MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE
MADANAPALLE

(UGC-AUTONOMOUS)

www.mits.ac.in

DEPARTMENT OF CIVIL ENGINEERING

ACADEMIC REGULATIONS
AND
COURSE STRUCTURE & 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. CIVIL ENGINEERING

VISION AND MISSION OF THE INSTITUTION

Vision:

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.

Quality Policy :

Madanapalle Institute of Technology & Science is committed to bring out and nurture the talents and skills of youth in the fields of Engineering and Management to cater to the challenging needs of society and industry.

- We shall achieve this by contributing to the academic standing and overall

Knowledge development of the students

- Providing excellent infrastructure and conducive learning environment.
- Enhancing the competence of faculty and promoting R&D Programs
- Collaborating with institutions and industries.
- Ensuring continual improvement of Quality Management System.

VISION AND MISSION OF THE DEPARTMENT

Vision

To grow as a globally recognized Civil Engineering Department through cutting-edge education and research to bring sustainable cultural, economic and social growth in the nation

Mission

1. To provide modern educational tools and techniques to the students in order to enrich them to solve complex civil engineering problems.
2. To develop sustainable technologies and solutions for various organizations involved in developmental activities through consultancy and research services
3. To foster the socio-economic and cultural upliftment in the region through formal and informal education.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

Graduates will:

PEO1: Contribute to the cost effective and sustainable infrastructural growth in the region and nationwide.

PEO2: Pursue higher education and involve in research to work out the solutions for complex civil engineering problems.

PEO3: Demonstrate to be ethical, skilled and environment friendly professionals working to advance the cultural and socio-economic status of the country.

PROGRAMME OUTCOME (POs)

Graduates will be able to:

PO1: Fundamentals: Apply the knowledge of mathematics, science, engineering fundamentals, and Civil Engineering principles to the solution of complex problems in Civil Engineering.

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

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

PO4: Investigation: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions related to Civil Engineering problems.

PO5: Tools: Create, select, and apply appropriate techniques, resources, and modern engineering tools such as CAD, FEM and GIS including prediction and modelling to complex Civil Engineering activities with an understanding of the limitations.

PO6: **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 Civil Engineering practice.

PO7: Environment: Understand the impact of the professional Civil 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 norms of the Civil Engineering practice.

PO9: **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 Civil Engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Management: 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 Civil Engineering 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 (PSO)

PSO1: Establish the processes of planning, analysis and design of sustainable civil engineering systems using the concepts of basic science, humanities and engineering sciences.

PSO2: Provide cost-effective, environment-friendly solutions to civil engineering problems through laboratory experiments and field investigations.

PSO3: Exhibit professional and ethical values towards project execution through the knowledge of project management and public policies using modern as well as contemporary skills.

PRELIMINARY DEFINITIONS AND NOMENCLATURES

Academic Council: The Academic Council is anapex 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, Chemistryetc., 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 andupdating 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.Techin 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 forholistic development.

Choice Based Credit System (CBCS): The credit based system that provides flexibility in designing curriculumand 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 toreceive 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 arebinding 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.

Index

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

A technical 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 courseduring 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	
First Class with Distinction	≥ 7.5 & 10.0	Based on the 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 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	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 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.

	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.	
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. Civil 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	14ME11T01	Engineering Graphics	4
	14EEE12T01	Basic Electrical & Electronics Engineering	3	14CSU12T01	Computer Programming	4
	14PHY12P01	Engineering Physics Practical	2	14CHE11P01	Engineering Chemistry Practical	2
	14CSU11P01	Computing Practical	2	14CSU12P02	Computer Programming Practical	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
	14CE101	Strength of Materials	3	14CE105	Analysis of Structures-I	3
	14CE102	Fluid mechanics-I	3	14CE106	Building Drawing	3
	14CE103	Surveying-I	3	14CE107	Fluid mechanics-II	3
	14CE104	Building materials and construction	3	14CE108	Surveying-II	3
		Audit Course - I	**-**			
	14CE201	Surveying Practical-I	2	14CE203	Fluid Mechanics Practicals	2
	14CE202	Strength of Materials Practical	2	14CE204	Surveying Practicals-II	2
		Total	**22**		**Total**	**22**

Year	First Semester			Second Semester		
	Course Code	**Course Name**	**Credits**	**Course Code**	**Course Name**	**Credits**
III	14ENG103	Soft Skills	3	14CE113	Design of Concrete Structures	3
	14CE109	Highway Engineering	3	14CE114	Irrigation Engineering	3
	14CE110	Hydrology & Water Resources Engineering	3	14CE115	Soil Mechanics	3
	14CE111	Concrete Technology	3	14CE116	Water Supply And Waste Water Engineering	3
	14CE112	Analysis of Structures-II	3		**Discipline Elective - I**	3
		Open Elective - I	3		**Open Elective - II**	3
		Audit Course - II	-			
	14CE205	Highway Engineering Practicals	2	14CE207	CADD Practicals-I	2
	14CE206	Concrete Technology Practicals	2	14CE208	Soil Mechanics Practicals	2
		Total	**22**		**Total**	**22**

Year	First Semester			Second Semester		
	Course Code	**Course Name**	**Credits**	**Course Code**	**Course Name**	**Credits**
IV	14CE117	Quantity Surveying	3			
	14CE118	Design of Steel Structures	3		**Discipline Elective - IV**	3
	14CE119	Foundation Engineering	3		**Open Elective - IV**	3
		Discipline Elective - II	3	14CE502	Project Work	14
		Discipline Elective - III	3	14CE601	Technical Seminar	2
		Open Elective - III	3			
	14CE209	Environmental Engineering Practicals	2			
	14CE210	CADD Practicals-II	2			
	14CE501	Mini Project	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.	14CE101	Strength of Materials	3
2.	14CE102	Fluid mechanics-I	3
3.	14CE103	Surveying-I	3
4.	14CE104	Building materials and construction	3
5.	14CE105	Analysis of Structures-I	3
6.	14CE106	Building Drawing	3
7.	14CE107	Fluid mechanics-II	3
8.	14CE108	Surveying-II	3
9.	14CE109	Highway Engineering	3
10.	14CE110	Hydrology & Water Resources Engineering	3
11.	14CE111	Concrete Technology	3
12.	14CE112	Analysis Of Structures-II	3
13.	14CE113	Design of Concrete Structures	3
14.	14CE114	Irrigation Engineering	3
15.	14CE115	Soil Mechanics	3
16.	14CE116	Water Supply And Waste Water Engineering	3
17.	14CE117	Quantity Surveying	3
18.	14CE118	Design of Steel Structures	3
19.	14CE119	Foundation Engineering	3
	Practical Courses		
1.	14CE201	Surveying Practical-I	2
2.	14CE202	Strength of Materials Practical	2
3.	14CE203	Fluid Mechanics Practicals	2
4.	14CE204	Surveying Practicals-II	2
5.	14CE205	Highway Engineering Practicals	2
6.	14CE206	Concrete Technology Practicals	2
7.	14CE207	CADD Practicals-I	2
8.	14CE208	Soil Mechanics Practicals	2
9.	14CE209	Environmental Engineering Practicals	2
10.	14CE210	CADD Practcals-II	2
		Total Credits	77

List of Discipline Electives

Discipline Elective - I		
Sl.No.	**Course Code**	**Course Name**
1	14CE401	Pavement Design, Maintenance and Management
2	14CE402	Rural Water Supply and Sanitation
3	14CE403	Green Buildings and Energy Conservation
Discipline Elective - II		
Sl.No.	**Course Code**	**Course Name**
1	14CE404	Design of Pre-stressed Concrete Structure
2	14CE405	Design Advanced Concrete Structures
3	14CE406	Introduction to Bridge Engineering
Discipline Elective - III		
Sl.No.	**Course Code**	**Course Name**
1	14CE407	Construction Equipment, Planning and Management
2	14CE408	Principles of Geographical Information Systems
3	14CE409	Geotechnical Earthquake Engineering and Machine Foundations
Discipline Elective - IV		
Sl.No.	**Course Code**	**Course Name**
1	14CE410	Environmental Impact Assessment
2	14CE411	Introduction to Finite Element Methods
3	14CE412	Ground Improvement Techniques

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.	14EEE401	Modern Control Systems	Electrical	14EEE108, 14EEE113
15.	14EEE402	Communication Systems	Electrical	14EEE104, 14EEE109
16.	14EEE403	Computer Architecture	Electrical	14EEE104, 14EEE107
17.	14EEE416	Non-Conventional Energy Resources	Electrical	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.	14EEE404	Switchgear and Protection	Electrical	14EEE110, 14EEE115
17.	14EEE405	Digital Image Processing	Electrical	14EEE117
18.	14EEE406	Operating Systems	Electrical	14CSU101, 14EEE114

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	
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.	14EEE407	Power Quality	Electrical	14EEE112, 14EEE115
14.	14EEE408	Introduction to MEMS	Electrical	14EEE104, 14EEE109
15.	14EEE409	Mobile Telecommunication Networks	Electrical	14EEE104, 14EEE109
16.	14EEE410	HVDC and FACTS	Electrical	14EEE112, 14EEE116
17.	14EEE415	Design Of Photovoltaic Systems	Electrical	14EEE105, 14EEE113

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.	14EEE411	Power Apparatus & Networks	Electrical	14EEE112, 14EEE115
14.	14EEE412	Wind Electrical Systems	Electrical	14EEE103, 14EEE120
15.	14EEE413	Robotics	Electrical	14EEE103, 14EEE107, 14EEE108
16.	14EEE414	High Voltage Engineering	Electrical	14EEE101

List of Audit Courses
(No Credits & End Exam – Only Internal Evaluation)

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

B. Tech. I Year I Semester

14ENG11T01 FUNCTIONAL ENGLISH

L	T	P	C
3	2	0	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:

The students after completing the course will be able to:

1. Use LSRW skills through the prescribed text and develop ability to communicate effectively.
2. Articulate well among themselves and with Faculty.
3. Construct compound sentences using common conjunctions.
4. Manage to organize and deliver oral presentation.
5. Demonstrate the skills needed to participate in a conversation that builds knowledge collaboratively.

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 their Derivatives, 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:

The students after completing the course will be able to:

1. Understand graphing and conic sections to trace the geometric shapes of various curves like Cartesian, polar and parametric relevant to the field of Engineering.
2. Demonstrate knowledge to work in functions of several variables provides mathematical solutions to various engineering problems.
3. Apply the multiple integrals to found the region of integration in 2-Dimentions & 3-Dimentions.
4. Demonstrate knowledge of vector calculus and applications of integration to solve complex problems.
5. Apply tools for convergence of various tests and the series expansions necessary for engineering problems.

Text Book:

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

References:

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

Course Syllabus:

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:

The students after completing the course will 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.

Reference Books:

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 ofenergy 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:

The students after completing the course will be able to:

1. To understand the natural environment, its relationship with human activities and need of the day to realize the importance of the renewable energy sources.
2. Demonstrate knowledge of various ecosystems and their importance along with the concepts of food chains, food webs and ecological pyramids.
3. Familiarize with biodiversity, its importance and the measures for the conservation of biodiversity.
4. Demonstrate knowledge about the causes, effects and controlling methods for environmental pollution, along with disaster management and solid waste management.
5. Demonstrate awareness about the sustainable development, environmental ethics, social issues arising due to the environmental disorders.

Text Books:

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

Reference Books:

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	2	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 Electrical and Electronics Engineering
2. To learn basic Electric & 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:
The students after completing the course will be able to:

1. Analyze the D.C., A.C. electrical circuits and magnetic circuits.
2. Apply the electrical circuit concepts to practical circuits.
3. Analyze the magnetic circuits.
4. Analyze the components of transformers, 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 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 LCRcircuit
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:
The students after completing the course will be able to:

1. Apply the scientific process in the conduct and reporting of experimental investigations.
2. Know about the characteristics and the behavior of various materials in a practical manner and gain knowledge about various optical technique methods.
3. Understand the characteristics and the behavior 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.

Reference Books:

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

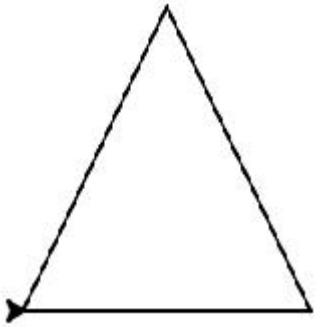
a) Implement Python script to develop stack ADT and its operations.
b) Implement Python script to evaluate postfix expression.

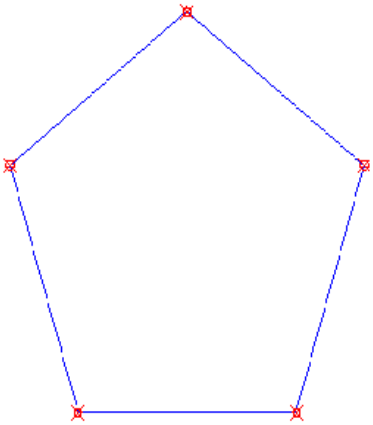
Week 14

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

Week 15

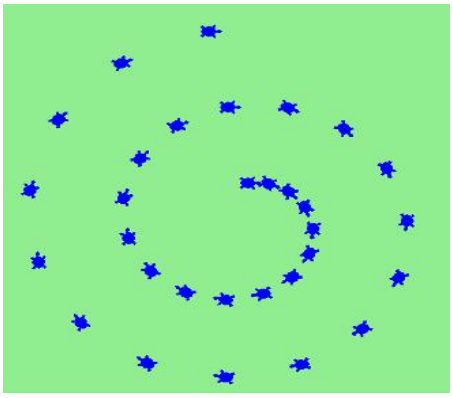
Write a python script to display following shapes using turtle.

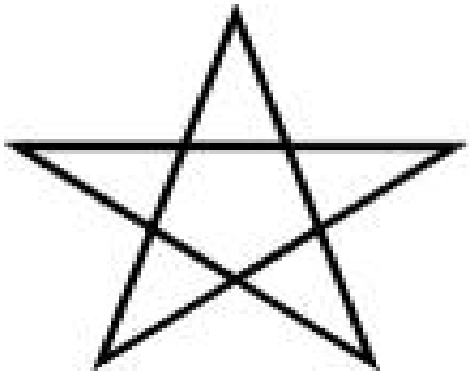
a) 

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:

The students after completing the course will be able to:

1. Apply problem solving techniques to find solutions to problems.
2. Able to use python effectively and implement solutions using it.
3. Identity the stack and queues for a given problem or application.
4. Demonstrate improved logical and programming skills.

Mode of Evaluation: Assignment, Mid Exam, Written Examination, Practicals

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.eMachining, 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:

The students after completing the course will be able to:

1. Measure linear, angular and radial dimensions using instruments likeVernier caliper, sine bar micro-gauge and height gauge.
2. Fabricate simple products using the operations of machine cutting,manual fitting, tin smithy, gas welding and arc welding.
3. Perform basic operations in carpentry, black smithy and foundry.
4. Write, upload and execute simple CNC programs on CNC machines foroperations like plane turning and face turning.
5. Design and analyze simple workflow layouts in production and service industries using FlexSim software.

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: End exam, Practicals

B. Tech. I Year II Semester

14ENG12 T02 TECHNICAL REPORT WRITING

L	T	P	C
2	0	3	3

Course Prerequisite: 14ENG101

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:

The objective of the course is to understand the process of effective communication by enhancing the learner's reading with understanding for note making and note taking as well as decision making and thereby leading to writing skills, which would then be used to write documents like technical reports and basic business communication.

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:

The students after completing the course will be able to:

1. Do documentation, presentation, discussions and develop communicative competence.
2. Do critical reading and comparing texts and their viewpoints.
3. Do effective writing using Sentence structures.
4. Draft Technical and Business style of writing.
5. Prepare Questionnaire for preparing the report which will assist them for doing research work.

Text Book:

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: 14MAT101

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 Objective:

1. To introduce System of linear equations, Vector spaces, basis and dimension etc.
2. To emphasize the role of Linear transformations, Elementary row operations, Eigenvalues 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, Eigenvalues 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:

The students after completing the course will be able to:

1. Solve system of equations and matrix applications, acquire knowledge on vector spaces.
2. Find the linear transformations and eigenvalues, eigenvectors of a matrix
3. Understand the concept of complex functions using CR-equations.
4. Gain knowledge of various types of functions in complex variables and evaluation of complex integrals.
5. Demonstrate adequate knowledge of Laurent series expansion and find residues at singular points.

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: None
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:

The students after completing the course will be able to:

1. Understand the impurities in water and can determine its hardness, alkalinity and dissolved oxygen content.
2. Familiarize 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. Demonstrate knowledge of electrochemical cells, lead acid batteries, Ni-Cad batteries, lithium ion Batteries, lithium batteries, and methanol oxygen fuel cells.
5. Demonstrate 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.

Reference Books:

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
3	1	0	3

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:

The students after completing the course will be able to:

1. Effectively 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. Effectively 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, 5 th edition, 20007.
3. Fundamentals of Data Structures in C++ by Ellis Horowitz, SartajSahni, Dinesh
4. Mehta, Universities Press, Second Edition.
5. Lipmen C++ Book.

Mode of Evaluation: Assignment, Written Examination.

B. Tech. I Year II 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:

The students after completing the course will be able to:

1. Identify various commands in AutoCAD and their usage for engineeringgraphics
2. Draw the projections of points and straight lines with AutoCAD
3. Draw the projections of the planes and sections of solids.
4. Sketch the intersections of surfaces and developments of solids
5. Draw the conversion of the orthographic views to isometric views and vice versa.

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 Prerequisite: None

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:

The students after completing the course will be able to:

1. Carry out chemical analysis volumetrically
2. Estimate hardness, alkalinity and dissolved oxygen in the given water sample.
3. Handle and operate instruments to estimate various ions present in the given samples.

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:

The students after completing the course 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. Demonstrate improved logical and programming skills.
5. Write Data Structures using C++ templates

References:

1. "Programming with C", Byron Gottfried, Third Edition, Schaum's Outlines, McGraw Hill
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, Dinesh Mehta, Universities Press, Second Edition.
6. "Pointers in C", YeswantKanetkar, BPB publications.

