Necessity of keeping frequency constant. Definitions of Control area – Single area control – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case. Load frequency control of 2-area system – uncontrolled case and controlled case, tie-line bias control.

UNIT V: ECONOMIC DISPATCH CONTROL

Proportional plus Integral control of single area and its block diagram representation, steady state response – Load Frequency Control and Economic dispatch control – Unit commitment problem – Constraints.

Course Outcomes:

At the end of the course, students will able to

1. Analyze the graph theory, Z_{bus} and Y_{bus} formation
2. Explain the algorithm for formation of Z bus matrix
3. Analyze modelling and block diagram representation of turbine and governor
4. Analyze the load frequency control of single area and two area power system
5. Explain the concept of economic dispatch control and unit commitment problem

Text Books:

1. Modern Power system Analysis by I.J.Nagrath&D.P.Kothari: Tata McGraw-Hill Publishing Company, 2nd edition.
2. Power System Analysis Operation and Control by A. Chakravarthi and S. Halder, 3rd Edition, PHI.
3. Electric Energy Systems by O I Elgerd, McGraw-hill Edition.

Mode of Evaluation: Assignment, Written Examination

B.Tech. III Year II Semester

14EEE117 DIGITAL SIGNAL PROCESSING

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE108 & 14EEE114

Course Description:
This course deals with the design of analog filters like Butterworth, Chebyshev, and Elliptic.Digital filter design for both IIR & FIR filters. Different filter structures for the realization of digital filters will be discussed. Finite word length effects and Multirate DSP will be introduced. DSP Processor architecture and implementation of DSP algorithms will be part of the course, which will be emphasized upon.

Course Objectives:
1. To enumerate the theoretical and practical aspects of modern signal processing in a digital environment.
2. To discuss application areas with particular stress on speech and image data.

UNIT I: INTRODUCTION
Discrete time Signal and Systems in Time Domain: Characterization and analysis of discrete time signals, LTI systems and Correlation of Signals. DSP Architectures: Numeric representation used in DSP, Architectural details of a typical DSP processor.

UNIT II: FOURIER AND Z-TRANSFORMS
Discrete time Signal in the Transform –Domain: The Discrete time Fourier Transform, Discrete Fourier Transform, Phase and group delay. Finite length discrete transform: DFT, FFT. Z-Transform, Inverse Z-Transform, Z-Transform uses for analysis of LTI.

UNIT III: ANALOG FILTERS
Analog Filter Design: Butterworth filters, Chebyshev filters, Elliptic & Bessel Filters, Design of HP, BP and BS Filters
Digital Processing of Continuous Time signals: Sampling of signals, Analog Low pass & High pass Filters, A/D converter, D/A Converter.
LTI Discrete –Time Systems in Transform domain: Types of TF, Digital Filters, All pass Transfer function, Inverse systems.

UNIT IV: DIGITAL FILTERS
Digital Filter Structures: FIR, IIR Digital filters. Digital Filter Design: Bilinear Transformation of IIR filter, Low pass & High pass IIR filter, FIR filter, Realization of IIR filters.
Analysis of Finite word length Effects: Quantization, A/D conversion noise analysis, Signal to noise ratio in Low order IIR filter, Low sensitivity Digital filters, Round off Errors.

UNIT V: APPLICATIONS

Multi rate DSP: Decimators & Interpolators, Multistage implementation, Polyphase implementation. Applications of DSP

Course Outcomes:

At the end of the course, students will able to

1. Explain the basic concepts and techniques for processing signals on acomputer.
2. Analyze the discrete-time signals analytically and visualize them in the time domain.
3. Write the meaning and implications of the properties of systems and signals.
4. Define and analyze the digital Filter Structures
5. Summarize the application of DSP systems.

Text Book:

S.K. Mitra, 'Digital Signal Processing – A Computer Based Approach', McGraw Hill Edu, 2013.

References:

1. J.G. Proakis and D.G. Manolakis, 'Digital Signal Processing Principles, Algorithms and Applications', Pearson Education, New Delhi, PHI. 2003.
2. Emmanuel C.Ifeachor and Barrie W. Jervis, "Digital Signal Processing: A Practical Approach, Second Edition", Pearson education.
3. Robert Schilling & Sandra L.Harris, Introduction to Digital Signal Processing using Matlab", Cengage Learning, 2014.

Mode of Evaluation: Assignment, Written Examination

B.Tech. III Year II Semester

14EEE207 POWER ELECTRONICS PRACTICALS

L	T	P	C
0	0	3	2

Course Prerequisite: 14EEE113

Course Description:
This practical course provide hands on experience with power electronic converter design and testing

Course Objective:
1. To analyze the Characteristics of SCR, MOSFET&IGBT
2. To design the single phase AC voltage controller with R and RL Loads
3. To analyze the forced Commutation circuits
4. To analyze the different converter circuits.
5. To simulate the resonant pulse commutation circuit and Buck chopper using PSPICE

List of Experiments
1. Study of Characteristics of SCR, MOSFET& IGBT
2. Gate firing circuits for SCR‘s
3. Single Phase AC Voltage Controller with R and RL Loads
4. Single Phase fully controlled bridge converter with R and RL loads
5. Forced Commutation circuits (Class A, Class B, Class C, and Class D & Class E)
6. DC Jones chopper with R and RL Loads
7. Single Phase Parallel, inverter with R and RL loads
8. Single Phase Cycloconverter with R and RL loads
9. Single Phase half controlled converter with R load
10. Three Phase half controlled bridge converter with R-load
11. Single Phase series and bridge inverters with R and RL loads
12. Single Phase dual converter with RL loads
13. PSPICE simulation of resonant pulse commutation circuit and Buck chopper.
14. PSPICE simulation of single phase Inverter with PWM control.

Course Outcomes:
At the end of the course, students will able to
1. Analyze the Characteristics of SCR, MOSFET&IGBT
2. Design the single phase AC voltage controller with R and RL Loads
3. Analyze the forced Commutation circuits
4. Analyze the different converter circuits.
5. Simulate the resonant pulse commutation circuit and Buck chopper using PSPICE

Mode of Evaluation: Practical, Written Examination

B.Tech. III Year II Semester

14EEE208 OBJECT ORIENTED PROGRAMMING PRACTICALS

	L	T	P	C
Course Prerequisite: 14CSU12T01	**0**	**0**	**3**	**2**

Course Description:
Basics of Object Oriented Programming - objects, classes, polymorphism, inheritance, static and dynamic binding. Object Oriented Programming using Java-classes, interfaces, inheritance, polymorphism, method dispatch, features for encapsulation and modularity.

Course Objectives:
1. Study the syntax, semantics and features of Java Programming Language
2. Learn the method of creating Multi-threaded programs and handle exceptions
3. Learn Java features to create GUI applications & perform event handling
4. Learn basics of Java Design Patterns

Week 1:
1. Write a Java program that prints all real and imaginary solutions to the quadratic equation $ax^2 + bx + c = 0$. Read in a, b, c and use the quadratic formula.
2. Write a Java program that find prime numbers between 1 to n.
3. Write a Java Program that find the factorial of a number

Week 2:
1. Write a java program that print the fibonacci series for a give number.
2. Write a java program to perform multiplication of two matrices.

Week 3:
1. Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome.
2. Write a Java program for sorting a given list of names in ascending order.
3. Write a Java program to make frequency count of vowels, consonants, special symbols, digits, words in a given text.

Week 4:

1. Write a Java program that reads a file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
2. Write a Java program that reads a file and displays the file on the screen, with a line number before each line.
3. Write a Java program that displays the number of characters, lines and words in a text file.

Week 5:

1. Write a java program to make rolling a pair of dice 10,000 times and counts the number of times doubles of are rolled for each different pair of doubles. Hint: Math.random()
2. Write java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read display it only if it‘s not a duplicate of any number already read display the complete set of unique values input after the user enters each new value.
3. Write a java program to read the time intervals (HH:MM) and to compare system time if the system time between your time intervals print correct time and exit else try again to repute the same thing. By using String Toknizer class.

Week 6:

1. Write java program to create a super class called Figure that receives the dimensions of two dimensional objects. It also defines a method called area that computes the area of an object. The program derives two subclasses from Figure. The first is Rectangle and second is Triangle. Each of the sub class overridden area() so that it returns the area of a rectangle and a triangle respectively.
2. Write a Java program that creates three threads. First thread displays ―Good Morning every one second, the second thread displays ―Hello‖ every two seconds and the third thread displays ―Welcome‖ every three seconds

Week 7:

1. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.
2. Use inheritance to create an exception super class called EexceptionA and exception sub class ExceptionB and ExceptionC, where ExceptionB inherits from ExceptionA and ExceptionC inherits from ExceptionB. Write a java program to demonstrate that the catch block for type ExceptionA catches exception of type ExceptionB and ExceptionC

Week 8:

1. Develop an applet that displays a simple message.
2. Develop an applet that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named ―Compute is clicked

Week 9:

Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result

Week 10:

Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the J text Fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.

Week 11:

Write a Java program that implements a simple client/server application. The client sends data to a

server. The server receives the data, uses it to produce a result, and then sends the result back to the client. The client displays the result on the console. For ex: The data sent from the client is the radius of a circle, and the result produced by the server is the area of the circle. (Use java.net)

Week 12:
Write a java program establish a JDBC connection, create a table student with properties name, register number, mark1, mark2, mark3. Insert the values into the table by using the java and display the information of the students at front end.

Course Outcomes:
At the end of the course, students will able to
1. Ability to solve problems using object oriented approach and implement them using Java
2. Ability to write Efficient programs with multitasking ability and handle exceptions Create user friendly interface
3. Ability to develop GUI Components
4. Ability to develop Application Projects.
5. Develop an applet that displays a simple message.

Text Books:
1. Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI.
2. Java The Complete Reference" by Herbert Schildt, TMH, 8th Edition

References:
1. Introduction to Java programming, Sixth edition, Y. Daniel Liang, Pearson Education
2. Programming in Java, Sachine
3. Big Java, 2nd edition, Cay Horstmann, Wiley Student Edition, Wiley India Private Limited.
4. Introduction to Programming with Java, J.Dean&R.Dean, McGraw Hill education.
5. Java Programming, D S Malik, Cengage Learning, India Edition

Mode of Evaluation: Practical, Written Examination

B. Tech. IV Year I Semester

14EEE118 ELECTRICAL DRIVES

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE103,14EEE113

Course Description:

This course covers the Power Electronics applications to AC and DC drives.

Course Objectives:

This course is an extension of Power Electronics applications to AC and DC drives. Control of DC motor drives with single phase and three phase converters and choppers are given in detail. The control of AC motor drives with variable frequency converters and variable voltage are presented.

UNIT-I: CONTROL OF DC MOTORS BY SINGLE PHASE AND THREE PHASE CONVERTERS

Introduction to Thyristor controlled Drives, Single and Three Phase semi, Fully controlled converters connected to d.c separately excited and d.c series motors – continuous current operation – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque Characteristics- Problems

UNIT-II: FOUR QUADRANT OPERATION AND CHOPPER CONTROL DRIVES

Introduction to Four quadrant operation – Motoring operations, Electric Braking – Plugging, Dynamic and Regenerative Braking operations. Four quadrant operation of D.C motors by dual converters – Closed loop operation of DC motor.

Single quadrant, Two –quadrant and four quadrant chopper fed dc separately excited and series excited motors – Continuous current operation – Output voltage and current wave forms – Speed torque expressions – speed torque characteristics – Problems on Chopper fed d.c Motors – Closed Loop operation

UNIT-III: CONTROL OF INDUCTION MOTOR THROUGH STATOR VOLTAGE AND STATOR FREQUENCY

Variable voltage characteristics-Control of Induction Motor by Ac Voltage Controllers – Waveforms – speed torque characteristics, Variable frequency characteristics-Variable frequency control of induction motor by Voltage source and current source inverter and cyclo converters- PWM control – Comparison of VSI and CSI operations – Speed torque characteristics – numerical problems on induction motor drives – Closed loop operation of induction motor drives

UNIT-IV: CONTROL OF INDUCTION MOTOR FROM ROTOR SIDE

Static rotor resistance control – Slip power recovery – Static Scherbius drive – Static Kramer Drive – their performance and speed torque characteristics – advantages - applications – problems

UNIT-V :CONTROL OF SYNCHRONOUS MOTORS

Separate control & self-control of synchronous motors – Operation of self-controlled synchronous motors by VSI and CSI cycloconverters. Load commutated CSI fed Synchronous Motor – Operation – Waveforms – speed torque characteristics – Applications – Advantages and Numerical Problems – Closed Loop control operation of synchronous motor drives

Course outcomes:

At the end of the course, students will able to

1. Analyze the control of single ,Three phase semi and full converters with DC motors
2. Evaluate the control of dual converters, choppers with DC motors
3. Study the voltage and frequency control of induction motor on stator
4. Analyze the voltage and frequency control of induction motor on rotor
5. Understand the control of synchronous motor drive and closed loop operation

Text books:

1. Fundamentals of Electric Drives – by G K Dubey Narosa Publications.
2. Power Electronic Circuits, Devices and applications by M.H.Rashid, PHI.

References:

1. Power Electronics – MD Singh and K B Khanchandani, Tata McGraw-Hill Publishing company,1998.
2. Modern Power Electronics and AC Drives by B.K.Bose, PHI.
3. Thyristor Control of Electric drives – Vedam Subramanyam, Tata McGraw Hill Publilcations.
4. Analysis of Thyristor Power conditioned motors, S K Pillai, Universities press, 1st Edition. .

Mode of Evaluation: Assignment, Written Examination

B.Tech. IV Year I Semester

14EEE119 ENGINEERING OPTIMIZATION

L	T	P	C
3	1	0	3

Course Prerequisite: 14MAT11T01, 14MAT12T02 &14MAT103

Course Description:
Linear programming problem, Goal programming, transportation and assignment problems, unconstrained and constrained optimization, project management and queuing models.

Course Objectives:
1. Provide students with the basic mathematical concepts of optimization.
2. Understand the theory of optimization methods and algorithms for solving various types of optimization problems.
3. Emphasize the modeling skills necessary to describe and formulate optimization problems.
4. Avail knowledge to solve and interpret optimization problems in engineering.
5. Analyze the techniques of project management and Queuing models.

UNIT I: LINEAR PROGRAMMING PROBLEM
Introduction to optimization, Linear Programming Problem (LPP), Mathematical formulation, Graphical solution, convex set, simplex method, artificial variable technique - Big M-method and two phase simplex method.

UNIT II: DUALITY IN LINEAR PROGRAMMING PROBLEM
Duality: formulation of dual Problem, Primal-Dual Relationships, Dual Simplex method, Sensitivity analysis and Post optimal analysis.

UNIT III: TRANSPORTATION PROBLEM AND GOAL PROGRAMMING PROBLEM
Transportation problem: definition and algorithm, Assignment problem. Goal Programming - formulation, Goal programming algorithms: The weights method and the preemptive method.

UNIT IV: UNCONSTRAINED & CONSTRAINED OPTIMIZATION
Unconstrained optimization, constrained multivariable optimization with equality constraints- Direct substitution method and Lagrange multipliers method, constrained multivariable optimization with inequality constraints - Kuhn-Tucker conditions. Elimination Methods- Interval Halving Method, Fibonacci Method and Golden Section Method, Gradient of a Function, Descent Methods - Steepest Descent Method and Conjugate Gradient (Fletcher-Reeves) Method.

UNIT V: PROJECT MANAGEMENT & QUEUING MODELS
Network analysis: Network representation, Critical Path Method (CPM) and Project Evolutionary and Review Technique (PERT).Introduction to Queuing system, single server queuing models (M/M/1): (∞/FCFS**)**, (M/M/1): (N/FCFS**),** Multi-server queuing models (M/M/s): (∞/FCFS**),** (M/M/s): (N/FCFS**).**

Course Outcomes:

At the end of the course, students will able to

1. Understood the importance of Optimization.
2. Get an idea about the Unconstrained and Constrained Optimization Techniques.
3. Applying Transportation & Assignment Problems in Engineering
4. Analyze the problems of Network Analysis for Project Management and Queuing Systems Engineering & Industry.
5. Think to solve the various problems in Engineering using the suitable Optimization techniques.

Text Books:

1. Hamdy A Taha, Operations Research: An Introduction, Pearson Education, 9/E, 2011.
2. J K Sharma, Operations Research: Theory and Practice, Macmillan Publishers India Ltd, 5th Edition, 2013.

References:

1. SS Rao, Engineering Optimization: Theory and Practice, New Age International (P) Limited, Third Edition, 1996 (R1)
2. FS Hillier and GJ Lieberman, Introduction to Operations Research, TMH, 8/E, 2006.
3. JC Pant, Introduction to Optimization: Operations Research**,** Jain Brothers, New, 6/E, 2004.
4. A Ravindran, DT Philips and JJ Solberg, Operations Research: Principles and Practice, John Wiley & Sons, Singapore, Second Edition. (R5).