Mode of Evaluation: Practical

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: 14MAT101& 14MAT102

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 with 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. Learn and find the convenient application of various principles of economics;
2. Understood and analyze the managerial economics applications, theories and methods in relation to the contemporary practice.
3. To design managerial applications to minimize the cost and maximize the profits of the organization with theoretical learning concepts.
4. Understood the concepts of demand, elasticity, markets, supply and its essence in floating of an organization.
5. Apply the models to production process and increase the productivity of the company in increase competition market.
6. Identify and apply the suitable techniques for cost control and evaluate the different projects in the practical situation.
7. Concentrate and learn to follow the concept of equilibrium and the impact of income distribution; andlearn the methods of measurement of macroeconomic 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

14CE101 STRENGTH OF MATERIALS

L	T	P	C
3	2	0	3

Prerequisite: Intermediate, Mathematics and Physics.

Course Description:
This course covers introduction to mechanics of rigid bodies and deformable bodies; simple stresses and strains; analysis of statically determinate trusses, shear force and bending moment; flexural and shear stresses. Furthermore, this course includesprincipal stresses and strains; theories of failures; torsion of circular shafts;combined stresses, columns and struts.

Course Objectives:
1. Introduce fundamentals of mechanics
2. Explain forces and consequent stresses developed in beams and solve numerical problems
3. To introduce the methods of analysis of Statically determinate Trusses
4. To understand the concepts of shear and bending moment and to solve the problems
5. To understand concept of flexural and shear stresses and to solve the numerical problems
6. To understand the concept of Principle stresses and strains
7. To understand the effect of torsion on shafts and springs.

UNIT I:
INTRODUCTION TO MECHANICS: Introduction, principles of mechanics, concept of force & moment, equilibrium conditions, concept of two & three force members, free body diagram, friction, Introduction to forces & moments acting on a section of a member, distributed loads & resultant of distributed loads.

SIMPLE STRESSES AND STRAINS: Deformable bodies - Elasticity and plasticity – Types of stresses and strains – Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain energy – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

UNIT II:
ANALYSIS OF STATICALLY DETERMINATE TRUSSES
Types of trusses – cantilever trusses and simply supported trusses – Analysis of frames using method of joints and methods of sections for vertical loads, horizontal loads and inclined loads.

SHEAR FORCE AND BENDING MOMENT: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed load uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT III:
FLEXURAL STRESSES: center of gravity, moment of inertia for regular sections. Theory of simple bending – Assumptions – Derivation of bending equation: M/I =f/y = E/R – Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hollow), I,T,Angle and Channel sections – Design of simple beam sections.
SHEAR STRESSES: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T and angle sections.

UNIT IV:

PRINCIPAL STRESSES AND STRAINS : Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions .

THEORIES OF FAILURES: Various Theories of failures like Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

UNIT V:

TORSION OF CIRCULAR SHAFTS – Theory of pure torsion –Derivation of Torsion equations : $T/J = q/r = Ne/l$ – Assumptions made in the theory, Theory of pure torsion – Torsional moment of resistance –Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure.

COMBINED STRESSES: Stresses under the combined action of direct loading and bending moment, core of a section –retaining walls and dams – conditions for stability – stresses due to direct loading and bending moment about both the axes.

COLUMNS AND STRUTS: Introduction and simple problems.

Course Outcomes:

After the completion of the course students will be able to-

1. Understand the effect of various forces acting on a rigid body and also they will analyse the effect of simple stresses and strains on deformable bodies
2. Analyse the forces on the different types of trusses and evaluate the shear force and bending moments of various types of beams
3. Calculate the bending and shear stress distribution across the different sections of the beam
4. Understand principal stresses and strains under different loading conditions and also various theories of failures
5. Analyse the effect of torsion on the shafts and combined stresses effect on dams and retaining walls along with stability conditions

Text Book:

Beer,F. P.,Johnston,E. R. and DeWolf,J. T., Mechanics of Materials, Fifth Edition,McGraw-HillInternational Edition, 2009.

References :

1. Beer, F. P., Johnston, E. R. and DeWolf, J. T., Mechanics of Materials, Third Edition, McGraw-Hill International Edition, 2002.
2. Lardner,T. J, Archer,R. R., Mechanics of Solids, an introduction, International Edition,McGraw-Hill, 1994.
3. Shames,I. H.,Introduction to Solid Mechanics, 2nd Edition, Prentice Hall of India Private Ltd. New Delhi, 1980.
4. Hibbler, R. C., Structural Analysis, Sixth Edition, Pearson Education, New Delhi, 2008.

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

URLs

1. https://www.youtube.com/watch?v=GkFgysZC4Vc.
2. http://freevideolectures.com/Course/2361/Strength-of-Materials.

B. Tech II Year I Semester

14CE102 FLUID MECHANICS -I

L	T	P	C
3	2	0	3

Prerequisite: Intermediate Mathematics and Physics.

Course Description:

This course is an introduction to the field of Transport Phenomena. The study covers fundamentals of conservation of mass, energy and momentum. The emphasis in this course will be to stress more on understanding of the above governing laws and various applications. The unified approach will enable students to tackle the real life problems in more comprehensive manner and provide a broader view on the subject.

Course Objectives:

1. To introduce the basic concepts of fluids, their behavioral properties and to explain the analysis of the fluid flows using primary equations.
2. To explain various flow measuring devices and concepts of dimensional analysis.

UNIT I:

INTRODUCTION: Dimensions and units – physical properties of fluids, specific gravity, viscosity, surface tension and capillarity, vapor pressure and their influences on fluid motion. Newtonian and non-Newtonian fluids.Fluid Pressure at a Point; Pascal's law, Hydrostatic law, Atmospheric, Absolute and gauge pressure; Hydrostatic paradox, pressure measurement, manometers; simple, differential and Micro Manometers.

HYDROSTATIC FORCES ON SURFACES: Total Pressure and Centre of Pressure: on Horizontal Plane Surface; Vertical Plane Surface; Inclined Plane Surface and Curved Surfaces.

UNIT II:

BUOYANCY: Buoyancy; Buoyant Force and Centre of Buoyancy, Stability of submerged bodies and floating bodies; Metacenter and metacentric height, analytical method for metacentric height, time period of Transverse oscillation of flow body.

KINEMATICS OF FLUID MOTION: Methods of describing fluid motion, classification of flow, steady, unsteady, uniform and non-uniform flows; laminar and turbulent flows; Three, two and one dimensional flows; Irrotational and rotational flows, Streamline, Path line; Equation for acceleration; Convective acceleration; Local acceleration; Continuity equation; velocity potential and stream function; Flow net; Vortex flow – free vortex and forced vertex flow.

UNIT III:

DYNAMICS OF FLUID FLOW: Forces acting on a Fluid in Motion; Euler's equation of motion; Bernoulli's equation ; Energy correction factor; Momentum principle; Force exerted on a pipe bend, momentum correction factor.

FLOW MEASUREMENTS IN PIPES: Discharge through Venturi Meter; Discharge through Orifice Meter; Discharge through flow nozzle; Measurement of velocity by Pitot tube, Pitot - static tube.

UNIT IV:

FLOWTHROUGH ORIFICES AND MOUTHPIECES: Flow through orifices: classification of orifices; Determination of coefficients for an orifice,Flow through large rectangular orifice; Flow through submerged orifice – fully submerged and partially submerged. Classification of mouthpieces; Flow through external and internal cylindrical mouthpiece.

FLOW OVER NOTCHES & WEIRS: Classification of Notches and Weirs; Flow through rectangular, triangular and trapezoidal, stepped notches and weirs; End contractions; Velocity of approach; Cipolletti weir, Broad crested weir.

UNIT V:

ANALYSIS OF PIPE FLOW: Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length; Hydraulic power transmission through a pipe; Siphon; Pipes in series, parallel & branched pipes.

HYDRAULIC SIMILITUDE: Dimensional analysis -Rayleigh's method and Buckingham's π theorem-study of Hydraulic models – Geometric, kinematic and dynamic similarities-dimensionless numbers – model and prototype relations.

Course Outcomes:

After the completion of the course students will be able to-

1. Understand the fluid properties and they will analysis the fluid pressure in different geometrical planes of the surface.
2. Calculate the metacentric height for the stability of bodies and can analyse the kinematics of fluid motion.
3. Derive the expression for Bernoulli's equation and they will be able to use Bernoulli equation for the various flow measuring devices.
4. Analyses the flow through orifice, mouthpiece, notches and weir.
5. Understand and evaluate the characteristics of flow through pipe and will able to understand the hydraulic similitude.

Text Book:

Modi, P.N. and Seth, S.M., Hydraulics and Fluid Mechanics, Standard Book House, New Delhi, Twentieth edition, 2015.

References:

1. Ojha,C.S.P. Chandramouli, P.N & Berndtsson,R.,Fluid Mechanics and Machinery,Oxford University Press, First Edition, 2010.

2. Balachandran, P., Engineering Fluid Mechanics, PHI Learning Pvt. Ltd, 2012.

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

URLs

http://nptel.ac.in/courses/105101082/

B. Tech II Year I Semester

14CE103 SURVEYING-I

L	T	P	C
3	1	0	3

Prerequisites: Mathematics, Physics

Course Description:
This compulsory disciplinary course is designed to introduce the fundamental concepts of surveying. Different measurement methods such as chain, compass, plane table and levelingisincluded.

Course Objectives*:*
1. To apply knowledge of mathematics, science, and engineering to understand the measurement techniques and equipment used in land surveying.
2. To use techniques, skills, and modern engineering tools necessary for engineering practice.

UNIT I:
BASIC CONCEPTS: Surveying – History; Definition; primary divisions, Classification, Principles of surveying Plan and map; Basic Measurements; Instruments and Basic methods; units of measurement, Scales used for Maps and plans, Duties of a surveyor. Errors: Accuracy and Precision Sources and types of errors, theory of Probability, Rounding of numbers. Minor instruments- uses and working of the minor instruments: Hand level, Line ranger, Optical square, Abney level, Clinometers, Pantograph, Box Sextant and Planimeter.

UNIT II:
CHAIN SURVEYING: Instruments for chaining, Ranging out, chaining a line on a flat ground; Chaining on an uneven or a sloping ground; Chain & Tape corrections; Degree of accuracy. Principles of chain surveying; Basic definitions; Well-Conditioned Triangle, Field book, Field work; Offsets, Cross Staff survey; obstacles in chain survey-problems, Conventional signs.

UNIT III:
COMPASS SURVEY: Introduction, Bearings and angles, Designation of bearings, Conversion of bearings from one system to the other, fore bearing and back bearing, , Calculation of bearing from angles, Theory of Magnetic compass (i.e. Prismatic compass), Temporary adjustments of compass-Magnetic Declination, Local attraction-Related Problems-Errors in compass survey.

UNIT IV:
PLANE TABLE SURVEYING: Introduction, Accessories, Working operations, Methods of plane tabling, three point problem-Mechanical method -Graphical method, two point problem,
Errors in plane tabling.

UNIT V:
LEVELLING: Introduction, basic definitions, methods of levelling, levelling instruments: dumpy level, levelling staff, Temporary and permanent adjustments method of levelling- dumpy level, theory of simple and differential leveling, Level field book, Classification of direct leveling methods, Reciprocal leveling, Profile leveling and Cross sectioning, Curvature and Refraction, Difficulties in leveling, errors in leveling, Degree of Precision.

CONTOURING: Introduction, contour interval, Characteristics of contours, Methods of locating contours - Direct and indirect methods; Interpolation and sketching of contours, Contour gradient-Uses of contour maps.

Course Outcomes*:*
After the completion of the course students will be able to-

1. Understand the basic concepts of surveying.
2. Use the chain and its accessories to measure the distances.
3. Use the prismatic compass to measure the horizontal angles.
4. Apply the plane table equipment to measure the area and distance.
5. Utilize the modern and conventional instruments to measure the level and preparation of contouring.

Text Books:
Arora K.R, Surveying (In SI Unit) Vol. I, II and III, Standard, 2002.

References:
1. Punmia B.C et al, Surveying, Vol I, II and III, Laxmi Publishers, 2005.
2. Bhavikatti, S.S, Surveying and Leveling Vol. I and II, I.K. International Pvt Ltd, 2008.
3. Venkataramaiah, C, Surveying , Universities Press, 2008.

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

URLs
1. http://nptel.ac.in/courses/105107122/home.htm
2. http://freevideolectures.com/Course/98/Surveying#
3. http://www.aboutcivil.org/surveying-levelling%20II.html
4. http://www.valorebooks.com/new-used-textbooks/technology-engineering/surveying

B. Tech II Year I Semester

14CE104 BUILDING MATERIALS AND CONSTRUCTION

L	T	P	C
3	1	0	3

Prerequisites*:* 14PHY101&14CHE101

Course Description:

Introduce the various materials such as stones,wood,clay products, lime metals and finishes used in civil engineering construction. Further the course includes different components of buildings and their construction

Course Objectives:

1. To introduce various materials commonly used in Civil Engineering construction and their properties.
2. To introduce the different components involved in building and their construction

UNIT I:

REQUIREMENTS OF BUILDINGS AND ITS COMPONENTS: Introduction to building and its components, strength, dimensional stability, damp prevention, fire protection, lighting and ventilation. Properties of materials: physical and mechanical properties.

UNIT II:

STONES: Source**,** Classification, characteristics of good building stones - quarrying and processing – uses of stones, tests on stones and applications

WOOD: Structure – properties –Classification of various types of woods used in buildings – Seasoning of timber and preservation, Defects in timber- tests and applications

STRUCTURAL CLAY PRODUCTS: Clay and its properties,types of structural clay products, composition of good brick earth, various methods of manufacturing of bricks, Tests on bricks, Types of tiles, tests on tiles, applications of clay products.

UNIT III:

LIME, METALS AND FINISHES: Lime, various ingredients of lime – sources of lime – classification of lime – various methods of manufacture of lime, properties of lime, application of lime – Cement manufacturing, components of cement, various types of cement and their properties, environmental impact of cement production.

Metals- ferrous metals-manufacturing of iron, types of iron, properties of iron, market forms of steel, tests on steel.

Types of non-ferrous materials and alloys, applications of non-ferrous materials.Use of Materials like aluminum, gypsum, glass and bituminous materials.Damp proofing and water proofing materials.Polymeric materials, paints, enamels and varnishes.Geo-synthetics.Emerging and recycle materials.

UNIT IV:

BUILDING CONSTRUCTION: Site investigation and sub-soil exploration, bearing capacity of a soil, setting out, excavation for foundations.Foundations-functions and types foundations.Stone Masonry- Rubble and Ashlar masonry. Brick masonry – basic terminology, types of bonds, walls-loadbearing, cavity and partition walls.Doors and windows.

UNIT V:

FLOORS AND ROOFS: Floors- Floor components, ground floors and upper floors, Different types of flooring-Concrete, Mosaic, Terrazo floors,Lintels, Arches, Vaults-stair casesRoofs- Pitched, flat and curved.Form work, underpinning, scaffolding.

Course Outcomes:

After the completion of the course students will be able to-

1. Familiarized with various building parts and components
2. Understand the characteristics of various building materials along with their tests
3. Know various methods of manufacturing Lime, Metals and Finishes along with their properties and uses
4. Understand the basic terminologies used in building construction, like Site investigation, Sub-soil exploration, Types of Foundations, Masonry work, Walls, Doors and windows
5. Understand various building components like Floors, Roofs, Stair cases, Form work, Underpinning and Scaffolding along with their construction

Text Books:

1. Duggal, S.K., Building material, New Age International Publishers, Second Edition.

2. Punmia, B.C, Ashok Kumar Jain and Arun Kumar Jain., Building ConstructionLaxmiPublications (P) ltd., New Delhi.

References:

1. Varghese, P.C, Building Construction, Prentice-Hall of India private Ltd, New Delhi.

2. Arora, S.P. and Bindra, S.P., Building Construction, DhanpathiRai Publications.

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

URLs

https://www.youtube.com/watch?v=EIDXE28_8eQ.

B. Tech II Year I Semester

14CE201 SURVEYING PRACTICALS – I

L	T	P	C
0	0	3	2

Prerequisites: Intermediate Mathematics, Physics and 14CE103

Course Description:
This course covers practical usage of various surveying instruments for different field measurements like lengths, angles, areas, volumes and elevations.

Course Objectives:
1. To Use different surveying instruments for field measurements and apply knowledge to resolve various field challenges through suitable techniques.
2. To understand the differences in the field and office works.
3. To represent field measurements into a document form
4. To Perform calculations in obtaining necessary requirements from the data obtained during field work

LIST OF EXERCISES:
1. Survey of an area by chain survey (Closed traverse) & Plotting
2. Chaining across obstacles
3. Determination of distance between two inaccessible points with compass.
4. Surveying of a given area by prismatic compass (Closed traverse) and plotting after adjustment.
5. Radiation method and intersection methods by plane Table survey
6. Two point and three point problems in plane table survey.
7. Traversing by plane table survey
8. Fly leveling (differential leveling)
9. An exercise of L.S. and C.S. and plotting.
10. Two exercises on contouring.

List of Major Equipment:
1. Chains, tapes, Ranging rods (2M and 3M), cross staff, arrows
2. Compasses and Tripods, Optical square.
3. Plane tables, Alidade, Plumbing fork, trough compasses.
4. Leveling instruments and leveling staves.
5. Box sextants, planimeter.

Course Outcomes:

At the end of the course, students will able to

1. Perform surveying of area with various topography and characteristic through chain survey
2. Determine the distance between the two inaccessible points
3. Conduct the survey the given area by plain table
4. Use dumpy level for various differential levelling.
5. Draw the contour plot of given area.

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

URLs

1. NPTEL http://nptel.ac.in/courses/105107122/home.htm
2. Video Lectures, IIT Kanpur Online Coursehttp://freevideolectures.com/Course/98/Surveying#
3. http://www.aboutcivil.org/surveying-levelling%20II.html

B. Tech II Year I Semester

14CE202 STRENGTH OF MATERIALS PRACTICALS

L	T	P	C
0	0	3	2

Prerequisites*:* 14CE101

Course Objective:
To understand the behavior of materials under different types of loading.

LIST OF EXPERIMENTS:
1. Tension test.
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test.
5. Hardness test.
6. Spring test.
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges.
12. Continuous beam – deflection test.