Mode of Evaluation: Assignments, Internal Mid Examinations, External End Examination.

B.Tech. IV Year I Semester

14EEE120 ELECTRIC POWER UTILIZATION AND ILLUMINATION

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE103 & 14EEE112

Course Description:
This course deals with the illumination, Electrical heating, Welding and Electric Traction.

Course Objectives:
1. To understand and design the various illuminations systems.
2. To study the various electric heating and welding systems.
3. To analyse the different traction systems.
4. To analyze economics of utilization

UNIT I: ILLUMINATION
Definition – Laws of illumination – Polar curves – Calculation of MHCP and MSCP. Lamps: Incandescent lamp, Sodium Vapour lamp, Fluorescent lamp. Requirement of good lighting scheme – Types, Design and Calculation of illumination. Street lighting, LED lighting and Factory lighting - Storage batteries – Numerical Problems.

UNIT II: ELECTRICAL HEATING AND WELDING
Advantages, Methods of Electric heating – Resistance, arc, Induction and dielectric heating. Methods of Electric Welding–Types – Resistance, Electric arc, gas welding. Ultrasonic, Welding electrodes of various metals, Defects in welding.

UNIT III: ELECTRIC TRACTION MECHANICS
Introduction – Systems of Electric Traction.Comparison between A.C. and D. C Traction – Special features of Traction Motors - Methods of Electric Braking – Plugging, Rheostatic and Regenarative types – Mechanics of train movement. Speed-time curves of different services – trapezoidal and quadrilateral, speed-time curves for train movement – Numerical Problems.

UNIT IV: ELECTRIC TRACTION ANALYSIS
Calculations of tractive effort, Power, specific energy consumption - effect of varying acceleration and braking retardation, Adhesive weight and coefficient of adhesion – Problems.

UNIT V: ECONOMIC ASPECTS OF ELECTRIC ENERGY UTILIZATION
Introduction – definitions – load curve – load duration curve - Cost of electrical energy – interest and depreciation - Power Factor Improvement, Economic limits - Improvement of Load Factor - Electrical vehicle and smart grid concepts.

Course outcomes:

At the end of the course, students will able to

1. Design the various illuminations systems
2. Explain the Electric heating and welding.
3. Explain the various electric heating and welding systems.
4. Analyze the different traction systems.
5. Analyze economic aspects of electric energy utilization

Text Books:

1. Utilization of Electric Energy – by E. Openshaw Taylor and V. V. L. Rao, Universities Press.
2. Utilization of Electrical Power – by R. K. Rajput, Laxmi Publications.
3. Generation, Distribution and Utilization of Electrical Energy – by C.L. Wadhwa

References:

1. Utilization of Electrical Power including Electric drives and Electric traction – by N.V.Suryanarayana, New Age International (P) Limited, Publishers, 1996.
2. Art & Science of Utilization of electrical Energy – by Partab, DhanpatRai&Co..

Mode of Evaluation: Assignment, Written Examination

B.Tech. IV Year I Semester

14EEE209 DIGITAL SIGNAL PROCESSING PRACTICALS

L	T	P	C
0	0	3	2

Course Prerequisite: 14EEE117

Course description:
This course helps the students to learn digital signal processing techniques such as convolution, FFT, IIR and FIR.

Course objectives:
The student should be made to:
1. To implement Linear and Circular Convolution
2. To implement FIR and IIR filters
3. To study the architecture of DSP processor
4. To demonstrate Finite word length effect

LIST OF EXPERIMENTS:

MATLAB / EQUIVALENT SOFTWARE PACKAGE
1. Generation of sequences (functional & random) & correlation
2. To verify Linear and Circular Convolutions
3. Spectrum Analysis using DFT
4. FIR filter (LP/HP) using rectangular window techniques
5. FIR filter (LP/HP) using triangular window techniques
6. FIR filter (LP/HP) Using Kaiser Window
7. IIR filter
8. Multirate Filters
9. Equalization
10. N-point FFT algorithm

DSP PROCESSOR BASED IMPLEMENTATION
11. Study of architecture of Digital Signal Processor
12. MAC operation using various addressing modes
13. Linear Convolution
14. Circular Convolution
15. FFT Implementation
16. Waveform generation
17. IIR and FIR Filter Implementation
18. Finite Word Length Effect

Course Outcomes:

At the end of the course, students will able to

1. Carry out simulation of DSP systems
2. Demonstrate their abilities towards DSP processor based implementation of DSP systems
3. Analyze Finite word length effect on DSP systems
4. Demonstrate the applications of FFT to DSP
5. Implement adaptive filters for various applications of DSP

Mode of Evaluation: Practical, Written Examination

B.Tech. IV Year I Semester

14EEE210 POWER SYSTEMS PRACTICALS

L	T	P	C
0	0	3	2

Course Prerequisite: 14EEE112 & 14EEE116

Course description:
This practical course provides the knowledge to the students to analyze various faults in power system, power flow analysis and the operating characteristics of various protective relays.

Course Objectives:
1. To analyze various faults in power system.
2. To paraphrase the operational characteristics of synchronous machine.
3. To interpret the operating characteristics of various protective relays.

LIST OF EXPERIMENTS
1. Fault Analysis-I
   i) LG Fault
   ii) LL Fault
2. Fault Analysis-II
   i) LLG Fault
   ii) LLLG Fault
3. Capability curve of a Synchronous Generator.
4. Characteristics of IDMT over Current Relay.
5. Characteristics of Static Negative Sequence Relay.
6. Characteristics of Over Voltage Relay.
7. Characteristics of Percentage Biased Differential Relay.
8. Gauss Seidal load flow analysis using MATLAB Software
9. Newton Raphson method of load flow analysis using MATLAB Software.
10. Formation of Y bus matrix by inspection / analytical method using MATLAB Software.
11. Formation of Z bus using building algorithm using MATLAB Software.
12. Fast decoupled load flow analysis using MATLAB Software.

Course Outcome:
At the end of the course, students will able to
1. Analyze the various faults in power system.
2. Verify the operational characteristics of synchronous machine.
3. Analyze the operating characteristics of various protective relays.
4. Form the Y bus and Z bus matrix using MATLAB software
5. Carry the various load flow analysis using MATLAB software

Mode of Evaluation: Practical, Written Examination

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DISCIPLINE ELECTIVES

I never teach my pupils.
I only attempt to provide the
Conditions in which they can learn.

Albert Einstein

Discipline Elective - I

14EEE401 MODERN CONTROL SYSTEMS

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE108

Course Description:
This subject deals with state space, describing function, phase plane and stability analysis including controllability and observability. It also deals with modern control and optimal control systems.

Course Objectives:
1. To analyze Linear Continuous time invariant model for physical systems
2. To test the controllability and observability of continuous time invariant systems
3. To understand the types of non linear system phenomenon
4. To investigate the stability of non linear system using phase plane analysis
5. To investigate the stability of continuous time invariant system using Lyapunov's method
6. To formulate the optimal control problems and Linear quadratic regulator

UNIT I: STATE VARIABLE ANALYSIS
Linear Continuous time model for physical systems, Existence and Uniqueness of Solutions to Continuous Time State Equations, Solutions to Linear Time Invariant Continuous Time State Equations, State transition matrix and it's properties.

UNIT II: CONTROLLABILITY AND OBSERVABILITY
General concept of Controllability, General concept of Observability, Controllability tests for Continuous Time Invariant systems, Observability tests for Continuous Time Invariant systems , Controllability and Observability of state model in Jordan Canonical form , Controllability and Observability Canonical forms of State model.

UNIT III: NON LINEAR SYSTEMS
Introduction to Non Linear Systems ,Types of Non-linearities, Saturation, Dead Zone, Backlash, Jump Phenomenon, Singular Points, Introduction to Linearization of nonlinear systems, properties of Non Linear Systems,Describing function, describing function analysis of nonlinear systems- Stability analysis of Non Linear systems through describing functions,Introduction to phase plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phaseplane analysis of nonlinear control systems.

UNIT IV: STABILITY ANALYSIS
Stability in the sense of Lyapunov, Lyapunov's stability and Lyapunov'sinstability theorems, Stability Analysis of the Linear Continuous time invariant systems by Lyapunov second method – Generation of Lyapunov functions, Variable gradient method.

UNIT V: OPTIMAL CONTROL

Introduction to optimal control ,Formulation of optimal control problems ,calculus of variations fundamental concepts, functional, variation of functional fundamental theorem of Calculusof variations, boundary conditions , constrained minimization , formulation using Hamiltonian method Linear quadratic regulator.

Course Outcomes:

At the end of the course, students will able to

1. Analyze the linear continuous time invariant model for physical system.
2. Measure the controllability and observability of continuous time invariant systems.
3. Analyze the different types of non-linearity and stability of the non-linear system.
4. Investigate the stability of continuous time invariant system using Lyapunov's method.
5. Analysis the optimal control problems and Linear quadratic regulator.

Text Book:

Control Systems Engineering by I.J. Nagrath and M.Gopal, New Age International (P) Ltd. 2007.

References:

1. Modern Control System Theory by M. Gopal, New Age International Publishers, 2nd edition, 1996.
2. Modern Control Engineering by K. Ogata, Prentice Hall of India, 3rd edition, 1998.
3. Digital Control and State Variable Methods by M. Gopal, Tata McGraw-Hill Companies, 1997.

Mode of Evaluation: Assignment, Written Examination

Discipline Elective - I

14EEE402 COMMUNICATION SYSTEMS

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE104 & 14EEE109

Course Description:

Analysis and design of communication systems; analog and digital modulation and demodulation, frequency conversion, multiplexing, noise and distortion; spectral and signal-to-noise ratio analysis, probability of error in digital systems, spread spectrum. Introduction to the basic principles of the design and analysis of modern digital communication systems. Topics include source coding, channel coding, baseband and passband modulation techniques, receiver design, and channel equalization.

Course objectives:

1. To study the fundamental concept of the Modulation & Noise.
2. To analyze various analog modulation and demodulation techniques.
3. To understand sampling theorem and analyze various analog pulse modulation techniques.
4. To understand the influence of noise on the performance of analog communication systems, and to acquire the knowledge about information.

UNIT I: INTRODUCTION TO COMMUNICATION SYSTEMS & NOISE

Elements of communication System and its Fundamental limitations, Need of Modulation. Random Process, Stationary Processes, Ergodic Processes, Transmission through LTI, Power spectral density, Gaussian process. External and internal sources of noise, Thermal noise, Calculation of thermal noise, Shot noise, Noise figure, Noise temperature, Equivalent noise bandwidth.

UNIT II: ANALOG MODULATION & DEMODULATION:

Generation and detection of DSB, SSB, VSB, Carrier Acquisition, Concept of FDM, AM transmitter and Receiver, Types of Angle Modulation, Concepts of Instantaneous frequency, Wideband and Narrowband FM, Generation and detection of FM, Generation and detection of PM, FDM.

UNIT III: NOISE IN COMMUNICATION SYSTEMS

Noise in DSB-SC, SSB-SC and AM system, Noise in FM and PM, FM threshold and its extension, Pre-emphasis and De-emphasis in FM.

UNIT IV: ANALOG PULSE MODULATION SCHEMES

Sampling process, sampling theorem, signal reconstruction, flat top sampling of band pass signals, Analog Pulse Modulation: Types of analog pulse modulation, Method of generation and detection of PAM, PWM, PPM, Spectra of pulse modulation, concept of time division multiplexing.

UNIT V: INFORMATION THEORY

Measure of information, entropy, Source Coding Theorem, discrete memory less channels, Channel capacity & Channel Coding, Error Control Codes, Linear block & convolutional codes, Error probability plane, Nyquist bandwidth, Shannon-Hartley capacity theorem, bandwidth-Efficiency plane, BW efficiency of different modulation schemes, Modulation & coding trade-offs, Designing digital communication systems, Modulation & coding for Bandwidth limited channels, Concept of spread spectrum, PN sequences.

Course Outcomes:

At the end of the course, students will able to

1. Explain the fundamental concept of the Modulation & Noise.
2. Analyze various analog modulation and demodulation techniques.
3. Explain the concept of noise in communication systems.
4. Explain sampling theorem and analyze various analog pulse modulation techniques.
5. Demonstrate the influence of noise on the performance of analog communication systems, and to acquire the knowledge about information.

Text Books:

1. B.P. Lathi and Zhi Ding, Modern Digital and Analog Communication Systems, 3^{rd} or 4^{th} Edition, Oxford University Press, 2010
2. Simon Haykin& Michael Moher, Communication Systems, 4^{th} or 5^{th} Edition, John Wiley & Sons, 2010

References:

1. Proakis John, Digital Communications, 4th Edition, TMH
2. K. Sam Shanmugam, Digital and Analog communication systems, John Wiley & Sons
3. DIGITAL COMMUNICATIONS Fundamentals and Applications: ERNARDSKLAR andPabitra Kumar Ray; Pearson Education 2009.

Mode of Evaluation: Assignment, Written Examination

Discipline Elective - I

14EEE403 COMPUTER ARCHITECTURE

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE104 & 14EEE107

Course Description:
This course provides computer architecture, instruction set design, memory organization,ALU operations, I/O interfaces and multi computing systems.

Course Objectives:
1. To provide an introduction to concepts in computer architecture.
2. Impart knowledge on design aspects, system resources such as memory technology and I/O subsystems needed to achieve increase in performance.
3. Acquaint the students with current trends in computing architecture.

UNIT I: INTRODUCTION TO COMPUTERS
Introduction to computer abstractions and technology, CPU performance, the power wall, Switch from uniprocessors to multiprocessors.

UNIT II: INSTRUCTIONS
Operations and Operands of the computer hardware, Signed and unsigned numbers, Representing instructions, Logical operations, Instructions for making decisions, Supporting procedures in computer hardware, Communicating with people, MIPS architecture and instruction set.

UNIT III: PIPELINE ARCHITECTURES
Logic design conventions, data path design, a simple implementation scheme, Control hardware, Pipelining overview, Pipelined data-path and control.

UNIT IV: ARITHMETIC OPERATIONS
Addition, Subtraction, Multiplication, Division, Floating point arithmetic, Parallelism and Computer Arithmetic, Floating point in the x86, Forwarding versus stalling, Control hazards, Exceptions, Branch prediction.

UNIT V: MEMORY ORGANIZATIONS & MULTI-PROCESSORS
Introduction to memory organization, Basics of caches, cache performance, Virtual memory, Introduction to Storage, Dependability reliability and Availability, Disk storage, Flash storage, Connecting processors memory and I/O devices, Interfacing I/O devices, Introduction to multi-cores, multi-processors and clusters, Creating parallel processing programs, Shared memory multiprocessors, Clusters and other message passing multiprocessors, Hardware multi-threading, SISD, MIMD, SIMD, SPMD, Vector

Course Outcomes:

At the end of the course, students will able to

1. Analyze the computer abstractions and technology.
2. Explain the various Instructions.
3. Analyze the basics of computer architecture.
4. Analyze the various arithmetic operations.
5. Explain functioning of modern CPUS acquainted with the technology behind memory and I/O

Text Book:

Patterson, D.A. &J.L. Hennessy, Computer Organization and Design, Elsevier, 4th ed.,2009

References:

1. Patterson, D.A. &J.L. Hennessy Computer Architecture: A Quantitative Approach, 5thEdition, 2012
2. William Stallings, Computer Organisation& Architecture, Pearson, 8th ed., 2010.
3. Hamacheret. al, Computer Organisation, McGraw Hill, 5th ed., 2002.
4. Samir Palnitkar, Verilog HDL: A Guide to Digital Design and Synthesis, Pearson Education, Asia, 2003.

Mode of Evaluation: Assignment, Written Examination

Discipline Elective - I

14EEE416 NON-CONVENTIONAL ENERGY RESOURCES

L	T	P	C
3	1	0	3

Course Prerequisite: Course will be accessible to most students who have completed their first two years of study at an Undergraduate level.

Course Description:

This course looks at the operating principle of a range of non-conventional energy resources, materials used, characterization, and key performance characteristics. The technologies looked at will include, Solar energy, Wind, Batteries, Fuel cells, and Geothermal conversion. The advantages and limitations of these technologies in comparison to conventional sources of energy will also be examined.

Course Objectives:

1. To get an overview of current energy consumption and energy sources.
2. To have an idea about solar energy, its spectrum, performance of solar energy conversion devices and durability.
3. To gain knowledge about wind energy, geothermal energy and biomass energy.
4. To learn the basics of battery, types, testing and performance.
5. To learn the basics of fuel cell, flywheel and super capacitor.

UNIT I: CURRENT ENERGY CONSUMPTION AND SOURCES

Scale of quantities, Impact of current energy usage, Conventional sources of energy, Overview of non-conventional energy resources, Consumption by sector.

UNIT II: SOLAR ENERGY

Solar energy incident on earth, solar spectrum, Overview of solar energy technologies, Solar Thermal devices, Solar Photovoltaic devices, Performance and durability of solar devices.

UNIT III: WIND, GEOTHERMAL & BIOMASS ENERGY

Wind energy, technology and geographical aspects, Geothermal and Biomass.

UNIT IV: BATTERY-TYPES, TESTING & PERFORMANCE

Battery basics, types, Testing, performance of batteries.

UNIT V: FUEL CELL, FLYWHEEL AND SUPER CAPACITOR

Fuel cell types, Fuel processing, concept to product, Characterization and durability of fuel cells, Flywheels and super capacitors.

Course Outcomes:

Upon successful completion of the course, students will be able to

1. Explain the different types of energy sources and nation wise energy consumption.
2. Analyze the performance of solar energy harnessing devices.
3. Analyze the feasibility and performance of power generated from the sources like wind, geothermal and biomass.
4. Explain the different types of battery and their performance analysis.
5. Analyze the scope of application for fuel cell, flywheel and super capacitor.

Text Books:

1. Renewable Energy Resources, John W Twidell & Anthony d Weir, Published by E & F N Spon Ltd, London.
2. Non-Conventional Energy Sources; G D Rai, Published by Khanna Publishers, New Delh.
3. Ashok V Desai, Non-Conventional Energy, Wiley Eastern Ltd, New Delhi.

References:

1. Geothermal Energy, Dickson.
2. Wind Energy Conversation Systems, Fneris L.L.
3. Renewable Energy, Thomas B, Johansson
4. Solar Energy: Principal of Thermal Collection & Storage, Sukhatme, S.P.

Mode of Evaluation: Assignments, Internal Mid Examinations, End Semester Examination.

Discipline Elective - II

14EEE404 SWITCH GEAR AND PROTECTION

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE103 & 14EEE112

Course Description:
This course introduces all varieties of Circuit Breakers and Relays for protection of Generators, Transformers and feeder bus bars from over voltages and other hazards. It emphasis on Neutral grounding and protection against over voltages.

Course Objectives:
1. To learn the principles of fusing characteristics and circuit breaker ratings and specifications
2. To learn the Description and Operation of different types of circuit breakers
3. To learn operation of Electromagnetic and Static relays
4. Tolearn the construction and characteristics, Generator Protection, Transformer Protection, Feeder and Bus-Bar Protection
5. To learn about neutral grounding and Protection against over voltages

UNIT I: PRINCIPLES OF FUSING CHARACTERISTICS AND CIRCUIT BREAKER RATINGS AND SPECIFICATIONS
Elementary Principles of switches and fuses, Circuit Breakers: Elementary principles of arc interruption, Recovery, Restriking Voltage and Recovery voltages.- Restriking Phenomenon, Average and Max. RRRV, Numerical Problems - Current Chopping and Resistance Switching - CB ratings and Specifications: Types and Numerical Problems.

UNIT II: OPERATION OF DIFFERENT TYPES OF CIRCUIT BREAKERS
Description and Operation of following types of circuit breakers: Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum and SF6 circuit breakers.

UNIT III: ELECTROMAGNETIC AND STATIC RELAYS
Basic Requirements of Relays – Primary and Backup protection -Construction details of - Attracted armature, balanced beam, inductor type and differential relays – Universal Torque equation – Characteristics of over current, Direction and distance relays. Static Relays – Advantages and Disadvantages – Definite time, Inverse and IDMT static relays – Comparators – Amplitude and Phasecomparators.

UNIT IV: GENERATOR, TRANSFORMER, FEEDER & BUSBAR PROTECTION
Protection of generators against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter-turn fault Protection. Numerical Problems on % Winding Unprotected Protection of transformers: Percentage Differential Protection, Numerical Problem on Design of CT s Ratio, Buchholtz relay Protection of Feeder (Radial & Ring main) using over current Relays. Protection of Transmission line – 3 Zone protection using Distance Relays.Protection of bus-bars.

UNIT V: NEUTRAL GROUNDING AND PROTECTION AGAINST OVER VOLTAGES.

Ungrounded neutral system,Earthed neutral systemand solid grounding,resistancegrounding,reactance grounding and resonance grounding Generation of Over Voltages in Power Systems.-Protection against Lightning Over Voltages - Valve type and Zinc-Oxide Lighting Arresters - Insulation Coordination – BIL.

Course Outcomes:

At the end of the course, students will able to

6. Analyze the transients in circuit breaking
7. classify the circuit breakers and implement for various breaking requirements
8. classify the Relay and implement for various protecting requirements
9. Analyze the Generator, Transformer, Feeder and Bus-Bar Protection
10. Analyze the neutral grounding concept and Protection against over voltages

Text Books:

1. Switchgear and Protection – by Sunil S Rao, Khanna Publishers
2. Power System Protection and Switchgear by Badari Ram, D.NViswakarma, TMH Publications.

Reference:

Electrical Power Systems by C.L.Wadhwa, New Age international (P) Limited, Publishers, 3rd edition

Mode of Evaluation: Assignment, Written Examination

Discipline Elective - II

14EEE405 DIGITAL IMAGE PROCESSING

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE117

Course Description:
This is a first course on digital image processing. It begins with an introduction to the fundamentals of digital images and discusses the various discrete transforms, which are extensively used in image processing. It then goes on to discuss the different image processing techniques such as image enhancement, automatic image classification and recognition.

Course Objectives:
1. Helps to attain basic knowledge on DIP basic blocks and its applications.
2. Attains knowledge on different types of Image transformations.
3. Students can attain knowledge on Histogram processing techniques and applications.
4. Students can attain knowledge DIP Spatial and Frequency Domain transforms.
5. Students can attain knowledge on Image enhancement, compression, segmentation, Degradation and restoration techniques.
6. Introduces different color model and color image processing techniques.

UNIT I: DIGITAL IMAGE FUNDAMENTALS
Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition Image Sampling and Quantization, Some Basic Relationships BetweenPixelsLinear and Nonlinear Operations

UNIT II: IMAGE ENHANCEMENT IN SPATIAL DOMAIN
Some Basic Gray level transformations, Histogram Processing,Enhancement Using Arithmetic/Logic Operations , Image Subtraction , Image Averaging , Basics of Spatial Filtering, Smoothing Spatial Filters , Sharpening Spatial Filters

UNIT III: IMAGE ENHANCEMENT IN THE FREQUENCY DOMAIN
Background , Introduction to the Fourier Transform and the Frequency Domain ,Correspondence between Filtering in the Spatial and Frequency Domains , Smoothing Frequency-Domain Filters, Sharpening Frequency Domain Filters, Homomorphic Filtering .

UNIT IV: IMAGE RESTORATION
Model of the image frequency Domain Filtering, Linear, Position-Invariant Degradations, Degradation/Restoration process, Noise Models, Restoration in the presence of Noise only-spatial filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear, position-Invariant Degradations, Estimating the Degradation Function, Inverse Filtering.

Image Compression &Morphologial processing: Fundamentals, Image compression Models, Morphological Image processing: Preliminaries, Diilation and Erosion, Opening and Closing, The Hit-or-Miss Transformation, Some Basic Morphological Algorithms.

UNIT V: IMAGE SEGMENTATION, REPRESENTATION AND OBJECT RECOGNITION

Image Segmentation: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding.

Representation and Description: Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description,

Object Recognition: Patterns and Pattern Classes, Recognition Based on Decision-Theoretic Methods, Matching, Optimum Statistical Classifiers, Neural Networks.

Course Outcomes:

At the end of the course, students will able to

1. Explain the fundamental of digital image processing.
2. Describe the various building blocks of DIP.
3. Perform various arithmetic and logical operations on Images.
4. Explain the various transform methods for image processing applications.
5. Carryout image segmentation.

Text Book:

Gonzalez, R. C. & R. E. Woods, Digital Image Processing, Pearson Education, 3rd ed., 2009

Reference:

Digital Image Processing using MATLAB, Gonzalez, Woods &Eddins, Pearson, 2007

Mode of Evaluation: Assignment, Written Examination

Discipline Elective - II

14EEE406 OPERATING SYSTEMS

L	T	P	C
3	1	0	3

Course Prerequisite: 14CSU12T01 & 14EEE114

Course Description:
This course describes concepts of operating systems, its approach to memory management, structure and organization.

Course Objectives:
1. To understand the services provided by and the design of an operating system.
2. To understand what a process is and how processes are synchronized and scheduled.
3. To understand different approaches to memory management.
4. To understand the structure and organization of the file system.

UNIT I: OPERATING SYSTEMS OVERVIEW
Operating systems functions, Overview of computer operating systems, protection and security, distributed systems, special purpose systems, operating systems structures: operating system services and systems calls, system programs, operating system structure, operating systems generation.

UNIT II: PROCESS MANAGEMENT
Process concepts, threads, scheduling-criteria, algorithms, and their evaluation; Thread scheduling.

UNIT III: CONCURRENCY
Processsynchronization, the critical-section problem, Peterson's Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors, Synchronization examples, atomic transactions.
Principles of deadlock: system model, deadlock characterization, deadlock prevention, detection and avoidance, recovery form deadlock.

UNIT IV: MEMORY MANAGEMENT:
Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, virtual memory, demand paging, page-replacement, algorithms, Allocation of frames, Thrashing case studies UNIX, Linux, Windows

UNIT V: FILE SYSTEM INTERFACE:
The concept of a file, Access Methods, Directory structure, File system mounting, File sharing, protection. File System implementation**:** File system structure, file system implementation, directory implementation, allocation methods, free-space management, efficiency and performance, case studies.
Mass-storage structure: overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling.

Course Outcomes:

At the end of the course, students will able to

1. Explain the principles and modules of operating systems.
2. Design the operating systems modules
3. Explain the process management, concurrent processes and threads, memory management, virtual memory concepts, deadlocks
4. compare performance of processor scheduling algorithms
5. produce algorithmic solutions to process synchronization problems

Text Book:

Operating System Concepts, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Eighth edition, John Wiley.

References:

1. Operating Systems: Internals and Design Principles, Stallings, Sixth Edition–2009, Pearson Education.
2. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.
3. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
4. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.
5. Operating Systems, A.S.Godbole, Second Edition, TMH.
6. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
7. Operating Systems, aconcept based Approach-D.M.Dhamdhere, Second Edition, TMH.

Mode of Evaluation: Assignment, Written Examination

Discipline Elective – III

14EEE407 POWER QUALITY

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE112 & 14EEE113

Course Description:
This course introduces Power Quality introduction and terms and definitions, Voltagesags and interruptions, Transient over Voltages, Fundamentalsof harmonics, Harmonic Solutions, Long duration voltagevariations, Distributed generation and power quality, Wiring andgrounding, Power quality monitoring

Course Objectives:
To introduce the power quality problem

1. To educate on production of voltages sags, over voltages and harmonics and methodsof control.
2. To study overvoltage problems
3. To study the sources and effect of harmonics in power system
4. To impart knowledge on various methods of power quality monitoring.

UNIT I: INTRODUCTION TO POWER QUALITY
Terms and definitions: Overloading - under voltage - over voltage. Long-Duration Voltage Variations - Short-Duration Voltage Variations -Voltage Imbalance-Waveform Distortion-Voltage Fluctuation - Power Frequency Variations – Distributed generation.

UNIT II: VOLTAGE SAGS AND INTERRUPTIONS
Sources of sags and interruptions - estimating voltage sag performance. Fundamental Principles of Protection - Thevenin's equivalent source - analysis and calculation of various faulted conditions. Voltage sags due to induction motor starting. Estimation of the sag severity - mitigation of voltage sags, active series compensators. Static transfer switches and fast transfer switches.

UNIT III: TRANSIENT OVERVOLTAGES
Sources of over voltages - Capacitor switching – lightning - Ferro resonance. Mitigation of voltage swells - surge arresters - low pass filters - power conditioners. Lightning protection – shielding – line arresters - protection of transformers and cables, wiring and grounding.

UNIT IV: HARMONICS
Harmonic sources from commercial and industrial loads, locating harmonic sources.Power system response characteristics - Harmonics Vs transients. Effect of harmonics - harmonic distortion – voltage and current distortion - harmonic indices - inter harmonics – resonance. Harmonic distortion evaluation - devices for controlling harmonic distortion - passive and active filters.

UNIT V: POWER QUALITY MONITORING

Monitoring considerations - monitoring and diagnostic techniques for various power quality problems - modeling of power quality problems by mathematical simulation tools - power line disturbance analyzer – quality measurement equipment - harmonic / spectrum analyzer - flicker meters - disturbance analyzer. Applications of expert systems for power quality monitoring.

Course Outcomes:

At the end of the course, students will able to

1. Explain the power quality definitions and distributed generation
2. Explain the voltages sags, over voltages, harmonics and methods of control.
3. Ability to analyze overvoltage problems.
4. Analysis the harmonics sources and evaluates the harmonics distortion.
5. Demonstrate the various methods of power quality monitoring.

Text Books:

1. Roger. C. Dugan, Mark. F. McGranagham, Surya Santoso, H.WayneBeaty, 'Electrical Power Systems Quality' McGraw Hill,2003
2. Eswald.F.Fudis and M.A.S. Masoum, "Power Quality in Power System and Electrical Machines," Elseviar Academic Press, 2013.
3. C. Sankaran, Power Quality, CRC Press, 2002.

References:

1. M.H.JBollen, 'Understanding Power Quality Problems: Voltage Sags and Interruptions', (New York: IEEE Press, 1999).
2. G.J.Wakileh, "Power Systems Harmonics – Fundamentals, Analysis and Filter Design," Springer 2007.
3. E.Aeha and M.Madrigal, "Power System Harmonics, Computer Modelling and Analysis, Wiley India, 2012.
4. R.S.Vedam, M.S.Sarma, "Power Quality – VAR Compensation in Power Systems," CRC Press 2013.
5. A. Ghosh and G. Ledwich, Power Quality Enhancement Using Custom Power Devices, Kluwer Academic Publishers, 2002.

Mode of Evaluation: Assignment, Written Examination

Discipline Elective - III

14EEE408 INTRODUCTION TO MEMS

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE104 & 14EEE109

Course Description:
This course describes about manufacturing, modeling and applications of MEMS**.**

Course Objectives:
1. To know the fundamentals of MEMS materials, their physical properties and Principles of operation of MEMS devices
2. To know various MEMS microfabrication technologies.
3. To provide various MEMS technology for mechanical, optical, and chemical sensors and actuator

UNIT I: INTRODUCTION
Overview – History and industry perspectives – Working principles – Mechanics and dynamics — Scaling law

UNIT II: MICRO SENSORS & ACTUATORS
Micro sensors: Pressure sensors, accelerometers, gyroscopes-Micro actuators: comb drive actuators – Micro-electromechanical systems

UNIT III: MICRO MANUFACTURING
Materials for MEMS and Microsystems- Micro fabrication processes: Photolithography, Ion Implantation, Diffusion, Oxidation, Chemical Vapour Deposition- Physical Vapour Deposition, Micro manufacturing: Bulk micromachining, surface micromachining, LIGA Process- Packaging.

UNIT IV: MODELING IN MEMS
Micro system design: Finite Element Methods-– Modeling of simulation – piezoelectric, Gyroscope

UNIT V: MEMS APPLICATIONS
Micro fluids-sensors for turbulence measurement and control, micro-actuators for flow control, RFMEMS- filters, Oscillators and phase shifters, Optical MEMS, micro robotics – Case studies

Course Outcomes:

At the end of the course, students will able to

1. Explain the fundamentals of MEMS materials, their physical properties and Principles of operation of MEMS devices
2. Analyze the Micro sensors and actuators and its fabrication
3. Explain the materials for MEMS and Microsystems
4. Design MEMS using microfabrication techniques
5. Explain the advantages of MEMS technology for mechanical, optical, and chemical sensors and actuator

Text Books:

1. Chang Liu, 'Foundations of MEMS', Pearson Education Inc., 2006
2. G.K. Ananthsuresh et al ,'Micro and Smart Systems', Wiley, India, 2010

References:

1. NadimMaluf, "An introduction to Micro electro mechanical system design", ArtechHouse, 2000.
2. Mohamed Gad-el-Hak, editor, "The MEMS Handbook", CRC press Baco Raton, 2000
3. James J.Allen, micro electro mechanical system design, CRC Press published in 2005
4. Stephen D. Senturia, Microsystem Design, Kluwer Academic Publishers, 2001

Mode of Evaluation: Assignment, Written Examination

Discipline Elective – III

14EEE409 MOBILE TELECOMMUNICATION NETWORKS

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE104 & 14EEE109

Course Description:
This course describes about accessing methods and modeling RF channel in cellular networks. It also describes 3G Technologies: CDMA and UMTS.