List of Major Equipment:
1. UTM for conducting tension test on rods
2. Steel beam for flexure test.
3. Wooden beam for flexure test.
4. Torsion testing machine
5. Brinnell's/Rock well's hardness testing machine.
6. Spring testing machine
7. Compression testing machine
8. Izod Impact machine
9. Shear testing machine
10. Beam setup for Maxwell's theorem verification.
11. Continuous beam setup
12. Electrical Resistance gauges..

Course Outcomes:
At the end of the course, students will able to
1. Determine the tensile and shear strength of various types and grades of ductile materials
2. Examine the compressive strength of various types of brittle materials
3. Analyse the deflections at various positions along the length of the beam for different types of beams/spring and correlate it with existing theorems
4. Determine the torsional properties of ductile materials
5. Examine the hardness and impact value for different kinds of metals

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

B. Tech II Year II Semester

14MAT104 PROBABILITY & STATISTICS

L	T	P	C
3	2	0	3

Course Prerequisites: 14MAT101 & 14MAT102

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 behaviour of the sample mean.
5. Apply of 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 II Year 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. Students Learned and find the convenient application various management concepts in the real situation. Understood and analyze the management theories and approaches in relation to the contemporary practice.
2. They understood the concept of planning and how to plan, how manager as decision makers, and strategic management.
3. It can facilitate to design organization structure and chart diligently with theoretical learning concepts. They understood the various concepts of HRM and their essence in new business environment.
4. The students learned about the other function leading, managers and communication, motivating employees and managers as leaders.
5. They learned about how to controlling, managing operation and functional areas of management-marketing and financial management. Finally they can find the relevance of applying the strategic management 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

14CE105 ANALYSIS OF STRUCTURES– I

L	T	P	C
3	2	0	3

Prerequisites: 14CE101

Course Description:

This course covers statically determinate structures. It deals with analysis of statically determinate structures, deflection of beams using different methods like double integration method, moment area method and conjugate beam method. Further, it covers deflection of beams using energy concepts, Influence lines on statically determinate structures will also discussed.

Course Objectives:

To make the students to understand the principles of analysis of structures of static and moving loads by various methods for statically determinate structures.

UNIT I:

ANALYSIS OF STATICALLY DETERMINATE STRUCTURES: Idealized structure - Support Connections, Tributary Loadings, Principle of Superposition, determinacy and stability, applications of equations of equilibrium.

UNIT II:

DEFLECTION OF BEAMS: Introduction, Moment-curvature relations, integration of moment – curvature relations, superposition, load-deflection differential equation. Double integration method, Moment area method and conjugate beam method.

UNIT III:

DEFLECTIONS USING ENERGY METHODS: External work and strain energy, principle of work and energy, principle of virtual work, method of virtual work trusses, method of virtual work beams and frames, virtual strain energy caused by axial load, shear, torsion and temperature; Castigliano's theorem; Castigliano's theorem for trusses; Castigliano's theorem for beams and frames, unit load method.

UNIT IV:

FIXED BEAMS & CONTINUOUS BEAMS: Introduction to statically indeterminate beams with uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads – Shear force and Bending moment diagrams – Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

UNIT V:

INFLUENCE LINES OF STATICALLY DETERMINATE STRUCTURES: Influence lines, influence lines for beams, Qualitative influence lines, influence lines for floor girders, influence lines for trusses, maximum influence at a point due to a series of concentrated loads, absolute maximum shear and moment.

Course Outcomes:
After the completion of the course students will be able to-

1. Gain knowledge about analysis of statically determinate structure
2. Analyse the deflection of beams using various methods
3. Compute the deflection of beams using strain energy methods
4. Analyse the fixed and continuous beams under different loading conditions
5. Analyse the reactions, shear force and bending moments at different sections on the beams along with absolute shear force and bending moment

Text Book:
Hibbler, R. C., Structural Analysis, Eighth Edition, Pearson Education, New Delhi, 2009.

References:

1. Beer, F. P., Johnston, E. R. and DeWolf, J. T., Mechanics of Materials, Fifth Edition, McGraw-Hill International Edition, 2009.
2. Lardner, T. J, Archer, R. R., Mechanics of Solids, an introduction, International Edition, McGraw-Hill, New Delhi, 1994.
3. Shames, I. H., Introduction to Solid Mechanics, 2nd Edition, Prentice Hall of India Private Ltd. New Delhi, 1980.

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

URLs
http://nptel.iitk.ac.in/courses/Civil_Eng/IIT%20Delhi/Structural%20Analysis%201%20(Video).htm

B. Tech II Year II Semester

14CE106 BUILDING DRAWING

L	T	P	C
3	1	0	3

Prerequisites: 14ME101&14CE104

Course Description:
This course deals with building bylaws and regulations of private and public buildings, sign conventions and bonds. Further, in this course the drawings related to doors, windows, ventilators and roofs will be discussed. Drawing of a building using AUTOCAD will also be covered.

Course Objectives:
To introduce the students to draft the plan, elevation and sectional views of buildings in accordance with development and control rules satisfying orientation and functional requirements as per National Building Code.

UNIT I:
PUBLIC BUILDINGS: Planning of Educational institutions, hospitals, dispensaries, Office buildings, banks, industrial buildings, hotels and motels, buildings for recreation**.**

UNIT II:
SIGN CONVENTIONS FOR DIFFERENT MATERIALS: Brick, Stone, Plaster, Sand filling, Concrete, Glass, Steel, Cast iron, Copper alloys, Aluminum alloys etc., Lead, Zinc, tin, whitelead etc., Earth, Rock, Timber and Marble.

UNIT III:
MASONRY BONDS: English bond & Flemish bond odd & even courses for one, one and half, two and two and half brick walls in thickness at the junction of a corner.

UNIT IV:
DOORS WINDOWS, VENTILATORS, ROOFS AND TRUSSES: Panelled Door – paneled and glazed door, glazed windows – paneled windows – Swing ventilator – Fixed ventilator-Couple roof – Collar roof – Kind Post truss – Queen post truss, sloped and flat roof buildings.

UNIT V:
BUILDING DRAWING: Given line diagram with specification to draw, plan, section and elevation for: Residential buildings, School buildings, Public buildings and Bus stands, ,.
Note: Drawing using AUTOCADD tool.

Course Outcomes:
After the completion of the course students will be able to-
1. Draft (Design) the plan, elevation and sectional views public buildings.
2. Understand the sign conventions for different materials.
3. Understand the masonry bonds and orientation.
4. Design the different types of door, window and ventilator.
5. Draw the plan, section and elevation for Residential buildings, School buildings, Public buildings and Bus stands.

Text Book:
Sikka V.B, A Course in Civil Engineering Drawing, Jain Book Agency, New Delhi.

References:

1. Building bylaws by state and Central Governments and Municipal corporations.
2. Gurachana Singh., Building planning and drawing.
3. Peurifoyetal, R.L., Construction Planning Equipment and methods, Tata Mc. Graw Hill Publications.

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

B. Tech II Year II Semester

14CE107 FLUID MECHANICS– II

L	T	P	C
3	2	0	3

Prerequisites: 14CE102

Course Description:

This course is related to hydraulics. The study covers laminar and turbulent flows, boundary layer theory, open channels and hydraulic machinery. The unified approach will enable students to tackle the real life problems in more comprehensive manner and provide a broader view on the subject.

Course Objectives:

To introduce the advanced concepts of fluids, laminar and turbulent flows, boundary layer theory, open channel flows and fluid machinery.

UNIT I:

LAMINAR AND TURBULENT FLOW IN PIPES: Reynolds's experiment; Characteristics of laminar flow; Steady laminar flow through a circular pipe (Hazen poiseuille equation). Characteristics of turbulent flow, Prandtl's mixing length theory, Hydro dynamically smooth and rough boundaries, Velocity distribution, and Friction factor for pipe flow.

UNIT II:

BOUNDARY LAYER THEORY : Boundary layer – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarman momentum integral equation, laminar and turbulent Boundary layers (no deviation), separation of boundary layer, control of boundary layer, flow around submerged objects-Drag and Lift-Magnus effect.

UNIT III:

OPEN CHANNEL FLOW-I: Types of flows – Type of channels – Velocity distribution – Energy and momentum correction factors – Chezy's&Manning's; and Bazin formulae for uniform flow – most Economical sections. Critical flow: Specific energy-critical depth – Computation of critical depth – Critical sub-critical and super critical flows.

OPEN CHANNEL FLOW-II: Non uniform flow-Dynamic equation for G.V.F., Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method. Rapidly varied flow, hydraulic jump, energy dissipation.

UNIT IV:

BASICS OF TURBO MACHINERY: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle, Applications to radial flow turbines.

HYDRAULIC TURBINES - I: Layout of a typical Hydropower installation – Head and efficiencies – classification of turbines-Pelton wheel-Francis turbine-Kaplan turbine-working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and function efficiency.

UNIT V:

HYDRAULIC TURBINES – II: Governing of turbines-surge tanksunit and specific turbine-unit speed-unit quantity-unit power-specific speed performance characteristics-geometric similarity cavitation**.**

CENTRIFUGAL PUMPS: Pump installation details-classification work done- Monomeric head-minimum starting speed-losses and efficiencies-specific speed multistage pumps-pumps in parallel – performance of pumps-characteristic curves- NPSH-cavitation.

Course Outcomes:

After the completion of the course students will be able to-

1. Understand and apply the concepts of laminar and turbulent flow in pipes
2. Estimate the boundary layer growth at specific point of for a given velocity vector
3. Design the most economical open channel and also they will be able to estimate the discharge rate through it.
4. Estimate the force exerted by the jet of on stationary and moving plates
5. Understand the hydraulic pumps and turbines and they will be able to calculate the characteristics of pumps based on the analysis on models.

Text Book:

Modi, P.N. and Seth, S.M., Hydraulics and Fluid Mechanics, Standard Book House, New Delhi,Twentieth edition, 2015.

References:

1. Ojha,C.S.P. Chandramouli, P.N & Berndtsson,R., Fluid Mechanics and Machinery,Oxford University Press, First Edition, 2010.

2. Balachandran,P.,Engineering Fluid Mechanics, PHI Learning Pvt. Ltd, 2012.

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

URLs

http://nptel.ac.in/courses/105101082

B. Tech II Year II Semester

14CE108 SURVEYING-II

L	T	P	C
3	1	0	3

Prerequisites: IntermediateMathematics, Physics &14CE103

Course Description*:*
This course is designed to introduce various advanced measuring methods like trigonometric levelling, traverse surveying, curves and tachometry. Furthermore, in this course computation of areas and volumes using different methods is included. Introduction to advanced surveying methods like GPS, GIS, Arial photogrammetry, introduction to Geodetic Surveying and total station surveying is also included.

Course Objectives:
1. To apply knowledge of mathematics, science, and engineering to understand the measurement techniques and equipment used in land surveying.
2. To use techniques, skills, and modern engineering tools necessary for engineering practice.

UNIT I:
TRIGONOMETRIC LEVELLING: Introduction, Base of the object accessible, base of the object inaccessible-instrument stations in the same vertical plane as the elevated object; instrument stations not in the same vertical plane as the elevated object; determination of height of an elevated object above the ground when its base and top are visible but not accessible.

UNIT II:
TRAVERSE SURVEYING: Introduction, Selection and marking of traverse stations, methods of traversing, traversing by free needle and fast needle method, traversing by direct observation of angles, checks in closed traverse, closing error, methods of balancing the traverse, Gale's traverse table, Omitted measurements.
CURVES: Types of curves, design and setting out – simple and compound curves.

UNIT III:
TACHOMETRY: General, Instruments, Different systems of tachometric measurement; Principle of stadia method; distance and elevation formulae for staff vertical inclined sight; Distance and elevation formulae for staff normal.

UNIT IV:
COMPUTATION OF AREAS AND VOLUMES: Methods of determining areas, areas by subdivision into triangles, areas from offsets to a base line: regular and irregular intervals, area by double meridian distances, area by co-ordinates. embankments and cutting for a level section, two level sections, three level sections and multi-level sections, volume of earth work from contour plan, capacity of a reservoir , volume of barrow pits.

UNIT V:
INTRODUCTION TO ADVANCED SURVEYING TOPICS: GPS, GIS, Arial photogrammetry, Introduction to Geodetic Surveying.
TOTAL STATION: Introduction to geodetic surveying, Total Station, Advantages and disadvantages, types, measuring angles.

Course Outcomes*:*
After the completion of the course students will be able to-
1. Understand the basics of the trigonometric levelling.
2. Use the traverse surveying and curve setting concepts.
3. Apply the principles of tachometry
4. Compute of areas and volumes.
5. Understand the principles and operation of the advanced surveying methods like GPS, GIS, Arial photogrammetry, Geodetic Surveying and total station surveying.

Text Books:
Arora K.R, Surveying(In SI Unit) Vol. I, II and III, Standard, 2002.

References:

1. Punmia B.C et al, Surveying, Vol I, II and III, Laxmi Publishers, 2005.
2. Bhavikatti, S.S, Surveying and Leveling Vol. I and II, I.K. International Pvt Ltd, 2008.
3. Venkataramaiah C. Surveying, Universities Press, 2008.

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

URLs
1. NPTEL http://nptel.ac.in/courses/105107122/home.htm
2. Video Lectures, IIT Kanpur Online Course
3. http://freevideolectures.com/Course/98/Surveying#
4. http://www.aboutcivil.org/surveying-levelling%20II.html
5. http://www.valorebooks.com/new-used-textbooks/technology-engineering/surveying

B. Tech II Year II Semester

14CE203 FLUID MECHANICS PRACTICALS

L	T	P	C
0	0	3	2

Prerequisites: 14CE102&14CE107

Course Description: The course includesCalibration of flow meters; Bernoulli's apparatus; performance of turbines andpumps; various losses through pipes.

Course objectives:
Students should be able to verify the principles studied in theory by performing the experiments in lab.

LIST OF EXPERIMENTS
1. Calibration of Venturimeter& Orifice meter.
2. Determination of Coefficient of discharge for a small orifice by a constant head method.
3. Determination of Coefficient of discharge for an external mouth piece by variable headmethod.
4. Calibration of contracted Rectangular Notch and /or Triangular Notch.
5. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
6. Verification of Bernoulli's equation.
7. Impact of jet on vanes.
8. Study of Hydraulic jump.
9. Performance test on Pelton wheel turbine.
10. Performance test on Francis turbine.
11. Efficiency test on centrifugal pump.
12. Efficiency test on reciprocating pump.

LIST OF EQUIPMENT:
1. Venturimeter Setup.
2. Orifice meter setup.
3. Small orifice setup.
4. External mouthpiece setup.
5. Rectangular and Triangular notch setups.
6. Friction factor test setup.
7. Bernoulli's theorem setup.
8. Impact of jets.
9. Hydraulic jump test setup.
10. Pelton wheel and Francis turbines.
11. Centrifugal and Reciprocating pumps.

Course Outcomes:
After the completion of the project students will be able to-
1. Determine the coefficient of discharge for Venturimeter, orificemeter, small orifice, external mouth piece, triangular notch and impact of jet on vanes.
2. Compute the head loss due to sudden expansion and contraction
3. Verify the Bernoulli's equation and also they will study the hydraulic jump
4. Compute the performance of Francis and Pelton wheel turbine
5. Determine the efficiency of centrifugal and reciprocating pump

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

B. Tech II Year II Semester

14CE204 SURVEYING PRACTICALS -II

L	T	P	C
0	0	3	2

Prerequisites: 14CE103&14CE108

Course Description*:*
This course covers practical usage of various advanced surveying instruments for different field measurements like length, area and elevations.

Course Objectives*:*
1. To Use different surveying instruments for field measurements and apply knowledge to resolve various field challenges through suitable techniques.
2. To explain the differences in the field and office works.
3. To represent field measurements into a document form
4. To perform calculations in obtaining necessary requirements from the data obtained during field work

LIST OF EXERCISES:
1. Study of theodolite in detail - practice for measurement of horizontal and vertical angles.
2. Measurement of horizontal angles by method of repetition and reiteration.
3. Trigonometric Leveling - Heights and distance problem (Two Exercises)
4. Heights and distance using Principles of tachometric surveying (Two Exercises) [one plane and two plane method]
5. Curve setting – different methods. (Two Exercises)[Only horizontal, circular, reverse, compound curves]
6. Setting out works for buildings.
7. Determine of area using total station
8. Traversing using total station
9. Contouring using total station
10. Determine remote height using total station
11. State-out using total station
12. Distance, gradient, Diff, height between tow inaccessible points using total stations

LIST OF EQUIPMENT:
1. Theodolites, and leveling staffs.
2. Tachometers.
3. Total station.
4. GPS

Course Outcomes:
Upon successful completion of this course the student
1. Use the various instruments such as Theodolite and levelling staffs, Tachometer, Total station and GPS.
2. Measure the horizontal and vertical angles between the two points by using theodolite
3. Determine the height and distance between two points.
4. conduct set-out works for building.
5. Use total station for for different surveying puposes

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

Special Instructions for Survey Field Work:

1. Students must collect the instruments in the specified time. Late arrival will not be entertained in any case.
2. The students must come to the field- work with a 40 page field observation book or any other specified field book, pencil, scale and a calculator. The field- work record must be submitted in the next field- work class.
3. Field observation book also forms part and parcel of the evaluation process.
4. Since the work may involve standing in the sun for longer duration of time, you are advised to wear caps during field surveys.
5. Students are advised to use the instruments with utmost care. Loss / misuse of equipment will attract fine and entire batch handling that experiment will be held responsible
6. Students are advised to wear shoes during the field work from the safety point of view.

URLs

1. NPTEL http://nptel.ac.in/courses/105107122/home.htm
2. Video Lectures, IIT Kanpur Online Course http://freevideolectures.com/Course/98/Surveying#
3. http://www.aboutcivil.org/surveying-levelling%20II.html

B. Tech. III Year - I Semester

14ENG103 SOFT SKILLS

L	T	P	C
2	0	3	3

Course Prerequisite: 14ENG102

Course Description: This course intends and aims to enhance the confidence of the student by exposing them to various situations and contexts which they would face in their career. This course is very important because at this stage it is imperative for the student to start preparing for the ever growing competition in the Job market. The course focuses on the practical aspects of English incorporating all the 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 of self and others Greetings, Introductions, Small Talk (Findings common grounds to build a conversation).