Course Objectives:
1. To model RF channel with fading for cellular applications.
2. To understand various cellular data networks.
3. To understand CDMA Architecture.
4. To Understand UMTS for 3G Cellular network.

UNIT I: INTRODUCTION TO WIRELESS COMMUNICATION NETWORKS AND MULTIPLE ACCESS NETWORKS:
Concepts of Wireless, Mobile and Portable Networks, Introduction to 1G, 2G, 3G, 4G wireless networks and their evolution, TDMA, FDMA, Spread spectrum multiple access: FHMA, CDMA, Space division multiple access, Packet radio, capacity of cellular systems.

UNIT II: CELLULAR CONCEPT & PROPAGATION MECHANISM & TELE-TRAFFIC ENGINEERING:
Cellular system design, Frequency reuse, handoff, Interference and system capacity, Trunking and Grade of service, Coverage and Capacity in cellular systems, roaming issues, Introduction to radio wave propagation, Reflection, diffraction and scattering, Modulation, coding, spread spectrum, fading and multipath, parameters of mobile multipath channels, Rayleigh and Ricean distributions, Link budget design, models of propagation both indoor and outdoor, Traffic models, blocking formula, CCS, SS7

UNIT III: GERAN GSM DATA SERVICES, GPRS, EDGE
GSM architecture and Interfaces, Radio Link features, Logical channels and frame structure, speech coding, message, services and call flow Reference architecture of GPRS (SGSN, GGSN), EDGE Rel' 99, Evolution of GERAN standardization Privacy and security in GSM, Security algorithms

UNIT IV: CDMA ARCHITECTURE AND STANDARDS:
Frequency and channel specifications, forward CDMA channel, Spreading codes, IS-95, F.L. and R.L. channel generation, power control, Rake receiver, soft handoff, call processing, DECT, PACS, PDC, CT2 standard for cordless telephones, US PCM and ISM bands, Spectrum in India and its allocations, Different frequency bands allocated for 2G, 3G and LTE.

UNIT V: UMTS3G EVOLUTION PATH & CURRENT TRENDS IN MOBILE NETWORKS

UTRAN architecture, UMTS physical layer, UMTS core network architecture, HSDPA, FOMA CDMA 2000 and its layering structure, Evolution of CDMA: 1XEVDO, 1XEVDV, differences between cdma2000 and WCDMA, current trends: OFDM, MIMO, LTE and Beyond 4G.

Course Outcomes:

At the end of the course, students will able to

1. Model the RF channel with fading for cellular applications
2. Describe various cellular data networks.
3. Explain the GSM architecture and Interfaces
4. Describe CDMA Architecture
5. Explain the OFDM and MIMO technologies for UMTS mobile networks.

Text Book:

"Wireless Communication Principles and Practice" by Theodore.S. Rappaport Second Ed. Pearson Education, Asia 2002.

References:

1. Mobile Communication by Jochen H. Schiller, Addison –Wesley, Pearson Education Ltd., 2000.
2. Principles and applications of GSM by Vijay Garg and Joseph Wilkes, Pearson Education, Asia 2002
3. Wireless communication and networking by Vijay Garg, Morgan Kaufmann publishers, Imprint of Elsevier, 2008
4. IS-95 CDMA and CDMA 2000- Cellular/PCS system implementation by Vijay Garg, Pearson Education, 2000.
5. Mobile Telecommunications Networking With IS-41,by Michael D. Gallagher and Raand all snyder, McGram-hill,1997

Mode of Evaluation: Assignment, Written Examination

Discipline Elective - III

14EEE410 HVDC & FACTS

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE112, 14EEE113 & 14EEE116

Course Description:
This course covers the HVDC transmission systems and basic concepts of FACTS controller.

Course Objective:
This subject deals with the importance of HVDC transmission, analysis of HVDC converters, Harmonics and Filters, Reactive power control and Power factor improvements of the system. it also deals with basic FACTS concepts, static shunt and series compensation and combined compensation techniques.

UNIT – I: INTRODUCTION
Comparison of AC and DC transmission systems, application of DC transmission, types of DC links, typical layout of a HVDC converter station. HVDC converters, pulse number, analysis of Gratez circuit with and without overlap, converter bridge characteristics, equivalent circuits or rectifier and inverter configurations of twelve pulse converters.

UNIT – II: CONVERTER & HVDC SYSTEM CONTROL
Principles of DC Link Control — Converters Control Characteristics — system control hierarchy, firing angle control, current and extinction angle control, starting and stopping of DC link.

UNIT – III: HARMONICS, FILTERS AND REACTIVE POWER CONTROL
Introduction, generation of harmonics, AC and DC filters. Reactive Power Requirements in steady state, sources of reactive power, static VAR systems.

UNIT – IV: INTRODUCTION TO FACTS &STATIC SHUNT COMPENSATORS
Flow of power in AC parallel paths and meshed systems, basic types of FACTS controllers, brief description and definitions of FACTS controllers.
Objectives of shunt compensation, methods of controllable VAR generation, static VAR compensators, SVC and STATCOM, comparison between SVC and STATCOM.

UNIT - V: STATIC SERIES COMPENSATORS& COMBINED COMPENSATORS
Objectives of series compensation, variable impedance type-thyristor switched series capacitors (TCSC), and switching converter type series compensators, static series synchronous compensator (SSSC)-power angle characteristics-basic operating control schemes.
Introduction, unified power flow controller (UPFC), basic operating principle, independent real and reactive power flow controller.

Course Outcomes:

At the end of the course, students will able to

1. understand the advantages & applications of HVDC Transmission Systems
2. learn converter control characteristics and their control schemes
3. learn sources of harmonics and harmonics filters reactive power control.
4. understand the importance of controllable parameters and benefits of FACTS controllers
5. know the significance of shunt and series compensation through various static m compensators

Text Books:

1. HVDC Transmission, S. Kamakshaiah, V. Kamaraju, The Mc — Graw Hill Companies.
2. Understanding FACTS, Concepts and Technology of Flexible AC Transmission Systems, Narain. G. Hingorani, Laszlo Gyugyi, IEEE Press, Wiley India.

References:

1. HVDC and Facts Controllers Applications of Static Converters in Power Systems, Vijay K. Sood, Kiuwer Academic Publishers.
2. HVDC Power Transmission Systems: Technology and system Interactions, K.R.Padiyar, New Age International (P) Limited.
3. Thyristor — Based Conrollers for Electrical Transmission Systems, R.Mohan Mathur, Rajiv K. Varma.Wiley India.
4. FACTS Modeling and Simulation in Power Networks, Enrique Acha, Wiley India Distributed by BSP Books Pvt. Ltd.

M**ode of Evaluation:** Assignment, Written Examination

Discipline Elective - III

14EEE415 DESIGN OF PHOTOVOLTAIC SYSTEMS

L	T	P	C
3	1	0	3

Course Pre-requisite: 14EEE105, 14EEE113

Course Description:

This course is designed to provide the basics of photovoltaic system design. The course discusses about PV cell electrical characteristics and interconnections, estimation of insolation and PV sizing. Further, Maximum power point tracking and circuits related to it are discussed in order to extract more power from the existing installation. Some applications related to water pumping, grid connection and micro grids are also discussed in detail to bridge the gap of basic understanding and real time utility. Life cycle costing is discussed in order to assess financial requirement for an installation plan.

Course Objectives:

1. To understand the basics knowledge of PV cell.
2. To estimate the Insolation, irradiance with influence of atmosphere, Sizing of solar cell with and without batteries.
3. To design a suitable algorithm for maximum power point tracking.
4. To understand the battery interface, cooling methods.
5. To analyze the life cycle cost and grid interface

UNIT I - THE PV CELL

A historical perspective, PV cell characteristics and equivalent circuit, Model of PV cell, Short Circuit, Open Circuit and peak power parameters, Datasheet study, Cell efficiency, Effect of temperature, Temperature effect calculation example, Fill factor, PV cell simulation Identical cells in series, Load line, Non-identical cells in series, Protecting cells in series, Interconnecting modules in series, Simulation of cells in series, Identical cells in parallel, Non-identical cells in parallel, Protecting cells in parallel, Interconnecting modules in parallel, Simulation of cells in parallel, Measuring I-V characteristics, PV source emulation.

UNIT-II - ENERGY FROM SUN and SIZING

Insolation and irradiance, Insolation variation with time of day, Earth centric viewpoint and declination, Solar geometry, Insolation on a horizontal flat plate, Energy on a horizontal flat plate, Sunrise and sunset hour angles.

Energy on a tilted flat plate, Energy plots in octave, Atmospheric effects, Air Mass, Energy with atmospheric effects, Clearness index, Clearness index and energy scripts in Octave, Sizing PV for applications without batteries, Batteries - Capacity, C-rate, Efficiency, Energy and power densities, Battery selection, Other energy storage methods, PV system design, Load profile, Days of autonomy and recharge, Battery size, PV array size, Design toolbox in octave.

UNIT III - MAXIMUM POWER POINT TRACKING and Algorithms

MPPT concept, Input impedance of DC-DC converters -Boost converter, Buck converter, Buck-Boost converter, PV module in SPICE, Simulation - PV and DC-DC interface, Impedance control methods, Reference cell, Sampling method, Power slope methods, Hill climbing method, Practical points - Housekeeping power supply, Gate driver, MPPT for non-resistive loads, Simulation.

UNIT IV - PV-BATTERY INTERFACES, COOLING METHODS AND APPLICATIONS

Direct PV-battery connection, Charge controller, Battery charger - Understanding current control, slope compensation, simulation of current control, Batteries in series - charge equalisation, Batteries in parallel.

Peltier device - principle, Peltier element - datasheet, Peltier cooling, Thermal aspects - Conduction, Convection, A peltier refrigeration example, Radiation and mass transport, Demo of Peltier cooling.

Water pumping principle, Hydraulic energy and power, Total dynamic head, Numerical solution - Colebrook formula, Octave script for head calculation, Octave script for hydraulic power, Centrifugal pump, Reciprocating pump, PV power, Pumped hydro application.

UNIT -V - PV-GRID INTERFACE and LIFE CYCLE COSTING

Grid connection principle, PV to grid topologies, 3ph d-q controlled grid connection, dq-axis theory, AC to DC transformations, DC to AC transformations, Complete 3ph grid connection, 1ph d-q controlled grid connection SVPWM, Application of integrated magnetics, Life cycle costing, Growth models, Annual payment and present worth factor, LCC with examples.

Course Outcomes:

At the end of the course, students will able to

1. Estimate the Insolation, irradiance with influence of atmosphere.
2. Estimate the Sizing of solar cell with and without batteries.
3. Find suitable algorithm for maximum power point tracking and grid interface methods.
4. Estimate the thermal flow, design cooling methods.
5. Analyze life cycle cost.

Text Book

1. Solar Photovoltaics Fundamentals, Technologies and Applications, by Chetan Singh Solanki, 2nd ed. New Delhi, India: PHI Learning Private Limited, 2011.

2. Solar photovoltaic basics by Sean White, (Electrical engineer), Routledge, Year: 2015

References

1. The Indian solar photovoltaic industry: a life cycle analysis by Sunderasan Srinivasan, Elsevier Renewable and Sustainable Energy Reviews, 2007.

2. Ruschenbach, HS, Solar Cell Array Design Hand Varmostrand, Reinhold, NY, 1980.

Mode of Evaluation: Assignments, Internal Mid Examinations, End Semester Examination.

Discipline Elective – IV

14EEE411 POWER APPARATUS & NETWORKS

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE103, 14EEE112 & 14EEE115

Course Description:
This course is designed to provide knowledge in power apparatus and fundamental principles of power networks.
Course covers apparatus in power networks like transformers, synchronous generators; transmission lines, cables etc. It also covers stability, protection and deregulation of large interconnected power networks.

Course Objectives:
1. To understand the overview of power systems and changing landscape
2. To infer the constructional details, the principle of operation of apparatus in power networks
3. To comprehend the stability phenomenon of large interconnected power network
4. To interpret the protection aspects of power system.
5. To impart knowledge on deregulation of power industry.

UNIT I: ESSENTIAL FUNDAMENTALS OF POWER NETWORKS
Overview of power systems and changing landscape; sources of electrical energy and environmental consequences; the Indian power industry

UNIT II: FUNDAMENTAL PRINCIPLES OF POWER NETWORKS
Magnetic prerequisites. Apparatus in power networks: transformers; synchronous generators; transmission lines, cables, HVDC; loads and power quality.

UNIT III: ANALYSIS AND OPERATION
Power flow; rotor angle and voltage stability; control of large interconnected power networks.

UNIT IV: PROTECTION
Fault calculations, relay co-ordination and circuit breakers; transient overvoltages, protection by surge arrestors, and insulation co-ordination.

UNIT V: DEREGULATION
Management of vertical utilities, utility deregulation and open access: operational economics of the power industry, privatization; deregulation and energy markets.

Course Outcomes:

At the end of the course, students will able to

1. Identify different energy sources and its utilization
2. Apply the electrical apparatus to practical circuits
3. Classify the power system stability problems
4. Design the protection system for large interconnected network
5. Analyze the deregulated power industry.

Text Books:

1. G. L. Kusic, Computer Aided Power Systems Analysis. Prentice Hall of India Private Limited, 2003.
2. S. Roy, Simulation Experiments on Power Apparatus & Networks. EDD Laboratory Manual.

References:

1. W. D. Stevenson, Elements of power systems analysis, McGraw Hill International Book Company, fourth or subsequent editions.
2. PrabhaKundur, Power System Stability and Control, Tata McGraw-Hill, 2006

Mode of Evaluation: Assignment, Written Examination

Discipline Elective - IV

14EEE412 WIND ELECTRICAL SYSTEMS

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE103, 14EEE113 & 14EEE120

Course Description:
This course aims to give the exposures toThermodynamics of wind energy, Types of Wind energy conversion devices, Aerodynamics of wind rotors, design of wind turbine rotor, Power -speed characteristics, torque-speed characteristics, Wind turbine control systems, Wind speed measurements , Wind speed statistics, Site and turbine selection, Induction Generators, Wound field synchronous Generator, Permanent Magnet synchronous machine, Doubly fed induction generator, Power Flow equations, Power Semiconductor devices, Converters, Inverters, power quality, Reactive power compensation, Wind diesel hybrid systems, Wind photovoltaic systems, Role of Govt. and policies for market development.

Course Objectives:
1. To understand the fundamentals of wind energy and its conversion system
2. To study about various control scheme and measurement techniques
3. To learn about generation systems and power quality
4. To understand the hybrid wind power generation

UNIT I: FUNDAMENTALS OF WIND ENERGY SYSTEMS
Thermodynamics of wind energy-Types of Wind energy conversion devices- Horizontal axis wind turbine,Vertical axis wind turbine- Aerodynamics of wind rotors, - momentum theories - basic aerodynamics – airfoils and their characteristics - HAWT - blade element theory - Prandtis lifting line theory - VAWT aerodynamics – Design of wind turbine rotor- rotor design considerations - number of blades - blade profile - 2/3 blades and teetering – coning - upwind / downwind, Power - speed characteristics, torque-speed characteristics.

UNIT II: CONTROL AND MEASUREMENT
Wind turbine control systems- Blade Pitch and yaw Control - Generator Torque Control - steady state behavior, dynamic behavior - Control Strategies - Fixed-speed, Variable-speed, fixed-pitch, fixed-pitch Fixed-speed variable-pitch -Wind speed measurements, Wind speed statistics, Site and turbine selection

UNIT III: GENERATING SYSTEMS
Constant speed, constant frequency systems -Choice of Generators- Induction Generators - Wound field synchronous Generator - Permanent Magnet synchronous machine - Doubly fed induction generator - Power Flow equations.

UNIT IV: POWER SEMICONDUCTOR DEVICES

Power Semiconductor devices- Soft-starter - Capacitor bank– Power MOSFET Rectifiers - IGBT Rectifiers– IGBT Inverters- Frequency converters - power quality- Voltage and Frequency Variations -Fliker, Harmonics -Reactive power compensation.

UNIT V: HYBRID SYSTEMS

Wind diesel hybrid systems - Schematic of generalized wind-diesel system - Issues related to wind-diesel hybrid system - Energy storage systems and techniques - Wind photovoltaic systems - Wind-solar building - Wind-solar lighting - Role of Govt. and policies for market development.

Course Outcomes:

At the end of the course, students will able to

1. Explain the fundamentals of wind energy and its conversion system
2. Analysis the various control scheme and measurement techniques
3. Describe about the generation systems and power quality
4. Explain about the power semiconductor devices
5. Analyze the hybrid wind power generation

Text Book:

Spera, D.A., Wind Turbine Technology: Fundamental concepts of Wind Turbine Engineering, ASME Press, 1994.

References:

1. Freris, L.L., Wind Energy Conversion Systems, Prentice Hall, 1990
2. Twidell, J.W. and Weir, A., Renewable Energy Sources, EFNSpon Ltd., 1983.
3. SukhatmeS.P.,Solar Energy, 2nd Ed., Tata McGraw-Hill Publishing Co.Ltd.New.Delhi, 1996.

Mode of Evaluation: Assignment, Written Examination

Discipline Elective - IV

14EEE413 ROBOTICS

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE103, 14EEE107 &14EEE108

Course Description:
Robotics is an interdisciplinary area ranging from mechanical & electrical component design to advanced sensor technology, incorporating computer systems and Artificial Intelligence (AI). With advances in AI-techniques & computational power in recent years, it has become one of the most interesting area for multidisciplinary research, with lots of commercial applications already in market.

Course Objectives:
1. To know the fundamentals of Robotics & its Applications.
2. To make students capable of handling robot manipulator tasks in real, as well as in simulation environment.
3. To know about kinetic and Jacobian modeling
4. To know about sensors and actuators.

UNIT I: INTRODUCTION & TRANSFORMATION AND MAPPING
Evolution of Robots and Robotics, Laws of Robotics, Advancement in Robots, Robot Anatomy, Human Arm Characteristics, Design and Control Issues, Manipulation and Control, Sensors and Vision, Robotic Programming and Future Prospects
Coordinate Frames, Object Description in Space, Transformation of Vectors, Inverting a homogenous transform, Fundamental Rotation Matrices.

UNIT II: KINEMATIC MODELS
Direct Kinematic Model- Mechanical Structure and Notations, Description of links and joints, Kinematic modelling of the Manipulator, Denavit - Hartenberg notation, Kinematic relationship between Adjacent Links, Manipulator Transformation Matrix
Inverse Kinematic Model- Manipulator workspace, Solvability of Inverse Kinematic model, Solution Techniques, Closed form solution.

UNIT III: JACOBIAN AND DYNAMIC MODELLING
Differential motion and statics- Linear and Angular Velocity of a Rigid Body, Relationship between Transformation, Mapping Velocity Vector, Velocity propogation along links, Manipulator Jacobian, Jacobian Inverse, Jacobian Singularities, Static Analysis
Dynamic modelling- Lagrangian mechanics, Lagrange-Euler formulation, Newton-Euler formulation, Comparison of Langrange-Euler and Newton-Euler formulation, Inverse Dynamics

UNIT IV: ROBOT MANIPULATOR CONTROL AND PATH PLANNING

Robot manipulator control- Introduction, Control of Puma Robot Arm, Computed Torque Technique, near minimum time control, Variable structure control, Non linear decoupled feedback control, Resolved motion control, Adaptive ControlPath/Trajectory Planning- Introduction, Joint space techniques, Cartesian space techniques, State space search, Problem reduction and use of predicate logic, Means-Ends analysis, Problem solving and robot learning, Robot Task Planning and Basic problems.

UNIT V: SENSORS AND ACTUATORS

Range sensing, Proximity sensing, Touch sensors, Force and Torque sensing, Artificial Intelligence techniques using Neural Networks and Fuzzy control

Course Outcomes:

At the end of the course, students will able to

1. Explain the fundamentals of Robotics
2. Analyze the mechanical structure and notations kinematic model
3. Analyze the jacobian and dynamic modeling
4. Explain the robot manipulator control and path planning
5. Describe the various sensors and actuators.

Text Book:

Mittal, R.K. and Nagrath, I.J., Robotic and Control, Tata McGraw Hill, New Delhi, 2003.

References:

1. Fu, K.S., Gonzalez, R.C., and Lee, C.S.G., Robotics Control, Sensing, Vision and Intelligence, McGraw Hill, 1988.
2. Craig, J.J., Introduction to Robotics: Mechanism & Control. Addison Wesley, 1986.
3. Paul, R.P., Robot Manipulator: Mathematics Programming & Control. MIT Press, 1981.
4. Pugh,A., RobotSensors, Vision Vol.-I.Springer Verlag, 1986.
5. Groover, M.P., Industrial Robotics Technology, programming & Application, McGraw Hill, 1986

Mode of Evaluation: Assignment, Written Examination

Elective - IV

14EEE414 HIGH VOLTAGE ENGINEERING

L	T	P	C
3	1	0	3

Course Prerequisite: 14EEE106

Course Description:
This course covers the generation, measurement and testing of high voltages.

Course Objective:
This subject deals with the detailed analysis of Breakdown occur in gaseous, liquids and solid dielectrics.Information about generation and measurement of High voltage and current. In addition, the High voltagetesting methods are also discussed

UNIT-I:BREAK DOWN IN GASEOUS, LIQUID & SOLID DIELECTRICS
Introduction – Gases as Insulating Media, Collision Process, Ionization Process, Townsend's Criteria of Breakdown inGases, Paschen's Law, Liquid as Insulator, Pure and Commercial Liquids, Breakdown in Pure and Commercial Liquids.Intrinsic Breakdown, Electromechanical Breakdown, Thermal Breakdown, Breakdown of SolidDielectrics in Practice, Breakdown in Composite Dielectrics, Solid Dielectrics Used in Practice.

UNIT-II: GENERATION OF HV AC AND DC VOLTAGES
Need for Cascade Connection and Working of Transformers Units Connectedin Cascade. Series Resonant Circuit- Principle of Operation and Advantages - Tesla Coil - HV DCVoltageDoubler Circuit, Cockroft-Walton Type High Voltage DC Set - Calculation of High VoltageRegulation, Ripple and Optimum Number of Stages for Minimum Voltage Drop.

UNIT-III: GENERATION OF IMPULSE VOLTAGES
Introduction to Standard Lightning and Switching Impulse Voltages - Analysis of Single Stage ImpulseGenerator - Multistage Impulse Generator Working of MarxImpulse Generator, Components of Multistage Impulse Generator -Triggering and synchronization of Impulse Generator, Generation of Switching surges - Generation of High Impulse Current.

UNIT- IV: MEASUREMENT OF HIGH VOLTAGES
Electrostatic Voltmeter-Principle, Construction and Limitation - Chubb and Fortescue Method for HV ACMeasurement - Generating Voltmeter- Principle, Construction - Series Resistance Micro Ammeter for HVDC Measurements - Standard Sphere Gap Measurements of HVAC, HVDC And Impulse Voltages -Factors Affecting the Measurements - Potential Dividers-Resistance Dividers Capacitance DividersMixed RC Potential Dividers. Measurement of High Impulse Currents-Rogowsky Coil.

UNIT- V: HIGH VOLTAGE TESTING TECHNIQUES
Dielectric Loss and Loss Angle Measurements Using Schering Bridge - Transformer Ratio Arms Bridge.Need for Discharge Detection and PD Measurements Aspects - Factors Affecting the

DischargeDetection, Discharge Detection Methods-Straight and Balanced Methods. Tests on Isolators, CircuitBreakers, Cables, Insulators and Transformers.

Course Outcomes:
At the end of the course, students will able to

1. describe the break down in gaseous, liquid & solid dielectrics
2. explain the generation of hv ac and dc voltages
3. explain the generation of impulse voltages
4. understand the various method of high voltage measurement methods
5. know various high voltage testing techniques

Text Books:
1. High Voltage Engineering by M.S.Naidu and V. Kamaraju – TMH Publications, 4th Edition, 2004.
2. High Voltage Engineering by C.L.Wadhwa, New Age Internationals (P) Limited, 2007.

References:
1. High Voltage Technology by L. L. Alston, OXFORD University Press, Second Edition, 2009.
2. High Voltage Engineering Problems & Solutions, R. D. Begamudre, New Age International Publishers, First Edition 2010

Mode of Evaluation: Assignment, Written Examination

OPEN ELECTIVES

The task of the excellent teacher is to stimulate "Apparently ordinary" people to unusual effort. The tough problem is not in identifying winners; it is in making winners out of ordinary people.

K. Patricia Cross

Open Elective -I

14HUM401 PROFESSIONAL ETHICS

L	T	P	C
3	0	0	3

Course Prerequisite: None

Course Description:
Professionally accepted standards of personal and business behavior, values and guiding principles. Codes of professional ethics are often established by professional organizations to help guide members in performing their job functions according to consistent ethical principles.

Course Objectives:
The course is intended to

1. To provide a formal acquaintance with the ethical concepts and frameworks.
2. To enable the students to recognize the codes of ethics and moral values relevant to the experience of being a professional.
3. To develop among the students an understanding of various ethical issues relating to professions in general and business, management, education, engineering and computers in particular.
4. To enable the students to develop the awareness needed to understand the role of moral reasoning in the framework of professional life with the help of real time case studies.

UNIT I: PROFESSIONAL ETHICS-INTRODUCTION
The basic nature of ethics- Ethics, Applied Ethics and Professional Ethics, Concept of a Profession, Ethics and Professions, unique status and issues of professional ethics, Across the Professions, the nature and role of moral theories, Ethical Theories- Indian Ethics.

UNIT II: SOME THEORIES AND WOMEN RELATED ISSUES
Utilitarian Theory- Deontological Theory- Virtue Theory- Ethical codes for various professions, Employer-Employee Relation, peculiar moral right of a professional- Whistle-Blowing, the ethical nuances of women related issues in professions- Women and Family Issues, moral implications in concrete situations- Case Studies.

UNIT III: BUSINESS ETHICS AND CORPORATE SOCIAL RESPONSIBILITY
Business- the nature and value of business ethics, Corporate Social Responsibility and Stakeholders, the role of ethics in marketing and advertising and their relevance for professionals, the right of a professional to a safe workplace- Occupational Health, Case-Studies.

UNIT IV: ETHICS IN MANAGEMENT AND EDUCATION
Management- management ethics and its importance for professionals, the value of an ethical approach in management- Efficiency and Effectiveness, the moral implications of an unjust dismissal- Discrimination and Unjust Dismissal- Case-Studies. Education- the role of ethics in the field of education, the need for ethical codes in the educational system- Educator and Educational Institutions- Case-Studies.

UNIT V: ETHICS IN ENGINEERING AND COMPUTERS

Engineering- the nature of engineering ethics, the inter-dependence of standards and values in engineering profession- Standards and Values for Engineers, ethical practices in engineering- Engineers and Public Interest- the ethical issues concerning the use of professional information in engineering, Case-Studies. Computers- the ethical impacts of computerization on a society, Ethical Problems in Information and Communication, the ethical impacts of internet on a society, some peculiar moral issues raised by the use of internet- Privacy, Security, and Moral Wrongdoing, Case-Studies.

Course Outcomes:

Upon completion of this course, students will be able to

1. Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field.
2. Identify the multiple ethical interests at stake in a real-world situation or practice.
3. Assess their own ethical values and the social context of problems.
4. Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects.
5. Integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research.

Text Book:

Boatright, John R., Ethics and the Conduct of Business, Pearson Education, Fifth Edition, Indian Reprint, 2007

References:

1. Rowan, John, and Zinaich, Jr., Ethics for the Professions, Wadsworth, 2003.
2. Sekhar, R.C., Ethical Choices in Business, Response Books, Sage Publications, 1997.
3. Harris, Charles, E. Jr., Michael S. Pritchard, Michael J. Rabins, Engineering Ethics: Concepts & Cases, Wadsworth Publishing Company, 1995
4. Erwann, M.David, Williams, Masy B and Gutierrez, Claudio, Computers, Ethics, and Society, Oxford University Press, 1990
5. Langford, Duncan (ed.), Internet Ethics, Macmillan Press Ltd, 2000
6. Sachdev, Kumar Neeraj, Ethics: A Virtue Theoretic Approach, Delhi: Adhyayan Publishers &Distributors, 2005.

Mode of Evaluation: Assignment, Seminar, Written Examination.

Open Elective-I

14MAT401 NUMERICAL ANALYSIS

L	T	P	C
3	0	0	3

Course Prerequisite: 14MAT12T02& 14MAT103

CourseDescription:
Numerical approach to find errors, calculation of roots; solving system of linear equations; interpolation, trapezoidal rule and Simpson's rule; Taylor Series, Finite difference methods for ordinary differential equations; Wave, heat and poisson equations.

Course Objectives:
1. To avail knowledge in solving nonlinear equations through Numerical methods.
2. To familiarize the student in the fields of finite difference methods and Numerical calculus.
3. Our emphasis will be more on the logical and problem solving techniques in numerical methods for differential equations.
4. To introduce finite difference methods and its applications in technical fields.

UNIT I: SOLUTIONS OF ALGEBRAIC &TRANSCENDENTAL EQUATIONS
Introduction to Numerical analysis, Errors, Sources of errors, Floating point arithmetic, Significant digits, Relative error, Propagation of errors, how to avoid loss of significant digits, evaluation of polynomial.
Bisection, False-position, Fixed point iteration method, Newton's method, Secant, Order of convergence, Multiple roots by Newton's method.

UNIT II: SYSTEM OF SIMULTANEOUS LINEAR EQUATIONS
Gaussian Elimination, LU decomposition, Thomas algorithm for the tridiagonal systems, Norms, Condition numbers and errors in computed solutions. Jacobi's method, Gauss seidel method, Power method leading to Eigen values and eigenvectors of matrices.

UNIT III: INTERPOLATION & NUMERICAL CALCULUS
Existence and Uniqueness of interpolating polynomial, Lagrange polynomials, Divided differences, Evenly spaced points, Error of interpolation, cubic spline, Inverse interpolation, Derivatives from difference table, Higher order derivatives, Trapezoidal rule, Simpsons rule, a composite formula, Gaussian Quadrature.

UNIT IV: NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS
The Taylor series method, Euler and Modified Euler's method, Runge-Kutta methods for initial value problems.Theshooting method, Finite difference method for boundary value problems.

UNIT V:NUMERICAL SOLUTION TO PARTIAL DIFFERENTIAL EQUATIONS
Finite difference method ofWave, Heat and Poisson equations (initial and boundary).

Course Outcomes:

At the end of this course, students should be able to obtain

1. The student becomes familiar with the applications of numerical techniques in solving the nonlinear equations of engineering problems.
2. Ability to solve the system of linear equations using Numerical methods.
3. The student knows how to solve the calculus problems using Numerical techniques.
4. The student gains the knowledge to tackle the engineering problems using concepts of differential equations and numerical methods.
5. The student is capable of solving partial differential equations numerically, which finds its applications in different fields of engineering.

Text Book:

Applied Numerical Analysis by Curtis F. Gerald, Patrich O. Wheatley Pearson Education, 7th Edition, 2003.

References:

1. Numerical Analysis by Burden and Faires, 7th ed., Thomson Learning, 2001.
2. A Friendly Introduction to Numerical Analysis by Brain Bradie, 1sted., Pearson, 2005.
3. Elementary Numerical Analysis byK. Atkinson&Weimin Han, 3rd ed., Wiley, 2004.
4. Advanced Engineering Mathematics by E. Kreyszig, 10th ed., Wiley, 2010.
5. Applied Numerical Methods with MATLAB for Engineers and Scientists by Steven C. Chapra, 3rd ed., McGraw Hill, 2012.

Mode of Evaluation: Assignments, Internal Mid examinations, External End Examination.

Open Elective - I

14CHE401 INTRODUCTION TO NANOSCIENCE AND TECHNOLOGY

L	T	P	C
3	0	0	3

Course Prerequisites: 14CHE11T01

Course Description:
This is primarily a course which brings together relevant knowledge from the disciplines of physics and chemistry to give students a fundamental understanding of the integrated multidisciplinary nature of Nanotechnology. It will also be a forum for discussion on the possible consequences of such technological development. This multidisciplinary course will bring together discipline based knowledge and skills and which will show how this expertise can be applied to Nano-technological problems.

Course Objectives:
1. This course is designed to provide students with an overview of current topics and challenges in Nanoscience and Technology.
2. To introduce various synthetic strategies of nanomaterials.
3. To familiarize the existing types of nanostructured materials.
4. To analyze the properties and characterization techniques of nanomaterials.
5. To sensitize students with the exhaustive applications of nanomaterials and their current role in the modern technology.

UNIT I: BACKGROUND TO NANOTECHNOLOGY
Scientific revolution- Atomic structures-Molecular and atomic size-Bohr radius – Emergence of Nanotechnology – Challenges in Nanotechnology - Carbon age–New form of carbon, graphene sheet, CNT.

UNIT II: SYNTHESIS OF NANOMATERIALS
Types of simple crystal structures, top-down and bottom-up approaches, self assembly process-grain boundary volume in nanocrystals-defects in nanocrystals-surface effects on the properties.Self-assembly of nanoparticles on surfaces like silica surfaces and stainless steel surfaces.