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

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

B. Tech. III Year - I Semester

14CE109 HIGHWAY ENGINEERING

L	T	P	C
3	2	0	3

Prerequisites: 14CE103 &14CE108

Course Description:
Course covers planning and geometric design of highways; traffic characteristics and measurement; intersection design, Furthermore, this course coversmaterial and properties; analysis and design of flexible and rigidpavements.

Course Objectives:
The objective of the course is to expose the students to road transportation systems, their planning, materials for road construction and pavement design.

UNIT I:
HIGHWAY DEVELOPMENT AND PLANNING: Highway development in India – Necessity for Highway Planning- Different Road Development Plans- Classification of Roads- Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

UNIT II:
HIGHWAY GEOMETRIC DESIGN: Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements-Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment-Design of Super elevation and Extra widening- Setback Distances - Design of Transition Curves-Design of Vertical alignment-Gradients- Design of vertical curves like summit and valley curves.

UNIT III:
TRAFFIC ENGINEERING: Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies- Data Collection and Presentation-speed studies- Data Collection and Presentation-Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures-Accident Data Recording – Condition Diagram and Collision Diagrams- IRC A1 and A4 forms.
TRAFFIC REGULATION AND MANAGEMENT
Road Traffic Signs – Types and Specifications – Road markings-Need for Road Markings-Types of Road Markings- Design of Traffic Signals –Webster Method –IRC Method.

UNIT IV:
INTERSECTION DESIGN: Types of Intersections – Conflicts at Intersections- Types of at-Grade Intersections- Channelization: Objectives –Traffic Islands and Design criteria-Types of Grade Separated Intersections- Rotary Intersection – Concept of Rotary Intersections and Design Criteria-Advantages and Disadvantages of Rotary Intersection.

UNIT V:

PAVEMENT MATERIALS:

Highway materials -Aggregates and bitumen – Desirable properties – Laboratory tests on aggregate and bitumen, CBR test – Specifications – Aggregate bitumen mixes – Desirable properties – Mix design by Marshal method – Cement and cement concrete.

PAVEMENT DESIGN:

Stresses and strains in multilayered flexible pavements and rigid pavements; design of flexible pavements using IRC 37-2012; introduction to flexible pavement design by AASHTO and Mechanistic Empirical (ME) procedures; Design of Rigid pavements by IRC 58-2011 and PCA procedures; Introduction to the advances in composite pavements; Overlays: Overlays on flexible pavements; bonded and un bonded overlays on rigid pavements; overlay design by IRC 81-1997 CGRA process; Overlay design by Asphalt Institute's Principle Component Analysis Procedure.

Course Outcomes:

After the completion of the course students will be able to-

1. Comprehend the Roads, Plan the road network facilities and importance of highway Alignment
2. Apply the concept of geometric design for better perform of highways
3. Comprehend the Plan and design the traffic features like signals, intersections etc
4. Apply the concept about types intersections for design of different intersections
5. Design the flexible and rigid pavements and Design the overlays over the existing deteriorated flexible pavements

Textbooks:

Khanna, S.K, Justo, A and Veeraragavan, A., Highway Engineering, Nem Chand and Bros, Revised Tenth Edition, 2014.

References:

1. Kadiyali, L.R. and Lal, N.B, Principles and Practices of Highway Engineering, Fourth Edition,
2. Khanna Publishers, New Delhi, 2005.
3. Papacoastas, C. S. and Prevedouros., Transportation Engineering and Planning, Third Edition, Pearson Education, 2008.
4. Khisty, C.J and Lall B Kent, Transportation Engineering: An Introduction, Third Edition; Prentice Hall of India Private Limited, New Delhi, 2002.
5. Kadiyali, L. R, Traffic Engineering and Transportation Planning, Khanna Publishers, New Delhi, 2003.
6. S.P.BindraDhanpatRai and Sons., Highway Engineering, 4th Edition, 1981.
7. Virendhra Kumar and StatishChandhra., Air Transportation Planning & design, Gal Gotia Publishers, 1999.
8. Prabha and Co., Railway Engineering, 15th Edition, 1994.

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

B. Tech. III Year - I Semester

14CE110 HYDROLOGY AND WATER RESOURCE ENGINEERING

L	T	P	C
3	2	0	3

Prerequisites*:* 14CE102&14CE107

Course Description: The course includes Hydrological Cycle; Rainfall, Precipitation Measurement and Analysis; Hydrological Abstractions; Ground water; Stream Flow measurement and concepts of Hydrograph; Flood Routing; Channel alignment & design; Design of lined canal & Water logging.

Objective of the Course:

To introduce the basics/fundamentals of hydrological cycle, precipitation, runoff, hydrograph, measurements and statistics, ground water, flood routing, channel alignment and water logging.

UNIT I:

INTRODUCTION: Introduction to engineering hydrology and its applications, Hydrologic cycle, types and forms of precipitation, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, processing of rainfall data. Estimation of missing data – Double mass curve – Intensity – duration – frequency (IDF) curves.

UNIT II:

EVAPORATION:

Abstraction from rainfall-evaporation, factors affecting evaporation, measurement of evaporation-evapotranspiration-Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices.

RUNOFF:

Runoff-components of runoff, factors affecting runoff, stream gauging, effective rainfall, separation of base flow.Stream flow measurements.

UNIT III:

GROUND WATER: Ground water occurrence – Darcy's – Types of aquifers – Dupuit's equation – wells – yield – recuperation test.

HYDROGRAPH: Flood Hydrograph; Unit Hydrograph concepts & their applications, derivation of Unit Hydrograph, S-hydrograph, IUH and Synthetic Unit Hydrograph.

UNIT IV:

FLOODS: Importance of flood studies – Methods of estimating flood peak – Empirical formula – Rational method & SCS method

FLOOD ROUTING: Basic equation – Types – Routing by Pulse and Muskingum methods.

UNIT V:

CHANNELS – SILT THEORIES: Classification; Canal Alignment; Inundation canals; Cross-section of an irrigation channel; Balancing depth; Borrow pit, Spoil bank; Land width; Silt theories – Kennedy's theory, Kennedy's method of channel design; Drawbacks in Kennedys's theory; Lacey's regime theory – Lacey's theory applied to channel design; Defects in Lacey's theory; Comparison of Kennedy's and Lacey's theory.

WATER LOGGING AND CANAL LINING: Water logging; Effects of water logging; Causes of water logging; Remedial measures; Saline and alkaline soils and their reclamation; Losses in canal; Lining of irrigation channels – necessity, advantages and disadvantages; Types of lining; Design of lined canal.

Course Outcomes:

After the completion of the course students will be able to-

1. Gain the knowledge needed on hydrological cycle and be able to estimate the areal average precipitation over the basin.
2. Able to identify losses and calculate runoff excluding the initial losses.
3. Understand and apply concepts of hydrograph on the estimation of runoff and gain knowledge about ground water.
4. Estimate flood using flood routing techniques.
5. Apply silt theories on the design of canals and understand waterlogging problem

Text Book :

1. Jayarami Reddy, P., Engineering Hydrology, Laxmi publications pvt. Ltd., New Delhi.
2.Modi, P.N., Irrigation and Water Resources & Water Power, Standard Book House.

References:

1. Subramanya, K., Engineering Hydrology, Tata McGraw Hill.
2. Ojha, C.S.P., Engineering Hydrology, Oxford Publishers, New Delhi.

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

URLs

1. http://freevideolectures.com/Course/100/Water-Resources-Engineering#
2. http://www.nptelvideos.in/2012/11/advanced-hydrology.html

B. Tech. III Year - I Semester

14CE111 CONCRETE TECHNLOGY

L	T	P	C
3	1	0	3

Prerequisites: 14CHE101, 14CE104 &14CE101

Course Description:
This course covers ingredients of concrete and admixtures,properties of fresh concrete and hardened concrete, testing of hardened concrete and mix design. The course further covers special concretes used in construction industry.

Course Objectives:
1. The main aim of this course is toexplain properties of ingredients of concrete admixtures and procedures for testing concrete ingredients.
2. To make the student to understand fresh and hardened characteristics of concrete and also to enable the students to identify different mix design procedures and produce concrete mix proportions.
3. To explains the characteristics of emerging concretes.

UNIT I:
CEMENTS & ADMIXTURES: Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrate cement – Test on physical properties – Different grades of cement – Admixtures – Mineral and chemical admixtures.
AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum aggregate size.

UNIT II:
FRESH CONCRETE: Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.
HARDENED CONCRETE: Water / Cement ratio – Abram's Law – Gel space ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength - Curing.

UNIT III:
TESTING OF HARDENED CONCRETE: Compression tests – Tension tests – Factors affecting strength – Flexure tests – Chemical analysis of hardened concrete
ELASTICITY, CREEP & SHRINKAGE: Modulus of elasticity – Dynamic modulus of elasticity – Posisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

UNIT IV:
MIX DESIGN: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – BIS method of mix design.

UNIT V:

SPECIAL CONCRETES: Light weight aggregates – Light weight aggregate concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Different types of fibers – Factors affecting properties of F.R.C – Applications – Polymer concrete – Types of Polymer concrete – Properties of polymer concrete – Applications – High performance concrete – Self consolidating concrete – SIFCON.

Course Outcomes:

After the completion of the course students will be able to-

1. Identify different properties of concrete ingredients and estimate the properties through various test procedures.
2. Explain the basic characteristics of fresh and hardened concrete
3. Test the mechanical properties of hardened concrete.
4. Design the concrete mix as per various international codes.
5. Explain the characteristic and applications of special concrete.

Text Books:

1. Neville, A.M., Properties of Concrete, Low priced Edition, 4th edition.
2. Shetty, M.S., Concrete Technology, S.Chand& Co, 2004.

References:

1. Gambhir, M.L., Concrete Technology, Tata Mc. Graw Hill Publishers, New Delhi.
2. Santha Kumar, A.R., Concrete Technology, Oxford university Press, New Delhi.

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

B. Tech. III Year - I Semester

14CE112 ANALYSIS OF STRUCTURES - II

L	T	P	C
3	2	0	3

Prerequisites: 14CE101&14CE105

Course Description:
In this course analysis of statically indeterminate structures will be discussed. The course includes analysis of indeterminate trusses, frame analysis, flexibility method and stiffness methods two hinged arches, Cables and three hinged arches will be discussed.

Course Objectives:
To make the students to understand the principles of analysis of statically indeterminate structures, frames, continuous beams and arches.

UNIT I:
INDETERMINATE STRUCTURAL ANALYSIS: Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies – Solution of trusses with upto two degrees of internal and external indeterminacies – Castigliano's theorem.

UNIT II:
FRAME ANALYSIS: Moment distribution method, Kanis method, substitute frame method, cantilever method and portal frame method with examples.

UNI T 3:
FLEXIBILITY METHODS: Flexibility methods, Introduction, application to continuous beams including support settlements.
STIFFNESS METHOD: Introduction, application to continuous beams including support settlements.

UNIT IV:
TWO HINGED ARCHES: Determination of horizontal thrust bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, tied arches – fixed arches.

UNIT V:
CABLES AND THREE HINGED ARCHES: Cables, cable subjected to concentrated loads, cable subjected to a uniform distributed load, arches; three-hinged arch.

Course Outcomes:
After the completion of the course students will be able to-

1. Analyse the internal and external indeterminate trusses
2. Analyse the portal frame using moment distribution method, Kani's method and approximate methods
3. Analyse different types of continuous beams using flexibility and stiffness methods
4. Analyse the two hinged arches subjected to different loading conditions and temperature stresses
5. Analyse the cables and three hinged arches subjected to concentrated and distributed loads

Text Book:
Hibbler, R. C., **Structural Analysis**, Eighth Edition, Pearson Education, New Delhi, 2009.

References:
1. Beer, F. P., Johnston, E. R. and DeWolf, J. T., Mechanics of Materials, Fifth Edition, McGraw Hill International Edition, 2009.
2. Lardner, T. J, Archer, R. R., Mechanics of Solids, an introduction, International Edition, McGraw- Hill, 1994.
3. Shames, I. H., Introduction to Solid Mechanics, 2nd Edition, Prentice Hall of India Private Ltd. New Delhi, 1980.

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

URLs
1. http://nptel.ac.in/courses/105107120/
2. http://nptel.ac.in/courses/105105039/

B. Tech. III Year – I Semester

14CE205 HIGHWAY ENGINEERING PRACTICALS

L	T	P	C
0	0	3	2

Prerequisites14CE109
Course description: The course will provide knowledge andskills of road/highway material testing to those in the field ofroad construction or who intend to join this field ofspecialization.

Course Objectives:
To make the students to learn the principles and procedures of testing Highway materials and to get hands on experience by conducting the tests and evolving inferences.

LIST OF EXPERIMENTS
1. Aggregate Crushing value
2. Aggregate Impact Test.
3. Abrasion Test.
4. Shape tests
5. Stripping value test
6. Water Absorption test for aggregates
7. Spot Test
8. Penetration Test.
9. Ductility Test.
10. Softening Point Test.
11. Flash and fire point tests, Specific gravity test
12. Marshall's stability

LIST OF EQUIPMENT:
1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Los angles Abrasion test machine
4. Length and elongation gauges
5. Bitumen Universal Penetrometer
6. Bitumen Ductility and Elastic Recovery test setup.
7. Ring and ball Softening Point apparatus
8. Penskey – Morten's open cup flash and fire point apparatus
9. Bitumen Viscosity testing apparatus
10. Marshall's stability apparatus

Course Outcomes:
After completion of this course, a student is able to:
1. Perform aggregate testing related to road and highway construction
2. Select the appropriate materials for use in different road layers.
3. Evaluate the quality and performance of unbound and bound road materials.
4. Understand the strength of the road/concrete materials.
5. Evaluate the properties of binder in bituminous mix.

TEXT BOOK:

Khanna, S.K, Justo, A and Veeraragavan, A., Highway Materials and Pavement Testing, Nem Chand and Bros, Fifth Edition, 2009.

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

B. Tech. III Year – I Semester

14CE31206 CONCRETE TECHNOLOGY PRACTICALS

L	T	P	C
0	0	3	2

Prerequisites:14CE101,14CE104 &14CE111

Course Description: The course will provide knowledge andskills of concrete material testing

Course Objectives:
To learn the principles and procedures of testing Concrete materials and to get hands on experience by conducting the tests and evolving inferences.

LIST OF EXPERIMENTS

Aggregate tests

1. Aggregate specific Gravity and Water Absorption.
2. Sieve analysis of coarse and fine aggregates
3. Bulk density for aggregates
4. Bulking of sand

Cement

1. Normal Consistency and fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity and soundness of cement.
4. Compressive strength of cement.

Concrete

1. Workability test on concrete by compaction factor, slump, Vee-bee and flow table.
2. Young‘s modulus and compressive strength of concrete.
3. Non-Destructive testing on concrete (for demonstration)
4. Special concretes
    i. Self Compacting Concrete
    ii. Recycled aggregate concrete

Bricks

1. Compressive strength
2. Water absorption
3. Effloresence

LIST OF EQUIPMENT:

1. Pycnometers.
2. Vicat‘s apparatus
3. Specific gravity bottle.
4. Lechatlier‘s apparatus.
5. Slump and compaction factor setups
6. Longitudinal compresso meter
7. Rebound hammer, Pulse velocity machine.
8. Flow table

Relevant IS Codes

Course Outcomes

1. Identify different properties of aggregates through various test procedures.
2. Apply different test method to check the physical and mechanical properties of cement.
3. Test the mechanical properties of fresh and hardened concrete.
4. Get the knowledge in NDT and special type of concrete.
5. Evaluate physical and mechanical properties of brick masonry.

Mode of Evaluation: Continuous cumulative evaluation of the lab experiments, record, viva- and external lab examination

B. Tech. III Year – II Semester

14CE113 DESIGN OF CONCRETE STRUCTURES

L	T	P	C
3	2	0	3

Prerequisites: 14CE111, 14CE105&14CE112

Course Description:
This course includes design philosophies of structural elements. Furthermore, it includes design of singly and doubly reinforced beams, flanged beams, shear and development length, slabs, columns, foundations and staircase as per IS code.

Course Objectives:
1. To understand the fundamental principles and procedures of reinforced concrete design;
2. To apply the principles of reinforced concrete design to real world problems; and
3. Prepare students for entry level structural engineering employment.

UNIT I:
INTRODUCTION TO LIMIT STATE DESIGN: Introduction, objectives, Methods of Design, Loads & Forces acting on structures, Stress-strain curve for concrete, Size effect, behavior of concrete in tension, properties of Steel, Stress-strain curve for steel, A review on various design Philosophies, Types of Limit States, partial safety factors for materials and loads.

UNIT II:
LIMIT STATE OF COLLAPSE-FLEXURE: Assumptions and basic principles, analysis and design of singly reinforced concrete beams with Rectangular section.Assumptions and basic principles, analysis and design of doubly reinforced concrete beams with Rectangular section.Effective Width, Analysis of Flanged sections for various cases, Design of simply supported Flanged beam Sections, Design of continuous beam Flanged sections

UNIT III:
SHEAR, TORSION AND BOND: Design bond strength, development length, check for development length in tension, Anchoring of reinforcing bars, bearing stress at bonds, reinforcement splicing, Design for bond, Development length, Curtailment of reinforcement, Lap splice. Modes of failure due to shear, shear strength of concrete, critical section for shear, enhanced shear strength near support, minimum shear reinforcement, Design of shear strength, check for shear at point of tension reinforcement curtailment.
LIMIT STATE OF SERVICEABILITY: Short term deflection calculation for beams, deflection due to shrinkage and creep, Design of beams for combined bending, shear and torsion as per IS 456.

UNIT IV:
SLABS AND STAIRCASE: Design shear strength of concrete in slabs, design consideration for slabs, design and reinforcement detailing of one way simply supported and continuous slabs, design and reinforcement detailing of two way slabs.
Types of stair cases, components of staircase, structural system of stair cases, effective span, , Design of stair cases spanning transversely and longitudinally

UNIT V:

COLUMNS AND FOOTINGS: Classification of columns based on slenderness ratio, reinforcement & loading, Design of rectangular and circular columns subjected to Axial load, (Axial load + uni-axial bending) and (Axial load + Bi-axial bending).