UNIT III: TYPES OF NANOSTRUCTURES
Definition of a Nano system – Nanoscale building blocks, Types of Nanocrystals-One Dimensional (1D)-Two Dimensional (2D) -Three Dimensional (3D) nanostructured materials - Quantum dots (OD)-Quantum wire-Core/Shell structures.

UNIT IV: NANOMATERIALS AND PROPERTIES
Carbon Nanotubes (CNT) - Metals (Au, Ag) – Phase diagram of simple binary systems, Metal oxides (TiO_2, CeO_2, ZnO) -Semiconductors (Si, Ge, CdS, ZnSe) - Ceramics and Composites - Dilute magnetic

semiconductor.The Nanoscale and colloidal systems, characterization techniques, optical properties, LED application.

UNIT V: APPLICATIONS OF NANOMATERIALS

Molecular electronics and nanoelectronics – Quantum electronic devices - CNT based transistor and Field Emission Display - Biological applications - Biochemical sensor - Membrane based water purification, Targeted base drug delivery system.

Course Outcomes:

Upon completion of this course the students should be able to:

1. Demonstrate a working knowledge of nanotechnology principles and industry applications.
2. Identify current nanotechnology solutions in design, engineering and manufacturing.
3. Explain the nanoscale paradigm in terms of properties at the nanoscale dimensions.
4. Apply key concepts in materials science, chemistry, physics, biology and engineering to the field of nanotechnology.
5. Search, read and present current nanotechnology literature applied to a particular problem domain.

Text Books:

1. M. Wilson, K. Kannangara, G Smith, M. Simmons, B. Raguse, Nanotechnology: Basic science and Emerging technologies, Overseas Press India Pvt Ltd, New Delhi, First Edition,2005.
2. C.N.R.Rao, A.Muller, A.K.Cheetham (Eds), the chemistry of nanomaterials: Synthesis, properties and applications, Wiley VCH VerlagGmbh&Co, Weinheim, 2004.
3. Kenneth J. Klabunde (Eds), Nanoscale Materials Science, John Wiley & Sons, Inc, 2001.
4. C.S.S.R.Kumar, J.Hormes, C.Leuschner, Nanofabrication towards biomedical applications, Wiley – VCH Verlag GmbH & Co, Weinheim, 2004.

References:

1. W. Rainer, Nano Electronics and information Technology, Wiley, 2003.
2. K.E.Drexler, Nano systems, Wiley, 1992.
3. G.Cao, Naostructures and Nanomaterials: Synthesis, properties and applications, Imperical College Press, 2004.
4. T. Pradeep,Nano: The Essentials,Understanding Nano science and Nanotechnology, Tata McGraw-Hill Publishing CompanyLimited, New Delhi, 2007

Mode of Evaluation: Assignments, Internal Mid Examinations and Semester end examination

Open Elective- I

14PHY401 PHYSICS OF LASER AND APPLICATIONS

L	T	P	C
3	0	0	3

Course Prerequisite: None

Course Description:
This course covers the introduction to the theory and mechanism of laser action, various types of lasers and their applications and future use.

Course Objectives:
1. Make the student to understand the principle of laser.
2. Explain the properties of laser light and to make them understand the operations of different types of lasers.
3. Students are aware of latest developments in certain areas of Physics which have important applications for societal needs. Explain how material processing is accomplished with lasers.
4. Estimate laser operation parameters for material processing.
5. Introduce basic fiber optic communication systems using laser, and to make the students learn about their important applications for societal needs.

UNIT I: INTRODUCTION
Laser characteristics, Spontaneous and Stimulated emission of radiation, Einstein's Coefficients, Population inversion, Methods of Population Inversion Gaussian beam and its properties, Stable two minor optical resonators, Longitudinal and transverse modes of laser cavity, Mode selection, Gain in the regenerative laser cavity.

UNIT II: TYPES OF LASERS AND THEIR CONSTRUCTION
Basic principles of lasers, Solid-state lasers, Gas lasers, Ruby laser, Nd-YAG Laser, He-Ne laser, Carbon dioxide laser, Nitrogen laser.

UNIT III: TYPES OF LASERS- II
Semiconductor lasers, free electron lasers, Liquid, Dye and Chemical lasers. High power laser systems.Laser spectroscopic techniques and other applications.

UNIT IV: LASER OPTICS
Laser fluorescence and Raman scattering and their use in pollution studies, Laser induced multi-photon processes and their applications. Ultra high resolution spectroscopy with lasers and its applications.

UNIT V: LASER SPECTROSCOPY AND OPTICAL FIBERS
Propagation of light in a medium with variable refractive index, Construction and principle of optical fiber, light wave communication, medical and engineering applications of lasers.

Course Outcomes:

Upon completion of this course the students shall be able to:

1. Understand the principle of phenomenon of laser and identify the four elements of different lasers.
2. Estimate stability requirements introducing laser light by different types of sources.
3. Describe the structure and working of various types of lasers and their means of excitation.
4. Assesswhich laser would best meet the need for a particular industrial or research task.
5. Understands and appreciates components of optical fiber communication system and its important applications for societal needs.

Text books:

1. Laser Theory and Applications: A.K. Ghatak and K. Thyagarajan
2. Optics: Ghatak, 4th Edition, Tata McGraw Hill.

References:

1. Principles of Laser: O. Svelto
2. Laser spectroscopy: Demtroder
3. Laser Applications: Monte Ross

Mode of evaluation: Assignment, Seminar, Written Examination.

Open Elective- II

14HUM402 HUMAN RESOURCE DEVELOPMENT

L	T	P	C
3	0	0	3

Course Prerequisite: None

Course Description:
The course content includes : Introduction to HRM, strategic human resource challenges , work flows, job analysis, managing diversity, concepts, goals , mechanism and system of HRD, recruitment and selection, downsizing and outplacement, appraising and managing employee performance, training, career development, managing compensation, rewarding performance, designing benefit plans, employee relation and employee discipline ,and workplace safety and health.

Course Objectives:
The course is intended to

1. Every Organization (industrial, educational, medical etc.) had to depend on the co-operation of its personnel for accomplishing its set objectives.
2. This course aims at providing understanding of various human resource management concepts to obtain necessary co-operation and commitment of the organizational personnel
3. Performance management
4. Training programs &Succession plans
5. Motivation and employee engagement
6. Career development
7. Coaching and mentoring
8. Leadership development

UNIT I: INTRODUCTION
Understanding the nature and scope of Human Resource Management- Definition, Functions/objectives, organization of department, Evolution, Context in HRM Changing role in HRM Meeting present and emerging strategic Human resource challenges- Human resource management, planning and implementing strategic HR Policies, selecting HR strategies to increase firm performance.

UNIT II: HUMAN RESOURCE PLANNING
Human Resource Planning- Nature and importance of HR planning, Factors affecting HRP, the planning process, managerial succession planning. Analysis Work and Designing Jobs- Process of Job Analysis, Methods of collecting job data, Competency based Job Analysis, Job design approach, contemporary issues in Job Description.

UNIT III: RECRUITMENT, SELECTION AND PERFORMANCE APPRAISAL
Recruiting and selecting employees- Recruiting Human resource, recruitment process, Evaluation process, Selection process, Barriers, selection in India. Appraising and Managing Performance- Basic

Concept of Performance Management, Process of Performance Appraisal, Methods of Performance Appraisal - Errors in Performance Appraisal.

UNIT IV: TRAINING AND DEVELOPMENT

Training the workforce- Training v/s development, challenges in training, managing training process. Developing careers- Career development, effective career development, managing compensation- Designing, compensation tools. Rewarding performance & designing benefits- Designing pay for performance, types of Pay for performance, benefits strategy, administering benefits.

UNIT V: INDUSTRIAL RELATIONS, TRADE UNIONS, EMPLOYEE SAFETY AND HEALTH

Industrial Relations, Trade unions, Resolving dispute- Labor Movement - Trade Union in India, Collective Bargaining: Process and Methods, Grievance: Sources and process of Redressal, Managing Ethical issues in Human Resource Management- Ethics and fair treatment at work.- Human Resource Management's role in promoting ethics and fair treatment, Employee Discipline and Privacy, Managing Dismissal. Employee Safety and Health- Safety, Types of accidents, Need for safety. Safety Programme, Health.

Course Outcomes:

Upon completion of this course, students will be able to

1. Formulate Human Resource Development strategies that attract, develop, and retain the best human capital and talent.
2. Design and implement workplace learning and performance interventions to achieve employee and organizational goals.
3. Develop effective consulting, coaching, and mentoring skills to sustain learning, performance, and change in the workplace.
4. Lead strategic change initiatives and manage projects in any organizational setting.
5. Evaluate Human Resource Development programs and interventions to determine their quality, value, and effectiveness.

Text Books:

1. Aswathappa K., Human Resource Management- Text and Cases, Tata McGraw Hill, 6th Edition, 2010
2. Gomez-Mejia, L.R., Balkin, D.B., &Cardy, R.L. Managing Human Resource Management 6th edition, Pearson Edu. 2007.

References:

1. Garry Dessler, BijuVarkkey, Human Resource Management,11th Edition, Pearson Education, 2009.
2. R. Wayne Mondy, Human Resource Management, 10th Edition, 2010

Mode of Evaluation: Assignment, Seminar, Written Examination.

Open Elective-II

14MAT402 ENGINEERING OPTIMIZATION

L	T	P	C
3	0	0	3

Course Prerequisite: 14MAT11T01, 14MAT12T02&14MAT103

Course Description:
Linear programming problem, Goal programming, transportation and assignment problems, unconstrained and constrained optimization, project management and queuing models.

Course Objectives:
1. Provide students with the basic mathematical concepts of optimization.
2. Understand the theory of optimization methods and algorithms for solving various types of optimization problems.
3. Emphasize the modeling skills necessary to describe and formulate optimization problems.
4. Avail knowledge to solve and interpret optimization problems in engineering.
5. Analyze the techniques of project management and Queuing models.

UNIT I: LINEAR PROGRAMMING PROBLEM
Introduction to optimization, Linear Programming Problem (LPP), Mathematical formulation, Graphical solution, convex set, simplex method, artificial variable technique - Big M-method and two phase simplex method.

UNIT II: DUALITY IN LINEAR PROGRAMMING PROBLEM
Duality: formulation of dual Problem, Primal-Dual Relationships, Dual Simplex method, Sensitivity analysis and Post optimal analysis.

UNIT III: TRANSPORTATION PROBLEM AND GOAL PROGRAMMING PROBLEM
Transportation problem: definition and algorithm, Assignment problem. Goal Programming - formulation, Goal programming algorithms: The weights method and the preemptive method.

UNIT IV: UNCONSTRAINED & CONSTRAINED OPTIMIZATION
Unconstrained optimization, constrained multivariable optimization with equality constraints- Direct substitution method and Lagrange multipliers method, constrained multivariable optimization with inequality constraints - Kuhn-Tucker conditions. Elimination Methods- Interval Halving Method, Fibonacci Method and Golden Section Method, Gradient of a Function, Descent Methods - Steepest Descent Method and Conjugate Gradient (Fletcher-Reeves) Method.

UNIT V: PROJECT MANAGEMENT & QUEUING MODELS

Network analysis: Network representation, Critical Path Method (CPM) and Project Evolutionary and Review Technique (PERT).Introduction to Queuing system, single server queuing models (M/M/1): (∞/FCFS**)**, (M/M/1): (N/FCFS**),** Multi-server queuing models (M/M/s): (∞/FCFS**),** (M/M/s): (N/FCFS**).**

Course Outcomes:

The student will be able to

1. Understood the importance of Optimization.
2. Get an idea about the Unconstrained and Constrained Optimization Techniques.
3. Applying Transportation & Assignment Problems in Engineering
4. Analyze the problems of Network Analysis for Project Management and Queuing Systems Engineering & Industry.
5. Think to solve the various problems in Engineering using the suitable Optimization techniques.

Text Books:

1. Hamdy A Taha, Operations Research: An Introduction, Pearson Education, 9/E, 2011.
2. J K Sharma, Operations Research: Theory and Practice, Macmillan Publishers India Ltd, 5th Edition, 2013.

References:

1. SS Rao, Engineering Optimization: Theory and Practice, New Age International (P) Limited, Third Edition, 1996 (R1)
2. FS Hillier and GJ Lieberman, Introduction to Operations Research, TMH, 8/E, 2006.
3. JC Pant, Introduction to Optimization*:* Operations Research**,** Jain Brothers, New, 6/E, 2004.
4. A Ravindran, DT Philips and JJ Solberg, Operations Research: Principles and Practice, John Wiley & Sons, Singapore, Second Edition. (R5).

Mode of Evaluation: Assignments, Internal Mid Examinations, External End Examination.

Open Elective-II

14CHE402 GREEN CHEMISTRY AND CATALYSIS FOR SUSTAINABLE ENVIRONMENT

L	T	P	C
3	0	0	3

Course Prerequisite: 14CHE11T01

Course Description:
This course aims to introduce the interdisciplinary concept for engineering's to enhance their knowledge that they need to contribute with relevance and confidence in developing green technologies. This course covers feed stocks, green metrics and the design of safer, more efficient processes, as well as the role catalysts and solvents and green processes for Nanoscience.

Course Objectives:
1. Learn an interdisciplinary approach to the scientific and societal issues arising from industrial chemical production, including the facets of chemistry and environmental health sciences that can be integrated to promote green chemistry
2. Sensitize the students in redesigning of chemicals, industrial processes and products by means of catalysis.
3. Understand the use of alternatives assessments in using environmentally benign solvents.
4. Emphasize current emerging greener technologies and the need of alternative energies.
5. Learn to adopt green chemistry principles in practicing Nanoscience.

UNIT I: PRINCIPLES AND CONCEPTS OF GREEN CHEMISTRY
Introduction, Green chemistry Principles, sustainable development and green chemistry, atom economy, atom economic: Rearrangement and addition reactions and un-economic reactions: Substitution, elimination and Wittig reactions, Reducing Toxicity. Waste - problems and Prevention: Design for degradation, Polymer recycling.

UNIT II: CATALYSIS AND GREEN CHEMISTRY
Introduction to catalysis, Heterogeneous catalysts: Basics of Heterogeneous Catalysis, Zeolites and the Bulk Chemical Industry, Heterogeneous Catalysis in the Fine Chemical and Pharmaceutical Industries, Catalytic Converters, Homogeneous catalysis: Transition Metal Catalysts with Phosphine Ligands, Greener Lewis Acids, Asymmetric Catalysis, Heterogenising the Homogenous catalysts, Phase transfer catalysis: Hazard Reduction, C–C Bond Formation, Oxidation Using Hydrogen Peroxide, Bio-catalysis and photo-catalysis with examples.

UNIT III: ORGANIC SOLVENTS: ENVIRONMENTALLY BENIGN SOLUTIONS

Organic solvents and volatile organic compounds, solvent free systems, supercritical fluids: Super critical carbondioxide, super critical water and water as a reaction solvent: water based coatings, Ionic liquids as catalyst and solvent.

UNIT IV: EMERGING GREENER TECHNOLOGIES AND ALTERNATIVE ENERGY SOURCES

Biomass as renewable resource, Energy: Fossil Fuels, Energy from Biomass, Solar Power, Other Forms of Renewable Energy, Fuel Cells, Chemicals from Renewable feed stocks: Chemicals from Renewable Feed stocks: Chemicals from Fatty Acids, Polymers from Renewable Resources, Some Other Chemicals from Natural Resources, Alternative Economies: The Syngas Economy, The Bio-refinery, Design for energy efficiency: Photochemical Reactions: Advantages of and Challenges Faced by Photochemical Processes, Examples of Photochemical Reactions, Chemistry Using Microwaves: Microwave Heating, Microwave-assisted Reactions, Sonochemistry: Sonochemistry and Green Chemistry, Electrochemical Synthesis: Examples of Electrochemical Synthesis.Industrial applications of alternative environmentally benign catalytic systems for carrying out the important reactions such as selective oxidation, reduction and C-C bond formations (specific reactions).

UNIT V: GREEN PROCESSES FOR GREEN NANOSCIENCE

Introduction and traditional methods in the nanomaterials synthesis, Translating green chemistry principles for practicing Green Nanoscience.Green Synthesis of Nanophase Inorganic Materials and Metal Oxide Nanoparticles: Hydrothermal Synthesis, Reflux Synthesis, Microwave-Assisted Synthesis, Other methods for Green synthesis of metal and metal oxide nanoparticles, Green chemistry applications of Inorganic nanomaterials.

Course Outcomes:

Upon completion of this course the students should

1. Recognize green chemistry concepts and apply these ideas to develop respect for the interconnectedness of our world and an ethic of environmental care and sustainability.
2. Understand and apply catalysis for developing eco friendly processes.
3. Be in a position to use environmental benign solvents where ever possible.
4. Have knowledge of current trends in alternative energy sources.
5. Apply green chemistry principles in practicing green Nanoscience.

Text Books:

1. M. Lancaster, Green Chemistry an introductory text, Royal Society of Chemistry, 2002.
2. Paul T. Anastas and John C. Warner, Green Chemistry Theory and Practice, 4th Edition, Oxford University Press, USA.

Reference:

Edited by AlvisePerosa and Maurizio Selva, Hand Book of Greenchemistry Volume 8: Green Nanosciences, Wiley-VCH.

Mode of evaluation: Assignments, Internal Mid examinations and semester end examination.

Open Elective- II

14PHY402 OPTICAL PHYSICS AND APPLICATIONS

L	T	P	C
3	0	0	3

Course Description:
The course will cover Geometrical optics, Aberrations, Physical Optics, Diffractionand Optical fibers.

Course Objectives:
1. Knowledge of basic principles and concepts in optics and the techniques used to deal with them.
2. Explain the limitations associated with spherical and chromatic aberration.
3. Describe optical systems such as microscopes and telescopes with reference to parameters such as angular magnification and depth of field.
4. Provide a working knowledge of optical physics, including interference, diffraction and physical optics.
5. Introduce construction and concepts of basic fiber optic communication system and to make the students learn about its important applications for societal needs.

UNIT I: INTRODUCTION
Corpuscular and wave theory, Fermat's principle, Matrices for translation, refraction and reflection, Unit and nodal planes, Eigen values and Eigenvectors.

UNIT II: ABERRATIONS AND OPTICAL INSTRUMENTS
Types of aberrations, Chromatic and monochromatic aberrations. Different types of monochromatic aberrations. Simple and Compound microscopes, Astronomical and Terrestrial telescopes.Ramsden's and Huygens' eye pieces.

UNIT III: WAVE OPTICS & INTERFERENCE
Huygens' Principle, Superposition of waves, Fourier transforms, representation of slits and apertures, two beam interference by Division of wave front. Applications of Interference, Non linear interaction of light with matter (self-study).

UNIT IV: DIFFRACTION & POLARISATION
Fraunhoffer diffraction, Diffractionfrom single slit, double slit & multiple slits, Fresnel half-period zones, Zone plate, Applications of diffraction, Polarization, Malus' law, double refraction. Applications of polarization.

UNIT V: OPTICAL FIBERS

Construction and working principle of optical fibers, Numerical aperture and acceptance angle, Types of optical fibers. Attenuation and losses in optical fibers, Analog and Digital optical fiber communication system.Applications of optical fibers in communication, sensors and medicine.

Course Outcomes:

Upon completion of this course the students shall be able to:

1. Understand the fundamental characteristics of light and their mathematical principles.
2. Demonstrate an understanding of defects in optical instruments.
3. Describe optical phenomena and the principles of interference, diffraction and polarization in terms of the wave model.
4. Apply optical techniques in cutting edge research areas.
5. Describe the basic laser physics, working of lasers and principle of propagation of light in optical fibers.

Text Book:

Optics by Ghatak, 4th Edition, Tata McGraw Hill (2011).

References:

1. Optics by Lipson, Lipson & Lipson, 4th Edition, Cambridge Univ Press (2010).
2. Optics by Hecht, 4th Edition, Addison-Wesley (2002).

Mode of evaluation: Assignment, Seminar, Written Examination.

AUDIT COURSES

Don’t watch the clock;
Do what it does. Keep going.
Sam Levenson

Audit Course -I

14ENG301 EFFECTIVE PUBLIC SPEAKING

L	T	P	C
2	0	0	0

Course Prerequisite: None

Course Description:
This course provides effective presentation training tools and skills include good content, organization, delivery, audience, and analysis. These enhance students' traits in becoming a more critical consumer of information and delivery of speeches within a public setting and group discussion. Emphasis is on research, preparation, delivery, and evaluation of informative, persuasive, and special occasion public speaking.

Course Objectives:
1. To improve student's speaking skills in various professional contexts and enable one to develop the art of public speaking.
2. To improve student's speaking skills in various professional contexts and enable one to develop the art of public speaking.
3. To develop the necessary skills through actual practice in presenting information, giving seminars, participating in group talk etc.

UNIT I:
Public Speaking- an overview- Significance to professionals- Importance of Listening and Speaking Skills.

UNIT II :
Credibility & Confidence- Preparation of Speech & Audience Analysis.

UNIT III :
Organization of Speech- Platform Manners & Use of Microphones- Modes of Delivery.

UNIT IV:
Use of Visual Aids- Psychology of Persuasion- Speeches for Special Occasions.

UNIT V:
Speech Practice.

Course Outcomes:

At the end of this course, students will able to

1. Understand public speaking and its significance to professionals.
2. Know the importance of listening for effective speaking.
3. Develop speeches that can increase self-confidence and credibility.
4. Understand how to prepare, rehearse and present a speech.
5. Become aware of the different nuances involved in the speeches for different occasions such as giving seminars and participating in group talks etc.

Text Book:

PushpLata and Sanjay Kumar. Communicate or Collapse New Delhi: Prentice Hall ofIndia, 2007.

References:

1. Lucas, Stephen E. The Art of Public Speaking. Third Edition, Singapore: McGraw- Hill, 1989.
2. Deanna D Sell now Public Speaking A Process Approach Media Edition, Wadsworth/Thomson, 2003.
3. Jaffe, Clella. Public Speaking New Delhi: Cengage Learning India Pvt. Ltd, 2008.
4. Bellingham, Jo. Giving Presentations Delhi: Oxford University Press. 2003.
5. Qubein, Nido. How to be a Great Communicator New Delhi: Viva. 1997.

Mode of Evaluation: Assignments, Written Examination (Internal Only)

Audit Course - I

14ENG302 CREATIVE WRITING

L	T	P	C
2	0	0	0

Course Prerequisite: None

Course Description:
The course functions as a broad-based introduction to various forms of creative writing, such as short fiction, poetry and drama. Short story writing is geared toward creative writing so that students learn about character, dialogue, voice, style and description in fiction. The course provides them with the opportunity to delve deeper into the analysis of selected short fiction and to work on stories of their own. Students explore the genre of poetry in-depth through their own writing and that of published poets. The study of playwriting involves many of the same focuses as short story writing, such as dialogue, character and plot. Students also experiment with writing these genres. The class is usually comprised of technique and style discussions, reading assignments and writing exercises.

Course Objectives:
1. To familiarize the students with different forms of writing: poetry, scene writing, and vignette and feature writing.
2. Apart from writing, the course will also encourage students to read and acquaint, appreciate and respond to different genres of writing.

UNIT I:
Introduction to creative writing and reading, Poetry, Short Story, Drama, Fiction, Non Fiction, Feature Writing, etc.

UNIT II:
Poetry, Scenario writing, feature and vignette writing, Haiku, Object Poem, List Poem, Visual Poem, Nature Poem, Scanning a poem and understanding its meaning

UNIT III:
Writing a scene, finding sources from which to draw ideas to write scenes, creating an effective setting for a scene to take place; creating strong, believable characters in a scene.

UNIT IV:
Learning how a scene can drive the plot of a story, how to effectively use point of view to enhance a scene, how to write interesting and useful dialogue, self-editing own writing.

UNIT V:
Writing a vignette, finding sources from which to draw ideas to write a vignette, organizing one's time and ideas to produce a longer piece of writing.

Course Outcomes:
At the end of this course, students will able to
1. Develop skills in writing, editing, and revision in the literary genre.
2. Enhance to inform appreciation and understanding of poetry.
3. Demonstrate the ability to read and respond thoughtfully.
4. Develop plot of the story and sketch characters with relevant dialogues; overall script writing and editing skills are imparted.
5. Understand the effective writing skills such as good essays and projecting scholarly ideas to the mass media.

Text Book:
Mills, Paul. 2006. Creative Writing Course Book. New York: Routledge.

References:

1. Jaron, Philip K. and Allan B. Lefcouitz. 2004. Creative Writer's Hand Book. 4th ed. Prentice Hall.
2. Bulman, Colin. 2007. Creative Writing: A guide and glossary to fiction writing. Polity Press.
3. Coles Notes. 1991. Dictionary of Literary Terms. Delhi: Chaman Enterprises.
4. Minot, Stephen. 1971. Three Genres: The Writing of Poetry, Fiction, and Drama. Englewood Cliffs: Prentice-Hall.

Mode of Evaluation: Assignments, Written Examination (Internal Only)

Audit Course - I

14HUM301 ENTREPRENEURSHIP DEVELOPMENT

L	T	P	C
2	0	0	0

Course Prerequisite: None

Course Description:

The objective of this course is to inculcate in students the skills necessary to craft strategies and initiatives which can enable growth and sustainability in an entrepreneurial venture, to include the effective management of inventory, receivables, production, human resources, financial resources, and risk. Students will develop higher-level critical thinking skills, evidenced by analysis, evaluation, and synthesis.

Course Objectives:

The course is intended to

1. Identify legal issues affecting development, ownership and operation of commercial property.
2. Understand strategies to manage and/or exit from distressed properties.
3. Addressing the development challenges that start-ups face.
4. Build skills needed to create high-value technology companies.
5. Analyze prospective venture capital investments.
6. Work in an entrepreneurial firm with instructor coaching.
7. In-depth research regarding a specific business opportunity.
8. Opportunity identification & evaluation.
9. Steps required to start a business.
10. Creativity techniques at the individual and organizational level to identify and capitalize on innovative opportunities.
11. Develop skills to translate patents and other intellectual property into viable business opportunities.
12. Analytic techniques to determine highest and best use of property.
13. Understand venture capital and angel investor funding criteria and contractual terms.

UNIT I: INTRODUCTION

Nature of Entrepreneurship- Features - Entrepreneur‘s competencies, attitude, qualities, functions. Entrepreneurial scenario in India and Abroad.Forms of Entrepreneurship: Small Business, Importance in Indian Economy, Types of ownership, sole trading, partnership, important features of various types of businesses -corporate entrepreneurship, intrapreneurship - Role of Government in the promotion of Entrepreneur, State Enterprises in India.

UNIT II: PROMOTIONAL & FINANCIAL ASPECTS OF ENTREPRENEURSHIP

Idea generation– opportunities - SWOT Analysis - patents and trademarks, Intellectual Property Rights.Financial Aspects of the Entrepreneurship: Source of Capital, Debt capital, seed capital, venture capital - Informal Agencies In financing entrepreneurs, Government Grants and Subsidies, Types of Investors and Private Offerings.

UNIT III: PROJECT PLANNING AND FEASIBILITY STUDIES

The Concept of Project, Project Life Cycle -Project Planning, Feasibility – Project proposal & report preparation. Entrepreneurial Strategy: Generation of new entry opportunity, Decisions under Uncertainty, entry strategy, new entry exploitation, environmental instability and First-Mover disadvantages, Risk Reduction strategies, Market scope strategy, Imitation strategiesand Managing Newness.

UNIT IV: WOMEN ENTREPRENEURSHIP

Scope of entrepreneurship among women, promotional efforts supporting women entrepreneurs in India - Successful cases of women entrepreneurs.

UNIT V: RURAL ENTREPRENEURSHIP AND EDPS

Need, Rural Industrialization – Role of NGO‘s –Organising EDPs – Need, Objectives, Evaluation of EDPs.

Course Outcomes:

At the end of this course, students will able to

1. Understand the concepts of entrepreneurship and its role in Indian Economy.
2. Compare and apply sources of different promotional and financial aspects.
3. Understand and analyze the feasibility study in project planning.
4. Find the women entrepreneurship development in India.
5. Assess the rural entrepreneurship and strengthen the role of NGOs and EDPs.

References:

1. Entrepreneurial Development, S. Chand and Company Limited, S.S. Khanka, New Delhi,2009.
2. Fundamentals of Entrepreneurship, H. Nandan, PHI, First/e, New Delhi, 2009.
3. Entrepreneurship, 6/e, Robert D Hisrich, Michael P Peters, Dean A Shepherd, TMH, 2009.
4. The Dynamics of Entrepreneurial Development and Management, Vasanth
5. Desai, Himalaya,2009
6. Entrepreneurship Management – text and cases, BholanathDutta, Excel Books, 2009
7. Entrepreneurship – New venture Creation, Holt, PHI, 2009.

Mode of Evaluation: Assignments, Written Examination (Internal Only)

Audit Course - I

14HUM302 INTRODUCTION TO INTELLECTUAL PROPERTY RIGHTS

L	T	P	C
2	0	0	0

Course Prerequisite: None

Course Description:
Intellectual property (IP) is a legal term that refers to creations of the mind. Examples of intellectual property include music, literature, and other artistic works; discoveries and inventions; and words, phrases, symbols, and designs. Under intellectual property laws, owners of intellectual property are granted certain exclusive rights. Some common types of intellectual property rights (IPR) are copyright, patents, and industrial design rights; and the rights that protect trademarks, trade dress, and in some jurisdictions trade secrets. Intellectual property rights are themselves a form of property, called intangible property.

Course Objectives:
The course is intended to

1. This course will provide the engineering as well as management students to understand the importance of intellectual property rights protection and management.
2. It is an important part of new products/processes/ technologies development to get the competitive advantages for competing and sustaining in the competitive global business scenario.
3. This represents the Intellectual Property Rights, assets, ownership rights and valuation of property rights.
4. It represents the Filing of patent rights, acts, rules & portfolio analysis, management, patent strategy.
5. It represents the Right to Information Act, objectives, obligations, powers &functions, penalties & appeal.

UNIT I:
Introductory issues related to intellectual property and its protection, WTO, TRIPS Agreement& its Protection.

UNIT II:
Introduction to Copyrights - Principles of Copyright Principles -The subject matter of Copyright - The Rights Afforded by Copyright Law - Copyright ownership, transfers and duration - Right to prepare

derivative works – Rights of Distribution - Copyright Formalities and Registrations - Limitations - Copyright disputes and International Copyright Law – Semiconductor Chip Protection Act – Patent - Trademark – Industrial Design – Trade Secret – Geographical indications.

UNIT III:
Commercialization of IP assets: Contracting, Licensing, Assignment and technology transfer; Drawing up a business strategyIP rights in export markets; Ownership of rights by employees; Valuation of intellectual property rights.

UNIT IV:
Procedure for filing patent in India and other countries, PCT filing, Patent Search, Patent Acts & Rules, Patent Infringement, Patent Portfolio analysis and management, Patent Strategy.

UNIT V:
RTI – Introduction – Objectives – Obligation of Public Authorities – The Central & State information commission – Powers & Functions – Penalties & Appeal.

Course Outcomes:
At the end of this course, students will able to

1. Understand the process of getting intellectual property rights and managing the IP assets strategically.
2. Broaden thinking perspective of the students that will enhance their long term planning and decision making capabilities as an R&D/Technology manager or as an Entrepreneur.
3. Sensitize the students to think on this legal as well as management aspect.
4. Know patent filing, acts & rules, Patent portfolio analysis.
5. Explain the details of Right to Information Act.

Text Book:
Intellectual Property: The Law of Trademarks, Copyrights, Patents, and Trade Secrets, 4th Edition (2013) By Deborah E. Bouchoux, Cengage Learning.

Reference:
Latest Research Papers

Mode of Evaluation: Assignments, Written Examination (Internal Only)

Audit Course - I

14CSE301 DATA ANALYSIS USING R

L	T	P	C
2	0	0	0

Course Prerequisite: None

Course Description:
This course is an applied statistics course focusing on data analysis. The course will begin with an overview of how to organize, perform, and write-up data analyses. Instead of focusing on mathematical details, the lectures will be designed to help you apply these techniques to real data using the R statistical programming language, interpret the results, and diagnose potential problems in your analysis. The course covers practical issues in statistical computing which includes programming in R, reading data into R, accessing R packages, writing R functions, debugging, profiling R code, and organizing and commenting R code.

Course Objectives:
1. Students will learn techniques of statistical modeling.
2. Students will learn to communicate their results effectively to others, including non-experts.
3. Students will have hands-on experience with analyzing diverse data types, using modern statistical computer tools.

UNIT I: INTRODUCTION TO R
Overview of R, R data types and objects, reading and writing data.

UNIT II: CONTROL STRUCTURES AND FUNCTIONS
Control structures, functions, scoping rules, dates and times.

UNIT III: LOOP FUNCTIONS AND DEBUGGING
Loop functions, debugging tools.

UNIT IV: PROFILING R CODE
Simulation, code profiling.

UNIT V: VECTOR AND VARIABLES
Interacting with the interpreter, R Functions, Vector and Variables.

Course Outcomes:
At the end of this course, students will able to
1. Understand the data types available in R.
2. Understand the various control structures, scope rules present in R.

3. Understand the loop functions and debugging tools.
4. Simulate and code profiling capability.
5. Understand the R Functions, Vectors, etc.