DIFFERENT TYPES OF FOOTINGS: Design of isolated, square, rectangular and circular footings.

Course Outcomes:

After the completion of the course students will be able to-

1. Explain the basic concepts of structural design methods and behavior of materials under loading.
2. Analyze and design R.C beam for flexure.
3. Apply the concept of strength and serviceability and design R.C. beams for shear, torsion, deflection.
4. Analyze and design slabs and staircase.
5. Analyze and design R.C. columns and footings.

Text Book:

Bandhopadhyay, J. N., Design of Concrete Structures, Prentice-Hall of India, New Delhi, 2008.

References:

1. IS 456:2000, Code of practice for Plain and Reinforced concrete, Bureau of Indian Standards, New Delhi.

2. Special Publication (SP)-16, Design aids for reinforced concrete to IS 456:1978, Bureau of Indian Standards, New Delhi.

3. Verghese, P. C., Limit State Design of Concrete, 2nd edition, PHI Pvt. Ltd., New Delhi, 2011.

4. Pillai, S.U. and DevdasMenon, Reinforced Concrete Design, 3rd Edition, TMH, New Delhi, 2009.

5. Jain, A.K., Reinforced Concrete: Limit State Design, 6th Edition, Nemchand& Bros, Roorkee, 2002.

6. Krishna Raju, N. andPranesh, R.N. Reinforced concrete design, New age International Publishres, New Delhi.

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

URLs

1. http://nptel.iitk.ac.in/courses/Webcoursecontents/IIT%20Kharagpur/Design%20of%20Con%20Struc/New_index1.html

2. http://nptel.ac.in/courses/105105105/

B. Tech. III Year - II Semester

14CE114 IRRIGATION ENGINEERING

L	T	P	C
3	1	0	3

Prerequisites: 14CE110

Course Description:
In this course introduction to irrigation engineering, different irrigation methods are included. Further, estimation of quantity of water required for various types of crops, analysis & design of gravity dams and earth dams, estimation of reservoir capacity, canal regulation and cross drainage works are emphasized. In addition to the above spillways and water power engineering are incorporated.

Course Objectives:
The student is exposed to different methods of irrigation, crop water requirements, design and analysis of dam, reservoir planningand management, canal regulation and cross drainage works and diversion head works. Furthermore, they will be imparted required knowledge on spillways and water power engineering.

UNIT I:
IRRIGATION METHODS: Irrigation – Irrigation methods – Canal irrigation – Lift irrigation – Tank irrigation – Flooding methods– Sprinkler irrigation – Drip irrigation – their merits and demerits – Crop and crop seasons – consumptive use of water – Duty – Factors affecting duty – Delta – Irrigationefficiencies – Planning and Development of irrigation projects.

UNIT II:

GRAVITY DAMS: Introduction; Forces acting on a gravity dam; Combination of loading for design: Modes of failure: stability requirements; principal and shear stresses; Stability analysis: Elementary profile of a gravity dam; Practical profile of a gravity dam; Limiting height of a gravity dam- High and low gravity dams; Design of gravity dams – singlestep method: Galleries; Stability analysis of non – overflowsection of Gravity dam.

EARTH DAMS: Introduction; Types of earth dams; Causes of failure of earth dams; Criteria for safe design of earth dams; Section of an earth dam; Design to suit available materials; Seepage control measures; Slope protection. Seepage through earth dam – graphicalmethod

UNIT III:
RESERVOIR PLANNING: Introduction, Investigations for reservoir planning; selection of site for a reservoir; zones of storage in a reservoir; Storage capacity and yield; Mass inflow curve and demand curve; Calculation of reservoir capacity for a specified yield from the mass inflow curve; Determination of safe yield from a reservoir of a given capacity; Sediment flow instreams: Reservoir sedimentation; Life of reservoir. Reservoir sediment control

UNIT IV:

CANAL REGULATION WORKS: Canal falls: Necessity and location of falls; Types of falls; classification of falls; cistern design; roughening devices; design of sarada type fall. Canal regulators: off-take alignment; head regulators and cross-regulators; design of cross- regulator and distributary head regulator.

CROSS DRAINAGEWORKS: Introduction; types of cross drainage works; selection ofsuitable type of cross drainage work; classification of aqueducts and siphon aqueducts.

UNIT V:

SPILLWAYS: Introduction; Types of Spillways; profile of ogee spillway; Energy dissipation below spillways for relative positions of jump height curve and tail water curve; Stilling basins; Indian standards on criteria for design of hydraulic jump type stilling basins with horizontal aprons; Spillway crest gates – Types and description only.

WATER POWER ENGINEERING: Development of hydro power in India; Classification of hydel plants; run off river plants, storage plants and pumped storage plants; low, medium and high head schemes; Investigation and planning; components of hydel schemes – fore bay, intake structure, surge tanks, pen stocks, power house, turbines – selection of suitable type of turbine, Scroll casing, draft tube and tail race; assessment of available power; definition of gross head; operating head, effective head; Flow duration curve; Power duration curve; Load duration curve; Load curve; primary power and secondary power; installed capacity, dependable capacity; firm power, secondary power; power factor; load factor; capacity factor; utilization factor and Diversity factor.

Course Outcomes:

After the completion of the course students will be able to-

1. Understand methods of irrigation
2. Identify causes and analyse stability of solid gravity and earth dams.
3. Plan and calculate capacity/life of reservoir,
4. Gain knowledge about various canal regulation works.
5. Understand the concepts of spillways and water power engineering

Text Books:

1. Punima B.C. and PandeLal, B.B., Irrigation and Water Power Engineering, Laxmi Publishing, New Delhi 2007.

2. S.K. Garg, Irrigation Engineering and Hydraulic Structures, Khanna Publishers, Delhi

References:

1. Asawa, G.L., Irrigation Engineering, New Age International Publishers, 2000.

2. Michael, A.M, Irrigation Theory and Practical, Vikas Publishing Pvt Ltd, 2006.

3. Gupta, B.L, & Amir Gupta, Irrigation Engineering, SatyaPraheshan, New Delhi.

4. Dilip Kumar Majumdar, Irrigation Water Management (Principles & Practices), Prentice Hall of India (P), Ltd, 2000.

5. Basak, N.N, Irrigation Engineering, Tata McGraw-Hill Publishing Co. New Delhi, 1999.

6. Sharma R.K. Irrigation Engineering, S.Chand& Co. 2007.

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

B. Tech. III Year - II Semester

14CE115 SOIL MECHANICS

L	T	P	C
3	2	0	3

Prerequisites: 14CE101, 14CE102, 14CE107 &14CE110

Course Description:
This course covers physical properties of soils, soil classification, soil structure, moisture effects; permeability and seepage, compressibility and consolidation; stress, deformation, Shear strength characteristics; stress distribution and analysis. Further the course also covers basic laboratory experiments.

Course Objectives:
1. To establish and understanding of the fundamental concepts of mechanics of granular materials; including the behavior of multiphase materials and their constitutive behavior.
2. To provide students with exposure to the systematic methods for solving engineering problems in soil mechanics.
3. To discuss the basic mechanical principles underlying modern soil mechanics and to create an understanding of assumptions that are inherent to the solution of geotechnical problems.
4. To build the necessary theoretical background for design and construction of foundation systems.

UNIT I:
INTRODUCTION: Soil formation - Types of soils – Soil structure and clay mineralogy – Adsorbed water – Volume-weight relationships - Three-phase diagram.
INDEX PROPERTIES OF SOILS : Moisture content - Specific gravity – In-situ density - Relative density- Grain size analysis – Sieve and hydrometer methods – Plasticity of soils - Consistency limits and indices – I.S. Classification of soils – Sensitivity – Thixotropy - Activity of soils.

UNIT II:
PERMEABILITY: Soil water – capillary rise – flow of water through soils – Darcy's law-permeability – Factors affecting – laboratory determination of coefficient of permeability – Permeability of layered systems.
SEEPAGE THROUGH SOILS: Total, neutral and effective stresses –quick sand condition – Seepage through soils –Flownets: Characteristics and Uses.

UNIT III:
STRESS DISTRIBUTION IN SOILS: Stress distribution in soil media-Boussinesq'sformula –stress due to line load and circular and rectangular loaded area-Approximate methods- New mark's influence chart–Contact pressure distributionWestergaard's theories for point loads and areas of different shapes

UNIT IV:
COMPACTION: Mechanism of compaction – factors affecting – effects of compaction on soil properties. – Field compaction Equipment - compaction control.
CONSOLIDATION: stress history of clay; e-p and e-log p curves – magnitude and rate of 1-D consolidation – Terzaghi's Theory.

UNIT V:

SHEAR STRENGTH OF SOILS: Mohr – Coulomb Failure theories – Types of laboratory strength tests – strength tests based on drainage conditions – Shear strength of sands – Critical Void Ratio – Liquefaction- shear strength of clays.

Course Outcomes:

After the completion of the course students will be able to-

1. Apply the concept of mechanics of granular materials; including the behavior of multiphase materials and their constitutive behavior for solving the basic problems.
2. Comprehend the Permeability and seepage through soils .
3. Apply the concept of stress distribution for solving the soil mechanics problems
4. Understand the mechanism of compaction and consolidation for solving the field problems
5. Identify necessary theoretical background of shear strength for design and construction of Geostructures.

Text Books:

1. Venkataramiah, C., Geotechnical Engineering, New Age International Pvt. Ltd, New Delhi, 2002.

2. Punmia, B.C, Ashok Kumar Jain and Arun Kumar Jain, Soil Mechanics and Foundation, Laxmi publications Pvt. Ltd., New Delhi,

References:

1. GopalRanjan and ASR Rao., Basic and Applied Soil Mechanics, New age International Pvt. Ltd, New Delhi.

2. Arora, K.R., Soil Mechanics and Foundation Engg, Standard Publishers and Distributors, Delhi.

3. Lambe, T.W. and Whitman Soil Mechanics, Mc-Graw Hill Publishing Company, Newyork. Purushotham Raj., Geotechnical Engineering.

4. ManojDutta and Gulati, S.K., Geotechnical Engineering, Tata Mc.Grawhill Publishers New Delhi.

5. Murthy, V. N. S. "Geotechnical Engineering: Principles and Practices of Soil Mechanics and Foundation Engineering", CRC Press, Taylor & Francis Group, First Indian Reprint, 2010.

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

B. Tech. III Year - II Semester

14CE116 WATER SUPPLY AND WASTE WATER ENGINEERING

L	T	P	C
3	1	0	3

Prerequisites: 14CHE101, 14CE102& 14CE107

Course Description:
The course covers demand, quality,treatmentand distribution of water. Further characteristics of waste water collection including low cost treatment and house drainage are also included.

Course Objectives:
To make the students conversant with principles of water supply, quality, treatment and distribution as well as waste water collection, its characteristics and treatment.

UNIT I:
WATER DEMAND: Water demand – various types of water demand and their estimation –potable and wholesome water quality parameters – drinkingwater standards - Waterborne diseases –Need for protected water supply schemes –Comparison from quality and quantity of various sources

UNIT II:
WATER TREATMENT: Layout and general outline of water treatment units – sedimentation – principles – design factors for sedimentation tank– coagulation-flocculation- clarifier design – coagulants – feeding arrangements.
FILTRATION AND CHLORINATION: Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation – comparisonof filters – disinfection – theory of chlorination, chlorine demand, and other disinfection practices- Miscellaneous treatment methods.
WATER DISTRIBUTION SYSTEMS: Water distribution systems – Requirements, Layout of Water distribution systems – Design procedures – HardyCross and equivalent pipe methods

UNIT III:
WASTE WATER COLLECTION AND CHARACTERSTICS: Conservancy and water carriage systems – sewage and storm water estimation – time of concentration – storm water overflows combined flow – characteristics of sewage – cycles of decay – decomposition of sewage, examination of sewage – B.O.D. – C.O.D. equations
HOUSE DRAINAGE
Designof sewers – shapes and materials – sewerappurtenances – housedrainage – components requirements – sanitary fittings-traps – one pipe and two pipe systems of plumbing

UNIT IV:
WASTE WATER TREATMENT: Layout and general outline of various units in a waste water treatment plant – primary treatment design of screens – grit chambers – skimming tanks — principles of design – biological treatment – trickling filters – standard and high rate

UNIT V:
LOW COST WASTE WATER TREATMENT: Working principle and design of Oxidation ponds – design and operation of Oxidation ditches – Case studies – Sludge digestion and factors effecting – design of Digestion tank – Sludge disposal methods – septic tanks,soak pits and Imhoff tanks

Course Outcomes:

After the completion of the course students will be able to-

1. Explain various types of water demands, water quality criteria and drinking water supply systems
2. Design various units of drinking water treatment plant and water distribution systems
3. Estimate sewage generation and design sewer system including sewage pumping stations
4. Design several units of waste water treatment plant
5. Identify different low cost waste water treatment systems and sludge disposal methods

Text Books:

1. Garg, S.K., Water Supply Engineering, Khanna Publishers, 2008.

2. Garg, S.K., Sewage Disposal and Air Pollution Engineering, Khanna Publishers, 2008.

References:

1. Birdie, G.S, Birdie, J.S., Water supply and sanitary Engineering, Including Environmental Engineering, Water and Air Pollution Laws and Ecology, DhanpatRai Publishing, 1996.

2. Punmia, B.C, Ashok Kr Jain, Arun Kr Jain., Waste Water Engineering, Laxmi Publications, 1998.

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

URLs

http://nptel.ac.in/courses/105106119/

B. Tech. III Year - II Semester

14CE207 COMPUTER AIDED DESIGN AND DRAWING (CADD) PRACTICALS–I

L	T	P	C
0	0	3	2

Prerequisites: 14CE113&14CE106

Course Description
The course covers drawings for concrete and steel structures normally encountered in civil engineering practice

Course Objective
To acquire hands on experience in design and preparation of structural drawings for concrete and steel structures normally encountered in civil engineering practice

SOFTWARE:
1. Structural analysis software
2. CADD software

EXCERCISIES:
1. 2-D Frame Analysis and Design
2. Steel Tubular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple tower Analysis and Design
6. One Way Slab Analysis & Design
7. Two Way Slab Analysis & Design
8. Column Analysis & Design
9. Structural detailing using CADD

Course outcomes
Upon successful completion of this course the students able to
1. Apply the principles of science and mathematics in the design of concrete and steel structures.
2. Understand the assumptions involved in the design concrete and steel structures
3. Design and develop concrete and steel structures as per the site suitability.
4. Use modern software in the design of a structures.
5. Acquires hands on experience in design and preparation of structural drawings for concrete and steel structures normally encountered in civil engineering practice

Text Book:
Dr. Sesha, M.N, Prakash and Dr. Suresh, C.S., Computer Aided Design Lab Manual.

References
1. SP 32
2. IS 456 2002

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

B. Tech. III Year - II Semester

14CE207 SOIL MECHANICS PRACTICALS

L	T	P	C
0	0	3	2

Prerequisites: 14CE115

Course Description:
This course covers laboratory experiments to predict soil characteristics. The experiments include determination of Index and Engineering properties of soil.

Course Objectives:
1. To understand different test methods based on soil type to characterize soil
2. To Demonstrate tests in the laboratory to obtain different soil properties
3. To Analyze the test data to obtain relationships among different properties of soil

LIST OF EXPERIMENTS
1. Specific gravity and Differential Free Swell Index (DFSI)
2. Atterberg's Limits.
3. Field density-core cutter and sand replacement method
4. Grain size analysis
5. Permeability of soil, constant and variable head test
6. Compaction test
7. CBR Test
8. Consolidation test
9. Unconfined compression test
10. Tri-axial Compression test
11. Direct shear test
12. Vane shear test
13. Swelling Pressure test

Any eight experiments may be completed.

LIST OF EQUIPMENT:
1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic and Shrinkage limits
3. Field Density apparatus for
   a) Core cutter method
   b) Sand Replacement method
1. Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 0.15mm, and 0.075mm.
2. Hydrometer
3. Permeability Apparatus for
   a) Constant Head test
   b) Variable Head test
4. Universal Auto compactor for I.S light and heavy compaction tests.
5. Apparatus for CBR test
6. Sampling tubes and sample extractors.
7. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
8. One dimensional consolation test apparatus with all accessories.
9. Tri-axial cell with provision for accommodating 38 mm dia specimens.
10. Box shear test apparatus
11. Laboratory vane shear apparatus.

12. Hot Air ovens (Range of Temperature 50-1500C
13. Moisture cans – 2 dozens.
14. Electronic balances 500 g capacity with 0.01g least count and 5 kg capacity with least count of 1gm
15. Measuring Jars - 1000CC - 6- 100CC - 4
16. Mercury - 500 g
17. Rammers – 2
18. Crow bars – 2

Course Outcomes:
Upon successful completion of this practicals the students able to

1. Identify the soil type by conducting Specific gravity and, Atterberg's Limits, Grain size analysis
2. Determine the Field density by using core cutter and sand replacement method
3. Determine the flow of water in soil using permeability test
4. Analyze the soil have swelling pressure by conducting Swelling Pressure and Differential Free Swell Index (DFSI)
5. Determine the shear strength of soil by conducting Tri-axial Compression test, Direct shear test and Vane shear test

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

B. Tech. IV Year - I Semester

14CE117 QUANTITY SURVEYING

L	T	P	C
3	1	0	3

Prerequisites: 14CE103, 14CE104, 14CE108&14CE106

Course Description:
Standard units; detailed and abstract estimates of buildings, roads and canals; rate analysis; reinforcement bar bending schedule; contracts and tenders; building valuation; specifications.

Course Objectives:
1. To provide the student with the ability to estimate the quantities of item of works involved in buildings, water supply and sanitary works, road works and irrigation works,
2. To equip the student with the ability to do rate analysis, valuation of properties and preparation of reports for estimation of various items

UNIT I:
INTRODUCTION TO ESTIMATION OF BUILDINGS: : Different items of works in building – Principles of taking out quantities – Detailed measurement form – Estimate of RCC building - Long walls – Short wall method and Centre line method – Various types of arches –Calculation of brick work and RCC works in arches.

UNIT II:
REINFORCEMENT ESTIMATION: Reinforcement bar bending and bar requirement schedules.
EARTHWORK ESTIMATION: Roads: Estimate of bituminous and cement concrete - Estimate ofearthwork - Estimate of pitching of slopes - Estimate of earthwork of road from longitudinal sections - Estimate of earthwork in hill roads.
Canals: Earthwork in canals – Different cases – Estimate ofearthwork in irrigation channels.

UNIT III:
RATE ANALYSIS: Working out data for various items of work overhead and contingent charges - Task or out – Turn work – Labourand materials required for different works - Rates of materials and labour - Schedule of Rates - Preparing analysis of rates for the following items of work: Concrete, RCC Works, Brick work in foundation and super structure, plastering, CC flooring,whitewashing.
VALUATION: Necessity - Different terms used in valuation and their meaning - Different methods of building valuationand rent fixation - Outgoings – Depreciation - Methods for estimatingcost depreciation – Escalation.

UNIT IV:
CONTRACTS AND TENDERS : Elements of contract- offer acceptance and consideration - Valid contract - Types of contracts –Lump sum contract, schedule contract, item rate contract, subcontracts, joint ventures - Departmental execution of works – Muster Roll Form 21 - Piece work agreement form - Work order.

Contract contractor – Quotation - Earnest money – Security money – Tender - Tender notice, tender form - Bidding procedure,irregularities in bidding – Bidding award - Arbitration disputes and claim settlement.

UNIT V:

STANDARDS SPECIFICATIONS: Purpose and method of writing specifications -General specifications - Detailed specifications for different items of building construction.

Course Outcomes:

After the completion of the course students will be able to-

1. Analyze and assess the quantity of different items of works in building
2. Estimate reinforcement and earthwork required for various structures
3. Prepare a detailed rate analysis for various items of work and valuation and rent fixation of different building structures
4. Discuss agreements, contracts, tenders for building construction
5. Explain specification of different material required for a building construction

Text Books:

1. Dutta, B.N., Estimating and Costing, UBS publishers, 2000.
2. Birdie, G.S., Text Book of Estimating and Costing 6th Edition, DhanpatRai Publishing Company (P) Ltd
3. Patil, B.S., Contracts and estimations, Univ.Press, New Delhi.

References:

1. Standard Schedule of rates and standard data book by public works department.
2. IS. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.)
3. Estimation, Costing and Specifications by M. Chakraborthi, Laxmi publications.
4. National Building Code.

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

B. Tech. IV Year - I Semester

14CE118 DESIGN OF STEEL STRUCTURES

L	T	P	C
3	2	0	3

Prerequisites: 14CE113

Course Description:
The course covers an understanding of basic design concepts, loads and stresses to be used as per Indian standards for steel design work will be developed. The course deals with designing of steel structural elements subjected to axial tension, axial Compression and bending. Emphasis will be also given to the special structures such gantry girders and plate girders. Inaddition, analysis and design of various types of connections such as bolted and welded will be discussed. All design approaches will be based on Limit State of strengths and serviceability.

Course Objectives:
To introduce the concept of limit state design of structural steel members subjected to compressive, tensile and bending loads, including connections. Design of structural systems such as Plate girders, gantry girders as per provisions of current code of practice.

UNIT I:

INTRODUCTION: Introduction, advantages and disadvantages of steel structures, loads and load combinations, Structural steel connections, Various types of connections in steel: Bolted & welded. Design code and considerations, Limit state method(LSM) of Design, Failure criteria for steel, Structural steel connections, Various types of connections in steel: Bolted & welded and applications.

UNIT II:

DESIGN OF TENSION MEMBERS: Types of tension members, modes of failure, Net area, Net sectional area, Design, Lug Angles, Tension Splices, gussets. Plastic theory, theorems of plastic collapse, methods of plastic analysis, plastic designs of portal frames, behavior and ultimate strength of plates.
DESIGN OF BEAMS: Types and classification, Lateral stability of beams, shear strength, shear strength, web buckling and crippling, and purlins.
UNIT III:

DESIGN OF COMPRESSION MEMBERS: Behaviour of compression members, possible failure modes, single angle struts, design, built-up compression members, column bases and caps.

UNIT IV:

DESIGN OF PLATE GIRDERS: Design of web, flanges, curtailment of flanges, stiffeners, web and flange splices, economic depth of plate girders, example problem.

UNIT V:

DESIGN OF GANTRY GIRDERS: Load and fatigue effects, selection and design of gantry girder
DESIGN OF BEAM- COLUMNS: Behaviour, equivalent moment factor, eccentricity, beam - column subjected to tension and bending, design. Course Outcomes: The students would have knowledge on the design of structural steel members subjected to compressive, tensile and bending forces, as per current code and also know to design structural systems such as plate girders, beam-columns and gantry girders.

Course Outcomes:

After the completion of the course students will be able to-

1. Understand the concepts related to the basics of design of steel structures.
2. Analysis and Design of Tension members (Lug angles, tension splices, portal frames and beams)
3. Analysis and Design of compression members (Columns, Struts, built-up sections, column bases and caps)
4. Explain the concept of plate girder and design plate girder
5. Describe the concept, Design of gantry girder and analysis of beam-columns.

Text Book:

Subramanian, N., Steel Structures Design and Practice, Oxford University Press, 2010.

References:

1. Duggal, S.k., Limit State Design of Steel Structures, TMH, 2011.
2. IS 800:2007, Code of practice for General construction in steel, B.I.S.
3. IS 875:1987, Code of practice for design Loads.
4. Ramachandra, Design of Steel structures, sairamprintice hall publications.

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

URLs

1. http://nptel.ac.in/courses/105103094/
2. http://nptel.ac.in/courses/IIT-MADRAS/Design_Steel_Structures_I/

B. Tech. IV Year - I Semester

14CE119 FOUNDATION ENGINEERING

L	T	P	C
3	2	0	3

Prerequisites: 14CE115

Course Description:
The main goal of this course is to provide an in-depth understanding regarding different types of foundation systems for buildings, bridges substructure, industrial complexes, ports, harbors, water tanks, and big storage tanks of industrial structure, transmission line towers, and machines subjected to static and dynamic loads. Complete analysis of foundation systems (spread footing, combined footing, raft foundation, ring foundation, pile foundations, machine foundations, retaining structures etc.) considering all geotechnical aspects will be covered.

Course Objectives:
1. Help students understand the fundamental principles and procedures of foundation analysis and design;
2. Help students learn to apply the principles of foundation engineering to real world problems; and
3. Prepare students for entry level geotechnical engineering employment.

UNIT I:
SOIL EXPLORATION: Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Plate load test –Pressure meter – planning of programme and preparation of soil investigation report.
EARTH SLOPE STABILITY: Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices, Bishop‘s Simplified method – Taylor‘s Stability Number- Stability of slopes of earth dams under different conditions.

UNIT II:
EARTH PRESSURE THEORIES: Rankine‘s theory of earth pressure –earth pressures in layered soils – Coulomb‘s earth pressure theory –Rebhann‘s and Culmann‘s graphical method
RETAINING WALLS: Types of retaining walls – stability of retaining walls.

UNIT III:
SHALLOW FOUNDATIONS: Types – choice of foundation – Location of depth – Safe Bearing Capacity – Terzaghi`s, Meyerhoff‘s and Skempton`s Methods.
ALLOWABLE BEARING PRESSURE: Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – allowable settlements of structures – Settlement Analysis.

UNIT IV:
PILE FOUNDATION: Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae – Pile load tests –Load carrying capacity of pile groups in sands and clays – Settlement of pile groups.

UNIT V:

WELL FOUNDATIONS: Types – Different shapes of wells – Components of wells – functions and Design Criteria – Sinking of wells – Tilts and shifts.

MACHINE FOUNDATIONS: General requirements and design criteria - Stiffness and damping parameters, Analysis and design of block and frame foundations for reciprocating engines, impact type machines, rotary type machines, turbo generator. Limitations of BIS code of practices

Course Outcomes:

After the completion of the course students will be able to-

1. Comprehend the SOIL EXPLORATION and earth slope stability
2. Apply the concept about earth pressure theories for design of different retaining walls
3. Design of shallow foundations
4. Design of pile foundations
5. Design of well and machine foundations

Text Book:

Murthy, V. N. S. "Geotechnical Engineering: Principles and Practices of Soil Mechanics and Foundation Engineering", CRC Press, Taylor & Francis Group, New Delhi, 2010.

References:

1. Knappett, J.A, and Craig, R.F.,Craig Soil Mechanics, CRC Press, 2012.

2. Kaniraj, S.R, "Design Aids in Soil Mechanics and Foundation Engineering", Tata McGrawHill, New Delhi, 1988.

3. Gulhati, S.K, and Datta, M. "Geotechnical Engineering", Tata McGraw-Hill, New Delhi 2005.

4. Saran, S. "Analysis and design of foundations and retaining structures subjected to seismic loads" I K Lee Publishers, 2012.

5. Relevant BIS, IRC codes and International code of practice

6. GopalRanjanandA S R Rao. Basic Soil and Applied Soil Mechanics, Revised second edition, New Age International Publishers, 2012.

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

URLs

1. http://nptel.ac.in/courses/105107120/
2. http://nptel.ac.in/courses/105105039/

B. Tech. IV Year - I Semester

14CE209 ENVIRONMENTAL ENGINEERING PRACTICALS

L	T	P	C
0	0	3	2

Prerequisites: 14CE116& 14CHE11P01

Course Description:
This course covers laboratory experiments to predict the water quality. The experiments include determination of water quality and estimation of chemicals required to treat the waste water.

Course Objectives:
To understand the sampling and preservation methods and significance of characterization of wastewater.

LIST OF EXPERIMENTS
1. Determination of pH and Turbidity
2. Determination of Conductivity and Total dissolved solids.
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides.
5. Determination and Estimation of total solids, organic solids and inorganic solids.
6. Determination of iron.
7. Determination of Dissolved Oxygen.
8. Determination of Nitrogen.
9. Determination of total Phosphorous.
10. Determination of B.O.D
11. Determination of C.O.D
12. Determination of Optimum coagulant dose.
13. Determination of Chlorine demand.
14. Presumptive coliform test.

Note: At least 8 of the above experiments are to be conducted.

LIST OF EQUIPMENT
1. pH meter,
2. Turbidity meter,
3. Conductivity meter,
4. Hot air oven,
5. Muffle furnace,
6. Dissolved Oxygen meter,
7. U – V visible spectrophotometer,
8. Reflux Apparatus,
9. Jar Test Apparatus,
10. BOD incubator.
11. COD Extraction apparatus

Course Outcomes:

After completion of these practicals students able to

1. Test water quality and asses waste water characteristics using the principles of treatment method.
2. Acquire knowledge on the quality standards
3. Estimate the quantity of chemicals required to treat the water and waste water.
4. Recommend for the suitability of water for drinking purposes.
5. Use different techniques in analyzing the water

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

Text Books:

1. Clair Sawyer, Perry McCarty and Gene Parkin "Chemistry for Environmental Engineering and Science" McGraHill, 2003.
2. Standard Methods for Analysis of water and Waste Water – APHA.
3. Dr. Kotaiah, G. and Dr. KumaraSwamy, N., "Environmental Engineering Lab Manual", CharotarPublishers, Anand, 2004.

Reference:

Relevant IS Codes.

B. Tech. IV Year - I Semester

14CE210 COMPUTER AIDED DESIGN AND DRAWING (CADD) PRACTICALS-II

L	T	P	C
0	0	3	2

Prerequisites: 14CE207, 14CE110 & 14CE116

Course Description:
The course covers design and drawings for Irrigation and Environmental structures normally encountered in Civil Engineering practice

Course Objectives
To acquire hands on experience in design and preparation of structural drawings for Irrigation Environmental structures normally encountered in Civil Engineering practice.

Software:
C and MATLAB

LIST OF EXCERCISIES

Civil Engineering (Using C / MATLAB/ SPREADSHEET)

Design & Drawing of –

1. Singly Reinforced beam
2. Double Reinforced beam
3. One way Slab
4. Two way slab
5. Isolated column footing
6. Rate analysis and Estimation of Civil structural building
7. Development of Unit Hydrograph
8. Determination of Safe Bearing Capacity of Soil
9. Highway geometric design parameters
10. Sedimentation tank / filter

Course Outcomes:
Upon successful completion of this practicals students able to

1. Apply the principles of science and mathematics in the design of Civil engineering structures.
2. Understand the assumptions involved in the design of civil engineering structures.
3. Use C/MATLAB/Spreadsheet in the design of civil engineering elements.
4. Acquire hands on experience in design and preparation of drawings for civil engineering structures.
5. Get the knowledge in codal provision relevant to civil engineering elements.

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

DISCIPLINE ELECTIVES

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

Albert Einstein

Discipline Elective-I

14CE401 PAVEMENT DESIGN, MAINTENANCE AND MANAGEMENT

L	T	P	C
3	2	0	3

Prerequisites: 14CE109

Course Description:
The course includes pavement analysis; stresses in flexible and rigid pavements, analysis and design of flexible and rigid pavements; highway maintenance and management.

Course Objectives:
1. To introduce the students the basic knowledge on various IRC guidelines for designing rigid and flexible pavements.
2. To explain various procedures to assess quality and serviceability conditions of roads and their management.

UNIT – I
PAVEMENT ANALYSIS: Types of pavement – Factors affecting design of pavements – Elastic modulus, Poisson's ratio, wheel load, wheel configuration and tyre pressure – ESWL Concept – Tyre pressure – Contact pressure - Material characteristics –Environmental and other factors.

UNIT – II
STRESSES IN FLEXIBLE PAVEMENTS – Stress inducing factors in flexible pavement-stresses in flexible pavement-Layered systems concept – One layer system – Boussinesq Two layer system – Burmister theory for pavement design
STRESSES IN RIGID PAVEMENTS -Types of stresses and causes; Introduction to Westergaard's equation for calculation of stresses in rigid pavements due to wheel loads and temperature; Considerations in rigid pavement analysis, wheel load stresses, warping stresses, frictional stresses, combined stresses.

UNIT III
DESIGN OF FLEXIBLE PAVEMENT: Theoretical, empirical and semi-empirical methods - Burmister, CBR Method, AASHO Method, IRC and Asphalt Institute method.
DESIGN OF RIGID PAVEMENT:PCA method, AASHTO, IRC method –Design of cement concrete pavements for highways; Design of joints, reinforcements, tie bars, dowel bars and slab thickness as per IRC guidelines.

UNIT IV
HIGHWAY MAINTENANCE: Need for highway maintenance –Failures and their causes in flexible pavements and rigid pavements-- Pavement evaluation - Evaluation based on Surface Appearance, Cracks, Patches and Pot Holes, Undulations, Raveling, Roughness, Skid Resistance. Structural Evaluation by Deflection Measurements - Benkleman beam method -Pavement Serviceability index. - Pavement maintenance (IRC Recommendations only). – Strengthening-of existing pavements - Overlays.

UNIT V

PAVEMENT MANAGEMENT

Pavement Management System (PMS) implementation and operation; Data base requirements; Road condition surveys; Data management; Pavement condition analysis;
Determination of maintenance and rehabilitation needs at network level;Panel inspection;Prioritization and optimization; Budgets, programmes and plans of action.

Course Outcomes:

After completion of these practicals students able to

1. Understand the various factors affecting design of pavements
2. Identify and analyse the stresses induced in different types of pavements
3. Design flexible and rigid pavements.
4. Recognize the need of Pavement evaluation and Maintenance, by quantifying the distresses and failures in Pavement structure
5. Understand the fundamentals and basic operations of Pavement Management System

Text Books:

1. R.Srinivas Kumar, Pavement Design, Universities Press.2013
2. R.Srinivasa Kumar "Pavement Evaluation and Maintenance Management System" Universities Press. 2014.
3. Dr.S.K.Sharma, Principles, practice and design of Highway Engineering including Air Port pavements,S.Chand publications

Reference:

Pavement Rating Manuals by many agencies (Freely available on web)

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

URLs

https://www.youtube.com/watch?v=lDv67Eppaos

Discipline Elective-I

14CE402 RURAL WATER SUPPLY AND SANITATION

L	T	P	C
3	1	0	3

Prerequisites: 14CE102& 14CE107

Course Description: The course coversvarious approaches of planning of water supply schemes in rural areas, methods of treatment of water in rural areas. Further the course includes waste water collection system, treatment and disposal of waste water in rural areas. The course also covers disposal of solid wastes in rural areas

Course Objectives:
To make the students conversant with principles of rural water supply, treatment and distribution as well as waste management systems for rural areas

UNIT I
INTRODUCTION Concept of environment and scope of sanitation in rural areas.Magnitude of problems of rural water supply and sanitation.Population to be covered, difficulties.National policy.

UNIT II
WATER SUPPLY: Design population and demand loads. Various approaches of planning of water supply schemes in rural areas. Development of proffered sources of water springs. Wells, infiltration wells, radial wells and infiltration galleries, collection of raw water from surface source. Water supply through spot sources, hand pumps, open dug –well. Specific practices and problems encountered in rural water supply.

UNIT III
METHODS OF TREATMENT: Specific problem in rural water supply and treatment e.g. iron, manganese, fluorides etc. Low cost treatment, appropriate technology for water supply and sanitation. Brief Details of multi-bottom settlers (MBS), diatomaceous earth filter, cloth filter, slow sand filter, chlorine diffusion cartridges. Pumps, pipe materials, appurtenances and improved devices for use in rural water supply. Planning of distribution system in rural areas.

UNIT IV
COMMUNITY AND SANITARY LATRINES: Various methods of collection and disposal of night soil.Planning of waste water collection system in rural areas.Treatment and Disposal of waste water. Compact and simple waste water treatment units and systems in rural areas such as stabilization ponds, septic tanks, Imhoff tank, soak pit etc. Disposal of waste water soakage pits and trenches.