Text Books:

1. R Programming for Data Science by Roger D.Peng, Lean publisher.
2. 25 Recipes for Getting Started with R, Publisher: O'Reilly Media, January 2011.
3. Learning R Paperback by Richard Cotton, Publisher: O'Reilly; 1 edition (20 September 2013).

References:

1. https://www.coursera.org/course/rprog
2. https://www.coursera.org/course/dataanalysis

Mode of Evaluation: Assignments, Written Examination (Internal Only)

Audit Course - II

14ENG303 PHONETICS AND SPOKEN ENGLISH

L	T	P	C
2	0	0	0

Course Prerequisite: None

Course Description:
This course aims to introduce the students the basic concepts of English phonetics and impart competence in the effective use of spoken English. To help them communicate effectively in social as well as classroom/academic settings and improve critical listening skills. Special focus on three important aspects of pronunciation: stress, rhythm, and intonation.

Course Objectives:
1. To deal with various articulation mechanics to get to proper pronunciation
2. To study 44 sounds of English.
3. To impart practical knowledge by providing listening sessions.

UNIT I:
Phonetics-an over view - Speech mechanisms - Organs of articulation.

UNIT II:
Pure Vowels and Diphthongs - Practice Sessions.

UNIT III:
Consonants - Practice Sessions.

UNIT IV:
Word Stress and Intonation - Process of listening and Characteristics of Voice - Practice sessions.

UNIT V:
Phonemic Transcription and pronunciation Practice - Spoken English Practice Sessions.

Course Outcomes:
At the end of this course, students will able to
1. Provides information on the sound system of English and deals specifically with some specific problems faced by the student as learner.
2. Understand the importance of phonetics for effective communication; extract precise and explicit information on pronunciation.
3. Know the Speech and hearing disorders that can have a huge impact on his social life.

4. Explain the flexibility in incorporating words and phrases in his speech.
5. Study of accent and its neutralization enable a student to understand standard form of language while it is a predominating dialect.

Text Books:

1. Krishna Mohan and N.P. Singh. Speaking English Effectively 2nd ed. Macmillan India Ltd., Delhi. 2009.
2. J.Sethi, KamleshSadanand and D.V. Jindal. A Practical Course in English Pronunciation Prentice Hall of India, New Delhi, 2004.

References:

1. Daniel Jones. Cambridge English Pronouncing Dictionary 17 thEdition. Ed. Peter Roach et al. Cambridge University Press, 2006.
2. Meenakshi Raman and Sangeeta Sharma. Communicative English Oxford University Press, Delhi, 2009.
3. Mark Hancock. English Pronunciation in Use Cambridge University Press, 2003.
4. T. Balasubramanian. A Textbook of English Phonetics for Indian Students Macmillan India Ltd. 1985.

Mode of Evaluation: Assignments, Written Examination (Internal Only)

Audit Course - II

14ENG304 INTRODUCTORY PSYCHOLOGY

L	T	P	C
2	0	0	0

Course Prerequisite: None

Course Description:
The development of psychology as a science – individual and the environment; Nature, kinds and determinants of Perception; Biological bases of behavior; Consciousness; Motivation; Emotion; Modification of behavior through learning; Memory and forgetting; Thought processes, Problem solving and Creative thinking; Individual differences – Intelligence, Gender, Personality, Stress and coping; and Social thought and Social Behavior.

Course Objectives:
To develop a conceptual framework for understanding the human behavior; relevance of psychology in daily life and its application in social, educational, industrial, personal and other spheres.

UNIT I:
Definition-Origin- Classical Studies- Psychology in India; **Nervous System**: Neurons - The Brain- the Brain and Human Behavior; Heredity and Behavior; **Sensation**: Perception-Extrasensory Perception; Thinking- Making decisions- Problem Solving.

UNIT II :
Biological Rhythms: Waking States of Consciousness;**Learning**: Types of learning-Theories; Human **Memory**: Kinds of Information Stored in Memory- Forgetting- Memory Distortion- Memory Construction, Memory in Everyday Life- Memory & Brain.

UNIT III:
Motivation: Theories - Motives & Motivation- Extrinsic and Intrinsic Motivation; **Emotions**: Nature-Expression & Impact; **Intelligence**: Contrasting Views of its nature; Measuring Intelligence; Human Intelligence- Emotional Intelligence; **Creativity**.

UNIT IV:
Personality: The Psychoanalytic Approach-Humanistic Theories- Trait Theories- Learning Approaches - Measuring Modern Research on Personality; **Health Psychology**: Stress- Understanding and Communication our Health Needs- Promoting Wellness.
Social Perception: Attribution-Social Cognition, Attitudes; Social Behavior- Prejudice & Discrimination, Social Influence, Leadership.

UNIT V:
Psychology & the Scientific Method; **Research Methods** in Psychology- Observation, Correlation, Experimentation Method; Issues in Psychological Research.

Course Outcomes:
At the end of this course, students will able to

1. Understand the rationale and application of the scientific method to behavior, cognition, and emotions.
2. Analyze the Importance of Memory In Learning and adopt the easier methods of memorization.
3. Respect and use critical and creative thinking, apply psychological principles to personal, social, and organizational issues.
4. Understand that stress is the product of the interaction between the person and their environment.
5. Understand and apply basic research methods in psychology, including research design, data analysis, and interpretation.

Text Book:
Robert A. Baron, "Psychology", Revised 5th Edition, Pearson, 2009

References:

1. Ceccarelli& Meyer, Psychology, South Asian Edition, Pearson Longman, 2006
2. A. K. Singh, "Tests, Measurements and Research Methods in Behavioural Sciences", Revised 4th Edition, BharatiBhawan, 2009.

Online Sources:

1. http://oyc.yale.edu/psychology/psyc-110
2. http://ocw.mit.edu/courses/brain-and-cognitive-sciences/9-00sc-introduction-to-psychology-fall-2011/
3. http://www.tru.ca/distance/courses/psyc1111.html

Mode of Evaluation: Assignments, Written Examination (Internal Only)

Audit Course - II

14CSE302 ETHICAL HACKING

L	T	P	C
2	0	0	0

Course Prerequisite: None

Course Description:
This course will function as an introduction to ethical hacking mechanisms. Students will understand about social engineering and types of attacks. Students will begin by understanding how perimeter defenses work and then be lead into scanning and attacking their own networks, no real network is harmed. Students then learn how intruders escalate privileges and what steps can be taken to secure a system. Students will also learn about Intrusion Detection, Policy Creation, Social Engineering, Buffer Overflows and Virus Creation.

Course Objectives:
1. To understand how intruders escalate privileges.
2. To understand Intrusion Detection, Policy Creation, Social Engineering, Buffer Overflows and different types of Attacks and their protection mechanisms.
3. To learn about ethical laws and tests.

UNIT I: ETHICAL HACKING
Types of Data Stolen From the Organizations, Elements of Information Security, Authenticity and Non-Repudiation, Security Challenges, Effects of Hacking, Hacker – Types of Hacker, Ethical Hacker, Hacktivism - Role of Security and Penetration Tester, Penetration Testing Methodology, Networking & Computer Attacks – Malicious Software (Malware), Protection Against Malware, Intruder Attacks on Networks and Computers, Addressing Physical Security – Key Loggers and Back Doors.

UNIT II: FOOT PRINTING AND SOCIAL ENGINEERING
Web Tools for Foot Printing, Conducting Competitive Intelligence, Google Hacking, Scanning, Enumeration, Trojans & Backdoors, Virus & Worms, Proxy & Packet Filtering, Denial of Service, Sniffer, Social Engineering – shoulder surfing, Dumpster Diving, Piggybacking.

UNIT III: DATA SECURITY
Physical Security – Attacks and Protection, Steganography – Methods, Attacks and Measures, Cryptography – Methods and Types of Attacks, Wireless Hacking, Windows Hacking, Linux Hacking.

UNIT IV: NETWORK PROTECTION SYSTEM & HACKING WEB SERVERS
Routers, Firewall & Honeypots, IDS & IPS, Web Filtering, Vulnerability, Penetration Testing, Session Hijacking, Web Server, SQL Injection, Cross Site Scripting, Exploit Writing, Buffer Overflow, Reverse Engineering, Email Hacking, Incident Handling & Response, Bluetooth Hacking, Mobiles Phone

Hacking.

UNIT V: ETHICAL HACKING LAWS AND TESTS

An introduction to the particular legal, professional and ethical issues likely to face the domain of ethical hacking, ethical responsibilities, professional integrity and making appropriate use of the tools and techniques associated with ethical hacking – Social Engineering, Host Reconnaissance, SessionHijacking, Hacking - Web Server, Database, Password Cracking, Network and Wireless, Trojan, Backdoor, UNIX, LINUX, Microsoft, NOVEL Server, Buffer Overflow, Denial of Service Attack, Methodical Penetration Testing.

Course Outcomes:

At the end of the course, students will able to

1. Explain the concepts of intruders.
2. Understanding of foot printing tools.
3. Understand and explain about Intrusion
4. Detection and different types of attacks.
5. Learn and implement mechanisms.
6. Understand about ethical laws.

Text Book:

Michael T. Simpson, Kent Backman, James E. "Corley, Hands-On Ethical Hacking and Network Defense", Second Edition, CENGAGE Learning, 2010.

References:

1. Steven DeFino, Barry Kaufman, Nick Valenteen, "Official Certified Ethical Hacker Review Guide", CENGAGE Learning, 2009-11-01.
2. Patrick Engebretson, "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy", Syngress Basics Series – Elsevier, August 4, 2011.
3. Whitaker & Newman, "Penetration Testing and Network Defense", Cisco Press, Indianapolis, IN, 2006.

Mode of Evaluation: Assignments, Written Examination (Internal Only)

Audit Course - II

14MBA301 BUSINESS ETHICS AND CORPORATE GOVERNANCE

L	T	P	C
2	0	0	0

Course Prerequisite: None

Course Description:
To make students aware of ethical and moral issues concerning business context and develop sensitivity in students for right ethical practices in conduct of business to understand the principles of corporate governance and to know the social responsibility of the corporate.

Course Objectives:
1. To explain students the significance of ethics in business, ethical theories and approaches.
2. To explain the significance of ethics in Marketing and HRM
3. To explain the significance of ethics in Finance and IT
4. To explain the concept, purpose, theories and Philosophies of Corporate Governance; Corporate Governance Structures and Processes
5. To explain corporate social responsibility

UNIT I: INTRODUCTION
Business Ethics: concept, need and importance, Ethical theories and Approaches-Modern Decision making- Ethical Models for Decision Making.

UNIT II: ETHICS IN MARKETING AND HRM
Marketing Ethics: Marketing ethics -advertising ethics -ethics in business competition; Ethical Aspects in HRM: Ethicsin Selection–Training and Development–Ethicsat work place –Ethicsin performance appraisal

UNIT III: **ETHICS IN IT AND FINANCE**
Ethics in Finance: Insider trading -ethical investment -combating Frauds; Ethical issues in Information Technology: Information Security and Threats –Intellectual Property Rights–Cybercrime, Case: Margadarsi financiers

UNIT IV: CORPORATE GOVERNANCE
Concept, Purpose – Theories and Philosophies of Corporate Governance; Corporate Governance Structures and Processes: Directors–committees - Institutional investors –Auditors; CG Provisions under Company Act 2013, Cadbury Committee report on corporate governance

UNIT V: CORPORATE SOCIAL RESPONSIBILITY

Stakeholders –Environment –social Development, Provisions under Company Act 2013. CSR practices by Companies

Course Outcomes:

At the end of the course, students will able

1. To understand the significance of ethics in business, ethical theories and approaches.
2. To understand the significance of ethics in Marketing and HRM
3. To understand the significance of ethics in Finance and IT
4. To Learn the concept, purpose, theories and Philosophies of Corporate Governance; Corporate Governance Structures and Processes
5. To understand corporate social responsibility

Text Books:

1. Business Ethics –An Indian perspective, Fernando, Pearson Education, 2009
2. "Perspectives in Business Ethics", Laura P Hartman, 2nd ed. Tata McGraw Hill.

References:

1. Bob Tricker, Corporate Governance, Oxford, 2009
2. Corporate Governance and Social responsibility, Balachandran, Chandrasekharan, PHI
3. Business Ethics -Concepts and Cases, Weiss,Cengage, 2009
4. Business Ethics, Himalaya, C.S.V.Murthy, 2008
5. Ethical Management, SatishModh, Mcmillan, 2005
6. The Theory and practice of Managerial Ethics, Jayashreesadri, Dastoor, Jaico,2008.

Mode of Evaluation: Assignments, Written Examination (Internal Only)

Audit Course - II

14HUM303 NATIONAL SERVICE SCHEME (NSS)

L	T	P	C
2	0	0	0

Course Prerequisite: None

Course Description:

NSS underlines that the welfare of an individual is ultimately dependent on the welfare of society on the whole. Therefore, it should be the aim of the NSS, to demonstrate this motto in its day-to-day Programme. It needs to organize National Integration Camps, Blood Donation Camps, Health Camps, Plantation, Immunization, Shramdaan, Disaster Management and many at various places. N.S.S. volunteers need to undertake various activities in adopted villages and slums for community service. An NSS volunteer will extend his/her services for 120 hours. NSS volunteers need actively to take a role in adopted villages for eradication of illiteracy, watershed management and wasteland development, agricultural operations, health, nutrition, hygiene, sanitation, mother and child care, family life education, gender justice, development of rural cooperatives, savings drives, construction of rural roads, campaign against social evils etc.

Course Objectives:

The course is intended to

1. The National Service Scheme (NSS) is an Indian government-sponsored public service program conducted by the Department of Youth Affairs and Sports of the Government of India.
2. Its Objective is "Not Me, But You".
3. NSS reflects the essence of democratic living and upholds the need for selfless service and appreciation of the other person's point of view and also to show consideration for fellow human beings.
4. Adoption of Villages to make the students study about living of the people, make people literate and make them to maintain hygiene health.
5. This Represents the Water Management and agricultural management as well as disaster management.

UNIT I: INTRODUCTION TO NSS &ADOPTION OF VILLAGE

What is NSS - NSS Song – Objectives of NSS – Functions of NSS - Identifying of a Village – Interacting with village heads – Identifying of local Challenges –Identifying the native people for involvement-Division of work-Preparation of Plan Chart-Getting approval from local authorities for taking up the work.

UNIT II: SRAMADHAN

Involving of native people - Cleaning - Plantation – Kitchen Gardening – Organic Farming - Construction of rural roads.

UNIT III: ORGANIZATION OF CAMPS

Health Camps - Blood Donation Camps-Immunization Camps – Health – Nutrition – Hygiene-Sanitation – First aid Rules & Regulations.

UNIT IV: LITERACY

Eradication of illiteracy - mother and child care-family life education-gender justice-development of rural cooperatives-savings drives-campaign against social evils.

UNIT V: WATER&DISASTERMANAGEMENT

Watershed management-Wasteland development-Agricultural operations- Disaster Management – Methods of Water Conservation.

Course Outcomes:

At the end of this course, students will able to

1. Understand the rationale and application of the scientific method to behaviour, cognition, and emotions.
2. Respect and use critical and creative thinking.
3. Apply psychological principles to personal, social, and organizational issues.
4. Making the student self-disciplined.
5. Social responsibility and making good environment.
6. Inculcate the quality of Team leadership and working as a Team

Mode of Evaluation: On Student's Performance

Massive Open Online Courses (MOOCS)

MITS, in line with the developments in Learning Management Systems (LMS) intends to encourage the students to do online courses in MOOCs, offered internationally. The main intension to introduce MOOCs is to obtain enough exposure through online tutorials, self-learning at one's own pace, attempt quizzes, discuss with professors from various universities and finally to obtain certificate of completion of the course from the MOOCs providers.

Choice Based Credit System (CBCS)

The CBCS provides choice for students to select from the prescribed courses (core, elective or minor or soft skill courses). The CBCS provides a 'cafeteria' type approach in which students can take courses of their choice, learn at their own pace and adopt an interdisciplinary approach to learning.

Audit Courses

The students merely might have received teaching and achieved a given standard of knowledge of the subject, rather than being evaluated. In that perception, MITS has also introduced 10 Audit Courses from various fields. A student who audits a course will obtain self-enrichment and academic exploration.

Foreign Languages

Apart from its Curriculum, MITS also offers two levels of certificate programmes in Japanese, German and Spanish languages. The training follows international benchmarks of teaching and learning in order to achieve international equivalency of proficiency. The certificate programme of each language is classified below.

1. JAPANESE [JLPT N-5/N4]
2. GERMAN [Levels-A1/A2]
3. SPANISH [Levels-A1/A2]

Certificate Courses

To improve the technical dexterity of the students, MITS also intends to offer several Certificate Courses like J2SE (Core JAVA) &J2EE (Advanced Java), PHP and MySQL Web Development, .Net Framework, Instrumentation etc.