UNIT V
DISPOSAL OF SOLID WASTES. Composting, land filling, incineration, Biogas plants, Rural health. Other specific issues and problems encountered in rural sanitation

Course Outcomes:

After the completion of the course students will be able to-

1. Identify problems pertaining to rural water supply and sanitation
2. Plan and design water supply and sanitation system for rural community
3. Identify specific problem in rural water supply and explain various methods of water treatment
4. Discuss low cost sanitary and waste water treatment systems for rural areas
5. Illustrate different solid waste management systems and problems associated with sanitation in rural areas

Text Books:

1. Water Treatment and Sanitation – Simple Method for Rural Area' by Mann H.T. and Williamson D.

2. Water Supply for Rural Areas & Small Communities' by Wanger E.G. and Lanoix J.N., WHO

References

1. 'Water Supply and Sewerage', by E.W.Steel&T.J.Mcghee, McGraw Hill.

2. 'Manual on Water Supply and Treatment', CPHEEO, Mini. Of Urban Development, Govt. of India.

3. 'Manual on Sewerage and Sewage Treatment', CPHEEO, Mini. Of Urban Development, Govt. of India

4. 'Environmental Engineering' by D. Srinivasan, PHI Learning Pvt. Ltd. 2009

5. 'Rijswijk (the Haque). Wagner, E.G. and Lanoik, J.N. water supply for rural areas and small communities, Geneva: W.H.O.1959.

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

Discipline Elective-I

14CE403 GREEN BUILDINGS AND ENERGY CONSERVATION

L	T	P	C
3	1	0	3

Prerequisites: None

Course Description: The course covers various aspects of bioclimatic architecture like climate sensitive design, passive solar architecture, Water management, green building materials and construction techniques.

Course Objectives:

1. The course introduces concepts of sustainability and bioclimatic design in planning, construction and life of buildings.
2. This course intends to equip students with technical knowledge of energy-efficient green buildings
3. This course guide students, through projects, to apply concepts and ideas for the design of a green building by introducing them to green initiatives and ratings.
4. This course also initiates students in basics of functional design and drawing of the various buildings using the above concepts.

UNIT -1: GREEN BUILDING CONCEPTS

Orientation - Introduction to bioclimatic architecture, Sustainability in building scienceFunctional planning -Elements of building design and drawing, regulations and bylaws -Traditional Vs VernacularArchitecture- Climate zones, Design Charts, sun path diagram, Solar angles, Indices of thermal comfort , Vernacular buildings in different climate zones

UNIT- 2: CLIMATE RESPONSIVE SCIENTIFIC PROCESS OF DESIGN

Introduction, various steps,Site planning , Plan form Building envelopeLandform, topography, vegetation, water bodies; Orientation, S/V ratio, P/A ratio, Walls, Fenestration, Roof and floors Active vs passive, Passive solar architecture

UNIT-3: THERMAL FLOW IN BUILDINGS

Calculation of thermal conductance, Heat flow through different building elements; Various software-Ventilation and day lighting- Design and placement of openings-- Water management in buildings-Techniques to recycle, reuse and harvest water

UNIT IV: GREEN BUILDING MATERIALS AND CONSTRUCTION

Material properties, Energy efficiency using various materials, emerging new materialsConstruction techniques- Techniques for roof, wall and foundations

UNIT V: ECONOMY OF GREEN BUILDING

Cost of building, operation and maintenance- Green building rating system, Evaluation criteria of LEED, TERI GRIHA case studies, Case studies in different climate zones

Course Outcomes:

After the completion of the course students will be able to-

1. Identify various elements of sustainable building design
2. Explain different green building concepts integrating climate response
3. Discuss thermal comfort and water management techniques in green building
4. Describe green building materials and construction techniques
5. Explain green building economy and existing performance rating systems

Text books:

1. Krishnan, A., Baker, N., Yannas, S., &Szokolay, S. (Eds.). (2001). Climate responsive architecture, a design handbook for energy efficient buildings. New Delhi: Tata McGraw–Hill Publishing Company.

2. TERI & ICAEN (InstitutCatalad'Energia). (2004). Sustainable building design manual (Vol. II). New Delhi: The Energy and Resources Institute(TERI) Press.

References:

1. Bureau of Indian Standards. (1995). SP:41, Handbook on functional requirements of buildings (other than industrial buildings) (First reprint ed.). New Delhi: Bureau of Indian Standards.

2. Indian Green Building Council, LEED-India. (2011). LEED 2011 for India- Green building rating system, abridged reference guide for new construction and major renovations (LEED India NC). Hyderabad: Indian Green Building Council.

3. Koenigsberger, O., ingersoll, T. G., Mayhew, A., &Skozolay, S. V. (2011). Manual of Tropical Housing and Building. Hyderabad: Universities Press.

4. Prabhu, Balagopal T S, K Vincent Paul, and C Vijayan. Building Design and Drawing. Calicut: Spades Publishers, 2008.

5. Szokolay, S. V. (2008). Introduction to Architectural Science – The Basis of sustainable Design (Second ed.). Architectural Press / Elsevier.

6. The Energy and Resources Institute (TERI). (2011). Green Rating for Integrated Habitat Assessment (GRIHA) manual. New Delhi: TERI press.

7. Journals: Energy and Buildings, Building and Environment, Other relevant publications.

8. National Building Code, Bureau of Indian Standards: New Delhi. 2005; Building Bye laws and building rules of selected Indian urban and rural areas

9. Swamy, N. K., &Rao, A. K. (2013). Building planning and Drawing,New DelhiCharothar Publishing House

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

Discipline Elective-II

14CE404 DESIGN OF PRESTRESSED CONCRETE STRUCTURE

L	T	P	C
3	2	0	3

Prerequisites: 14CE105, 14CE112 & 14CE113

Course Description:
This course includes Historic development of prestressing, methods of prestressing, losses of prestress. Further, in this course, analysis of sections for flexure, design of sections for flexure, design of section for shear will be explained.Composite section and deflections of prestressed concrete beams will also be explained.

Course Objectives:
1. To introduce the need for prestressing as well as the methods, types and advantages of prestressing to the students.
2. Students will be introduced to the design of prestressed concrete structures subjected to flexure and shear.
3. To explain analysis of composite sections, deflection of pre stressed concrete beams

UNIT I:
INTRODUCTION:
Historic development–General principles of pre-stressingpre-tensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics.

UNIT II:
METHODS OF PRESTRESSING: Methods and Systems of Pre-stressing; Pre-tensioning and post tensioningmethods – Analysis of post tensioning - Different systems of pre-stressinglike Hoyer System, Magnel System Freyssinet system and Gifford – Udall System.
LOSSES OF PRESTRESS: Loss of pre-stress in pre-tensioned and post-tensioned members due to various causes like elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of stress in steel, slip in anchorage ,bending of member and wobble frictional losses.

UNIT III:
ANALYSIS OF SECTIONS FOR FLEXURE: Elastic analysis of concrete beams prestressed with straight, concentric, eccentric, bent and parabolic tendons.
DESIGN OF SECTIONS FOR FLEXURE: Allowable stress, Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure – Kern – lines, cable profile.

UNIT IV:
DESIGN OF SECTION FOR SHEAR: Shear and Principal Stresses – Design for Shear in beams.
COMPOSITE SECTION: Introduction – Analysis of stress – Differential shrinkage – Generaldesigns considerations.

UNIT V:
DEFLECTIONS OF PRESTRESSED CONCRETE BEAMS: Importance of control of deflections – factors influencing deflections –short term deflections of uncrackedmembers prediction of long termdeflections.

Course Outcomes:

After the completion of the course students will be able to-

1. Explain the basic principle of pre-stressing .and post tensioning concrete structure and its limitations.
2. Apply different method and system of pre-stressing and explain different losses of pre-stress.
3. Analyze and design of prestressed section for flexure.
4. Design prestressed section for shear and explain its composite action.
5. Identify the factors influencing the deflection of pre-stressed concrete beams.

Text Book:

Krishna Raju, N., Prestressed Concrete, Tata Mc.Graw Hill Publications.

References:

1. Rajasekharan, N., Prestressed Concrete, Narosa publications.

2. Ramamrutham, Prestressed Concrete, Dhanpatrai Publications.

3. Lin, T.Y., & Ned H.Burns, John Wiley & Sons., Design of Prestressed concrete Structures (Third Edition).

4. E. G. Nawy's Prestressed Concrete 5th edition, Prentice Hall; 5 edition (2009)

Codes/Tables:

Codes: BIS code on prestressed concrete, IS 1343 to be permitted into the Examination Hall.

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

Discipline Elective-II

14CE405 DESIGN OF ADVANCED CONCRETE STRUCTURES

L	T	P	C
3	2	0	3

Prerequisites: 14CE113

Course Description:
In this course, concepts related to design of various concrete structures like flat slabs, irregular shaped slabs, retaining walls, curved beams, water tanks, folded plates, cylindrical shell roofs will be explained.

Course Objectives:
To understand and design various structural elements like flat slab- irregular shaped slabs, retaining walls, curved beams, water tanks, folded plates, cylindrical shell roofs

UNIT I:
DESIGN OF FLAT SLABS
Introduction, column and middle strips, proportioning of flat slab elements, design methods for flat slabs, direct design methods, total design moment, distribution of moments in slabs-effect of pattern loading, transfer of floor loads into columns, design for shear, provision for reinforcement, moments in columns, simple problems.

DESIGN OF SLABS OF IRREGULAR SHAPE BY YIELD-LINE THEORY
Introduction; fundamentals of yield line theory, convention of representation, ultimate moment of a slab equally reinforced in two perpendicular directions. Equilibrium of slab parts. Nodal forces-equilibrium method-Strip method

UNIT II:
DESIGN OF RETAINING WALLS
Introduction-Types of retaining walls-drainage-failures of retaining walls-lateral pressure on retaining walls-footing soil pressures-Design of retaining walls-cracks and wall joints
Design of beams curved in plan;–simple problems-Introduction-circular beam-circular arc-fixed at ends,

UNIT III:
DESIGN OF WATER TANKS
Introduction-special considerations special requirements, control joints, fundamentals of R.C.C. design of elements(Working stress method),minimum reinforcements, members subjected to axial tension only, members subjected to bending moment only-members subjected to combined axial tension and bending moment. Circular tanks with flexible joints at the base, analysis of circular tanks, cover slab or dome, side walls, side wall fitting, base slab.

UNIT IV:
INTRODUCTION TO BRIDGE ENGINEERING
Importance of site investigation in Bridge design; Highway Bridge loading standards; Impact factor; Railway bridge loading standards (B.G ML Bridge) various loads in bridges.
DECK SLAB BRIDGE
Introduction – Effective width method of Analysis Design of deck slab bridge (Simply Supported) subjected to class AA Tracked Vehicle only.

UNIT V:

INTRODUCTION TO PRESTRESSED CONCRETE

Historic development – General primciples of pre stressing, pre tensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics.

METHODS OF PRESTRESSING

Methods and Systems of Prestressing; Pre-tensioning and post-tensioning methods – Analysis of post tensioning – Different systems of prestressing like Hoyer System, Magnel system Freyssinet system and Gifford – Udall System. Losses of prestress

Course Outcomes:

After the completion of the course students will be able to-

1. Acquire the requisite skills to be able to carry out the design of flat slabs for various loading and support conditions.
2. Apply the principles of yield line theory to design slabs of irregular shape.
3. Classify retaining walls by type and carry out structural design of each for the prevailing site conditions.
4. Design of water tank and associated structural members as per working stress method.
5. Acquire skills on basic design aspect of Bridges.

Text Books:

1. Punmia B.C, Ashok Kumar Jain and Arun Kumar Jain, Limit State Design of Reinforced Concrete (As per IS 456-2000), Lakshmi Publications, New Delhi, 2007.

2. Krishna Raju N, Advanced Reinforced Concrete Design (IS: 456-2000), CBS Publisher, New Delhi, 2012

References:

1. Verghese, P. C, Limit State Design of Concrete, 2nd edition, PHI Pvt. Ltd., New Delhi, 2011.

2. Pillai, S.U. and Devdas Menon, Reinforced Concrete Design, 3rd Edition, TMH, New Delhi, 2009.

3. M.L. Gambhir, Fundamentals of Reinforced Concrete Design, Prentice Hall of India Private Limited, 2006.

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

Discipline Elective-II

14CE406 INTRODUCTION TO BRIDGE ENGINEERING

L	T	P	C
3	2	0	3

Prerequisites: 14CE105, 14CE112 &14CE113

Course Description:
This course includes introduction to bridge engineering. Design concepts of different bridge types like box culvert, deck Slab Bridge, T-beam Bridge, and plate Girder Bridge, composite bridges will be discussed. Bridge bearings, pears and abutments will also be explained.

Course Objectives:
To make the student to know about various bridge structures, selection of appropriate bridge structures and design it for given site conditions.

UNIT I:
INTRODUCTION: Importance of site investigation in Bridge design. Highway Bridge loading standards.Impact factor.Railway Bridge loading standards (B.G. ML Bridge) various loads in bridges.
BOX CULVERT: General aspects. Design loads, Design of Box culvert subjected to RC class AA tracked vehicle only.

UNIT II:
DECK SLAB BRIDGE: Introduction – Effective width -method of Analysis Design of deck slab Bridge (Simply supported) subjected to class AA Tracked Vehicle only.
BEAM & SLAB BRIDGE (T-BEAM BRIDGE): General features – Design of interior panel of slab – Pigweeds method –Design of a T-beam bridge subjected to class AA tracked vehicle only.

UNIT III:
PLATE GIRDER BRIDGE: Introduction – elements of a plate girder and their design. Design of a deck type welded plate girder – Bridge of single line B.G.
COMPOSITE BRIDGES: Introduction – Advantages – Design of Composite Bridges consisting of RCC slabs over steel girders including shear connectors.

UNIT IV:
BRIDGE BEARINGS: General features – Types of Bearings – Design principles of steel Rocker& Roller Bearings – Design of a steel Rocker Bearing – Design of Elastometric pad Bearing.

UNIT V:
PIERS & ABUTMENTS: General features – Bed Block – Materials piers & Abutments Types of piers – Forces acting on piers – Stability analysis of piers – General features of Abutments – forces acting on abutments – Stability analysis of abutments – Types of wing walls – Approaches – Types of Bridge Foundations (excluding Design).

Course Outcomes:

After the completion of the course students will be able to-

1. Gain knowledge on highway and railway loading standards and also designing a box culvert subjected to IRC class AA loading.
2. Design of deck slab bridge and beam slab bridge.
3. Design of plate girder and composite bridges.
4. Design of elastomeric and steel rocker bearing.
5. Understand the concept of piers and abutments including forces and stability analysis.

Text Books:

1. PonnuSwamy, Bridge Engineering, TATA McGraw Hill Company, New Delhi.

2. KrishnamRaju, N., Design of Bridges, Oxford & IBH, Publishing Company Pvt.ltd. Delhi.

References:

1. Jagadish, T.R, and Jayaram, M.A., Design of Bridges Structure, Prentice Hall of India Pvt., Delhi.

2. Victor, D.J., Design of Bridges Structure.

3. Punmia, B.C, Ashok Kumar Jain and Arun Kumar Jain Design of Steel structures, Laxmi Publications, New Delhi.

4. Ramachandra, Design of Steel structures. Punmia, B.C, Ashok Kumar Jain and Arun Kumar Jain., Design of R.C.C. structures, Laxmi Publications, New Delhi.

5. Relevant – IRC & Railway bridge Codes.

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

Discipline Elective-III

14CE407 CONSTRUCTION EQUIPMENT PLANNING AND MANAGEMENT

L	T	P	C
3	1	0	3

Prerequisites: 14CE104& 14CE111

Course description:
The course covers fundamentals of construction technology, different construction equipment, project management, Time estimates and computations, CPM, PERT and network analysis.

Course Objectives:
The main objective of this course is to make the student aware of the various construction procedures for sub to super structure and also the equipment needed for construction of various types of structures from foundation to super structure

UNIT I:
FUNDAMENTALS OF CONSTRUCTION TECHNOLOGY : Definitions and Discussion – Construction Activities – Construction Processes - Construction Works – Construction Estimating – Construction Schedule – Productivity and Mechanized Construction – Construction Documents – Construction Records – Quality – Safety – Codes and Regulations.
PREPARATORY WORK AND IMPLEMENTATION: Site layout – Infrastructure Development – Construction Methods – Construction Materials – Deployment of Construction Equipment – Prefabrication in Construction – Falsework and Temporary Works.

UNIT II:
EARTHWORK: Classification of Soils – Project Site – Development – Setting Out - Mechanized Excavation – Groundwater Control – Trenchless (No-dig) Technology – Grading – Dredging.
CONSTRUCTION EQUIPMENT:
Introduction to Construction Equipment: Their contribution and importance in construction Industry Classification of construction equipment – Earth moving equipment - Excavation equipment - Hauling equipment – Earth-compaction equipment - Hoisting equipment - Concreting plant andequipment – Selection of equipment –Task consideration – Cost consideration – Factors affecting the selection - Factors affecting cost owning and operating the equipment – Equipment maintenance.

UNIT III:
PROJECT MANAGEMENT AND BAR CHARTS AND MILESTONE CHARTS:
Introduction – Project planning – Scheduling – Controlling – Role of decision in project management – Techniques for analyzing alternatives Operation research – Methods of planning and programming problems – Development of bar chart – Illustrative examples – Shortcomings of bar charts and remedial measures – Milestone charts – Development of PERT net work problems.
ELEMENTS OF NETWORK AND DEVELOPMENT OF NETWORK:
Introduction – Event – Activity – Dummy – Network rules – Graphical guidelines for network – Common partial situations in network – Numbering the events – Cycles Problems – Planning for network construction – Modes of network construction – Steps in development of network – Work breakdown structure –Hierarchies – Illustrative examples – Problems.

UNIT IV:

PERT: TIME ESTIMATES & TIME COMPUTATIONS:

Introduction – Uncertainties: Use of PERT – Time estimates – Frequency distribution – Mean, variance and standard deviation – Probability distribution – Beta distribution – Expected time Problems –Earliest expected time – Formulation for TE - Latest allowable occurrence time – Formulation for TL - Combined tabular computations for TE and TL problems.

UNIT V:

PERT AND CPM: NETWORK ANALYSIS: Introduction - Slack – Critical path – Illustrative examples – Probability of meeting scheduled date Problems – CPM : process – CPM : Networks – Activity time estimate – Earliest event time – Latest allowable occurrence time – Combined tabular computations for TE and TL – Start and finish times of activity – Float – Critical activities and critical path – Illustrative examples Problems.

Course Outcomes:

After the completion of the course students will be able to-

1. Understand the different construction techniques
2. Gain knowledge on the various practices and equipment's in construction work.
3. Understand the fundamental of construction management tools
4. Plan the requirements for substructure and superstructure construction.
5. Apply the techniques of project planning and management in construction projects.

Text Books:

1. SubirK.Sarkar and SubhajitSaraswati., Construction Technology, Oxford Higher Education Univ.Press, Delhi.

2. Dr.Punmia, B.C, Khandelwal, K.K., Project Planning and Control with PERT and CPM, Lakshmi Publications New Delhi.

3. Jha, Construction project management, Pearson publications, New Delhi.

References:

1. Bhave, P.R., Optimal design of water distribution networks, Narosa Publishing house, 2003.

2. SankarIyer, P., Operations research, TMHPubilications, New Delhi.

3. Ramanathan, N., Operations research, TMHPubilications, New Delhi.

4. JOY, P.K., Total Project management, the Indian context, Mac Millan Publishers India Limited.

5. Robert L.Peurifoy "Construction planning, equipment, and methods" Mcgraw Hill publishing company

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

URLs

http://nptel.ac.in/courses/Webcourse-contents/IIT-%20Guwahati/cpm/

Discipline Elective-III

14CE408 PRINCIPLES OF GEOGRAPHICAL INFORMATION SYSTEMS

L	T	P	C
3	1	0	3

Prerequisites: None

Course Description: The topic coversAerial photogrammetric; remote sensing:GPS; geographic informationsystem: data representation, spatial analysis; computational algorithms,Strategies for development and implementation-applications of GIS

Course Objectives:

1. The main objective of the course is to promote a good foundation in GIS and working knowledge of fields strongly related to GIS in the computing perspective.
2. To discuss different algorithms for spatial analysis illustrated with case studies.
3. The course will also guide the students through projects and to apply concepts and ideas in various application areas and to establish a motivation towards research in thrust areas related to GIS.

UNIT I:

INTRODUCTION TO GEOGRAPHICAL INFORMATION SYSTEMS (GIS),

Introduction to GIS – GIS-definition and terminology – GIS categories – Components of GIS,fundamental operations of GIS – Land surveying – Global positioning system- Introduction of GIS modules- GIS Functionality: Interface, Spatial data, Raster data model and vector data model Databases.

UNIT II:

DATAACQUISITION FOR GIS:-Remote sensing Fundamentals- Basics of Photogrammetric, Flight planning- Basics of Global Positioning System (GPS)- RADAR, TM and Multispectral sensing Radar: basics and application.

UNIT III

TYPES OF DATA REPRESENTATION: Co-ordinate system and Geo-referencing -Map Projection- Digitization, Encoding, and Structuring of data- Basics of spatial database- Deterministic and Statistical spatial interpolation.

UNIT-IV

COMPUTATIONAL ALGORITHMS: Triangulation, DEM, TIN, terrain mapping and analysis-Network analysis, Geocoding,Path analysis and network applications

UNIT -V

STRATEGIES FOR DEVELOPMENT, IMPLEMENTATION AND MANAGEMENT OF GIS,Different aspects of Spatial model creation, monitoring and managing at various levels of project. Case studies on use of GIS from various fields such as water and land resources, environment, transportation, etc., next generation GIS systems.

Course out comes:

After the completion of the project students will be able to

1. Understand the basics of GIS, GPS and different types of raster and vector data
2. Analyse the advantages and limitations of TM and multispectral remote sensing
3. Evaluate the suitable coordinate system (Geographic/Projected) for specific applications
4. Understand the different types of raster and vector data geocoding methods
5. Apply the Remote sensing and GIS concepts to solve complex management problems.

Text Book:

Rajiv Gupta &Mukesh Kumar Rohil, 'Computing Aspects of Geographical Information Systems', EDD Notes, BITS Pilani, 2001, 1st. edi.

References:

1. Kang-tsung Chang; "Introduction to Geographic Information Systems" , Tata McGraw-Hill 4th edi.

2. Thomas M Lillesand, and Ralph W Kiefer; "Remote sensing and Image Interpretation", John Wiley & Sons, 1994, 3rded.

3. Michael F. Worboys, "GIS: A Computing Perspective", Taylor & Francis Ltd; 1995.

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

Discipline Elective-III

14CE409 GEOTECHNICAL EARTHQUAKE ENGINEERING ANDMACHINE FOUNDATIONS

L	T	P	C
3	1	0	3

Prerequisites: 14CE115&14CE119

Course Description:
The course covers Earthquake seismology, ground motion, ground response analysis, Liquefaction seismic design of foundation and retaining walls and machine foundations.

Course objectives
1. To understand the dynamics of earth and to estimate dynamic properties of soils
2. To develop the site specific design spectrum for design of sub structure and evaluation of liquefaction potential.
3. To understand the concepts of design of machine foundations

UNIT I:
EARTHQUAKE SEISMOLOGY: Causes of earthquake, Plate tectonics, Earthquake fault sources, Seismic waves, Elastic rebound theory, Quantification of earthquake, Intensity and magnitudes, Earthquake source models.

UNIT II:
EARTHQUAKE GROUND MOTION: Seismograph, Characteristics of ground motion, Effect of local site conditions on ground motions, Design earthquake, Design spectra, Development of site specification and code-based design.

UNIT III:
GROUND RESPONSE ANALYSIS: One-dimensional ground response analysis: Linear approach, Nonlinear approach, Comparison of one dimensional ground response analyses. Two dimensional ground response analysis: Dynamic finite element analysis, Equivalent linear approach, Nonlinear approach, Comparison of two dimensional ground response analyses.

UNIT IV:
LIQUEFACTION AND LATERAL SPREADING: Definition and types -Liquefaction related phenomena, Effect of Liquefaction on built environment. Evaluation of Liquefaction susceptibility, Soil improvement for remediation of Liquefaction hazard.
SEISMIC DESIGN OF FOUNDATIONS,RETAINING WALLS & SLOPES: Seismic design requirements for foundation, Seismic bearing capacity, Seismic settlement, Design loads. Seismic slope stability analysis - Seismic design of retaining walls.

UNIT V:
MACHINE FOUNDATIONS: Fundamentals of vibration, Free and forced vibrations with special considerations for design of machine foundation-Vibration analysis of block foundation for different modes of vibration. Method of analysis of machine foundations-Linear elastic weightless spring and elastic half space theory approach. Design criteria of machine foundations as per I.S. codes**.**

Course Outcomes:

After the completion of the course students will be able to-

1. Comprehend the earthquake seismology
2. Comprehend the Characteristics of ground motion and Effect of local site conditions on ground motions
3. Analysis of site specific response to develop design spectra.
4. Evaluation of Liquefaction susceptibility and Seismic design of geo structures
5. Apply the concept about Free and forced vibrations for Design of machine foundations as per I.S. codes

Text Books:

1. Kramer S. L, Geotechnical Earthquake Engineering, Prentice Hall, 1996.

2. Swami Saran, Soil dynamics and Machine Foundations, Galgotia Publications Pvt. Ltd., New Delhi.

References:

1. Day, R. W., Geotechnical Earthquake Engineering Handbook, McGraw-Hill, 2002.

2. Naeim, F.,The Seismic Design Handbook, Kluwer Academic Publication, 2nd Edition, 2001.

3. Kamalesh Kumar., Basic Geotechnical Earthquake Engineering, New Age International Publishers, 1st Edition, 2008.

4. Dowrick, Earthquake Resistant Design, John Wiley & Sons, (2009).

5. Sreenivasulu, P &Vaidyanathan, C.V. Hand book of machine foundations, Tata McGraw-Hill Education, 01-Jan-1976.

6. Bharat BushanPrasad, Advanced Soil Dynamics and Earthquake Engineering, PHI Learning Pvt. Ltd., New Delhi, 2011.

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

Discipline Elective-IV

14CE410 ENVIRONMENTAL IMPACT ASSESSMENT

L	T	P	C
3	1	0	3

Prerequisites: 14CHE11T02&14CE116

Course Description:
In this course Basic concept of Environmental Impact Assessment (EIA), EIA Methodologies, Impact of Developmental Activities and Land use will be discussed. Environmental Audit & Environmental legislation, Post Audit activities, The Environmental pollution Act will also be explained.

Course Objectives:
To impart knowledge on Environmental management and Environmental Impact Assessment.

UNIT I:
Basic concept of EIA : Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.
E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis.

UNIT II:
Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives.
Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, generalized approach for assessment of Air pollution Impact.

UNIT III:
Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

UNIT IV:
Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocel, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

UNIT V:
Post Audit activities, The Environmental pollution Act, The water Act, The Air (Prevention & Control of pollution Act.), Mota Act, Wild life Act.
Case studies and preparation of Environmental Impact assessment statement for Dairy, Paper Beverage and Rubber Industries

Course Outcomes:

After the completion of the course students will be able to-

1. Discuss the various methods used in predicting environmental impacts
2. Utilize site information to interpret impacts on land and groundwater
3. Outline the environmental impacts of various development activities on existing ecosystem
4. Explain the procedure of environmental audit report and various protocols involved in preparation of environmental audit report.
5. Utilize the implications of current jurisdictional arrangements in relation to environmental impact assessment

Text Books:

Anjaneyulu, Y., Environmental Impact Assessment Methodologies, B.S. Publication, Sultan Bazar, Kakinada.

References:

1. Glynn, J. and Gary W. Hein Ke., Environmental Science and Engineering, Prentice Hall Publishers.

2. Suresh K. Dhaneja Environmental Science and Engineering, S.K., Katania& Sons Publication, New Delhi.

3. Dr. Bhatia, H.S., Environmental Pollution and Control, Galgotia Publication (P) Ltd, Delhi.

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

Discipline Elective-IV

14CE411 INTRODUCTION TO FINITE ELEMENT METHODS

L	T	P	C
3	2	0	3

Prerequisites: 14CE105& 14CE112.

Course Description:
This course includes concepts of Finite Element Methods (FEM),

Course Objectives:
To apprise the students about the basics of Finite Element theory, computer implementation of this theory and its practical applications

UNIT I:
INTRODUCTION: Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization – Rayleigh –Ritz method of functional approximation.
PRINCIPLES OF ELASTICITY: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading.

UNIT II:
ONE DIMENSIONAL FINITE ELEMENTS: Introduction, bar element, beam element, bar and beam element of arbitrary orientation, assembly of elements, stiffness matrices, boundary conditions, loads, applications.

UNIT III:
TWO DIMENSIONAL ELEMENTS: Different types of elements for plane stress and plane strain analysis – Displacement models generalized coordinates – shape functions – convergent and compatibility requirements – Geometric invariance – Natural coordinate system – area and volume coordinates
GENERATION OF ELEMENT: Generation of element stiffness and nodal load matrices for 3-node triangular element and four noded rectangular elements.

UNIT IV:
ISOPARAMETRIC FORMULATION: Concepts of isoperimetric elements for 2D analysis – formulation ofCST element, 4 –Noded and 8-noded iso-parametric quadrilateralelements –Lagrangian and Serendipity elements.

UNIT V:
AXI-SYMMETRIC ANALYSIS: Basic principles-Formulation of 4- nodediso-parametric axi-symmetric element.
SOLUTION TECHNIQUES: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

Course Outcomes:
After the completion of the course students will be able to-

1. Understand the concepts in finite element method and principles of elasticity
2. Know the one-dimensional elements and their application in FEM
3. Gain knowledge on two-dimensional elements and their application in FEM
4. Understand the isoperimetric elements and their application in FEM
5. Apply solution techniques and axisymmetric formulation

Text Book:
Tirupati. R. Chandrnpatla and Ashok D. Belegundu, Finite Elements Methods in Engineering,Pearson Education Publications.

References:

1. Bhavakatti, S.S., Finite element analysis, New age international publishers.
2. Dixit, U.S., Finite Element methods for Engineers, Cengage Publishers, New Delhi.
3. Rajasekharan, S., Finite element analysis in Engineering Design, S.Chand Publications, New Delhi.
4. Krishna Murthy, C.S., Finite Element analysis - Theory & Programming, Tata Mc.Graw Hill Publishers.
5. O. C.Zienkiewicz, Robert L Taylor J.Z. Zhu The Finite Element Method: Its Basis and Fundamentals, Seventh Edition, Butterworth-Heinemann - 2013-09-05
6. Robert cook Davis Mallcus, Concepts and Applications of Finite Element Analysis.
7. George R. Buchanan Schaum's Outline of Theory and Problems of Finite Element Analysis, McGraw-Hill, 1995.

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

URLs
1. http://nptel.ac.in/courses/112106135/

Discipline Elective-IV

14CE412 GROUNDIMPROVEMENT TECHNIQUES

L	T	P	C
3	1	0	3

Prerequisites: 14CE115&14CE119

Course Description: The course covers need and objectives; identification of problematic soils; ground improvement techniques;densification in granular soils; densification in cohesive soils; soil stabilization; confinement; reinforced earth; geosynthetics; improvement of expansive soils.

Course Objectives:
At the end of the course student is expected to identify the problematic soil and suggest suitable remedial measures to improve their behaviour.

UNIT I:
INTRODUCTION Need for engineered ground improvement, classification of ground modification techniques; suitability, feasibility and desirability of ground improvement technique.
DEWATERING: Methods of de-watering- sumps and interceptor ditches- wells- drains- Electro-osmosis.
GROUTING: Objectives of grouting- grouts and their properties-grouting methods

UNIT II:
DENSIFICATION METHODS IN SOILS:-
In – situ densification methods in granular Soils: – Vibration at the ground surface, Impact at the Ground Surface, Vibration at depth, Impact at depth.
In – situ densification methods in Cohesive soils: – preloading or dewatering, Vertical drains – Sand Drains, Sand wick geo-drains – Stone and lime columns – thermal methods.

UNIT III:
STABILISATION: Methods of stabilization-mechanical-cement- limebituminous-chemical stabilization with calcium chloride,sodium silicate and gypsum

UNIT IV:
GEOSYNTHETICS & REINFORCED SOIL: Principles – Components of reinforced earth – factors governing design of reinforced earth walls design principles of reinforced earth walls.
Geotextiles- Types, Functions and applications – geo-grids and geo-membranes – functions and applications.

UNIT V:
EXPANSIVE SOILS: Problems of expansive soils – tests for identification – methods of determination of swell pressure. Improvement of expansive soils – Foundation techniques in expansive soils – under reamed piles.

Course Outcomes:

After the completion of the course students will be able to-

1. Comprehend the ground improvement, methods of dewatering and grouting
2. Apply the concept of different In-situ densification methods for solving problems of cohesive and cohesionless soils
3. Apply the concept for different techniques of soil stabilization like mechanical and chemical, etc for improving soil strength.
4. Principles and components of geosynthetics and design of reinforced earth wall
5. Apply the concept expansive soils for identification of expansive soil

Text Books:

Dr. Purushotham Raj, P., Ground Improvement Techniques, Laxmi Publications, New Delhi.

References:

1. Hausmann M.R., Engineering Principles of Ground Modification, McGraw-Hill International Edition, 1990.

2. Moseley M.P., Ground Improvement, Blackie Academic and Professional, Boca Taton, Florida, USA, 1993.

3. Xanthakos P.P., Abramson, L.W and Brucwe, D.A., Ground Control and Improvement, John Wiley and Sons, New York, USA, 1994.

4. Robert M. Koerner, Designing with Geosynthetics, Prentice Hall New Jercy, USA.

Mode of Evaluation: Assignments, Internal Mid Examinations, External End 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. Articulate what makes a particular course of action ethically defensible
4. Assess their own ethical values and the social context of problems
5. 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
6. Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work
7. 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

Prerequisite: 14MAT102& 14MAT103

Course Description:
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 poisons 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: 14CHE101

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 (TiO2, CeO2, 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 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: 14MAT101, 14MAT102&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: 14CHE101

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. Analysis 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. Recognize a business opportunity that fits the individual student
2. Demonstrate the ability to provide a self-analysis in the context of an entrepreneurial career
3. Demonstrate the ability to find an attractive market that can be reached economically
4. Demonstrate the understanding of how to launch the individual’s entrepreneurial career
5. Create appropriate a business model
6. Articulate an effective elevator pitches to gain support for the venture
7. Develop a well-presented business plan that is feasible for the student

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. A good understanding of data types available in R.
2. A good understanding of various control structures, scope rules present in R.
3. A good understanding of loop functions and debugging tools.
4. Simulation and code profiling capability.
5. A good understanding of 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. Natural process of listening and speaking since it aims to give a "systematic, conscious consideration of how speech sounds are made, what they sound like, and how they compare with each other.
4. Know the Speech and hearing disorders that can have a huge impact on his social life.
5. Explain the flexibility in incorporating words and phrases in his speech.
6. 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 behaviour, cognition, and emotions.
2. Analyze the Importance of Memory In Learning and adopt the easier methods of memorization
3. Motivated and would have the self-desire to seek out new things and newchallenges, to analyse one's capacity, to observe and to gain knowledge. Intrinsically motivated students are more likely to engage in the task willingly as well as work to improve their skills, which will increase their capabilities.
4. Respect and use critical and creative thinking, apply psychological principles to personal, social, and organizational issues.
5. Understand that stress is the product of the interaction between the person and their environment. It can influence illness and the stress–illness link is influenced by coping and social support.
6. Students will know that beliefs and behaviours can influence whether a person becomes ill in the first place, whether they seek help and how they adjust to their illness.
7. 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, Session Hijacking, 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:

1. Explain the concepts of intruders.
2. Understanding of foot printing tools.
3. Understand and explain about Intrusion Detection and different types of attacks.
4. Learn and implement mechanisms.
5. 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 studentsawareofethicalandmoralissuesconcerningbusinesscontextanddevelopsensitivity 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

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

Watershedmanagement-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 behavior, cognition, and emotions.
2. Respect and use critical and creative thinking.
3. Apply psychological principles to personal, social, and organizational issues.

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.