ACADEMIC REGULATIONS, COURSE STRUCTURE, AND DETAILED SYLLABUS

CIVIL ENIGINEERING

For

B.Tech.FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2020-2021)

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

(UGC- AUTONOMOUS)

Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTUH

Accredited by NAAC with 'A' Grade. Accredited by NBA

(Medbowli, Meerpet, Balapur(M), Hyderabad, Telangana- 500097)

College

Vision:

Imparting Knowledge and instilling skills to the aspiring students in the field of Engineering, Technology, Science and Management to face the emerging challenges of the society.

Mission:

- Encouraging scholarly activities that transfer knowledge in the areas of Engineering, Technology, Science and Management.
- Ensuring students of all levels, well trained to meet the needs of education and their future endeavors.
- Inculcating human values and ethics into the education system for the all-round development of the students.

Department

About Department:

The department was established in the year of 2009 with a intake of 60 students now its 120. The Department offers a four-year UG course leading to B.Tech in Civil Engineering. The department has energetic and experienced faculty (Industrial & Teaching) for the benefit of the students and to promote R&D. The department has conducted National Conferences, Workshops, Seminars, Guest lecture, Industrial & Field Visits, etc to update the Technical knowledge of students. The department has fully equipped laboratories and all infrastructures to meet the academic requirements.

Vision:

To impart technical knowledge in the field of civil engineering and expose the graduate students to the technology.

Mission:

- To provide good theoretical and practical knowledge to the students during their course of study, and create awareness in technology.
- To encourage students for higher studies and to have research oriented direction.
- After completion of course, the students are empowered with good technical knowledge, employability and ethical values to serve the nation.

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1.0 Under-Graduate Degree Program in Engineering & Technology (UGP in E & T)

Teegala Krishna Reddy Engineering College (TKREC) offers a VIII- Semesters (4-years) Bachelor of Technology (B.Tech.) degree Program, under the Choice Based Credit System (CBCS) with effect from the academic year 2020- 21 in the various branches of Engineering.

2.0 Eligibility for Admission

2.1 Seats for each Program in the college are classified into CATEGORY-A (70% of intake), CATEGORY-B (30% of intake) and CATEGORY-C (10% of intake through Lateral Entry in III semester).

2.2 Admission to the CATEGORY-A (70% of Intake) is made either on the basis of the merit rank obtained by the qualified candidate in the entrance test conducted by the Telangana State Government (EAMCET) or on the basis of any other order of merit approved by the Talangana State council for Higher Education, subject to reservations prescribed by the government from time to time.

2.3 The college fills CATEGORY-B (30% of Intake) as per the guidelines of the competent authority.

2.4 CATEGORY-C (10% of intake) are Lateral Entry students who are admitted into the third semester directly based on the rank secured by the candidate in the Engineering Common Entrance Test (ECET) in accordance with the instructions received from the convener, ECET and the competent authority.

2.5 The medium of instruction for the entire under graduate Program in E & T will only be in English.

2.6 It is mandatory that every student follows the undertaking and abides by the rules of Teegala Krishna Reddy Engineering College.

3.0 B. Tech. Program structure

3.1 A student after securing admission is required to pursue the under graduate Program in B.Tech for a minimum period of eight semesters, (four academic years) and a maximum period of eight academic years starting from the date of commencement of the first semester, failing which the student shall forfeit the seat in the B.Tech course.

Each student should secure 160 credits (with CGPA ≥ 5.0) for the completion of Undergraduate Program and award of B.Tech. Degree.

B. Tech. Degree (LES)

The LES students after securing admission shall pursue a course of study for not less than three academic years and not more than six academic years. The student shall register for 123 credits and secure 123 credits with CGPA ≥ 5 from II year to IV year B.Tech program (LES) for the award of B.Tech. degree. The students, who fail to fulfil the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech. The attendance requirements of B. Tech. (Regular) shall be applicable to B.Tech (LES).

3.2 Definitions/descriptions specified by UGC/AICTE are adopted appropriately for various terms and abbreviations used in these academic regulations/norms are listed below.

3.2.1 **Semester scheme**

Each under graduate program constitutes eight semesters (four academic years). Each academic year is divided into two semesters, maximum of 22 weeks and minimum of 18 weeks (≥ 90 instructional days) each. In each semester, students are subjected to "Continuous Internal Evaluation (CIE) and a Semester End Examination (SEE)". The Choice Based Semester System (CBSS) is implemented as prescribed by the UGC and the curriculum/course structure is followed as suggested by AICTE on time to time.

3.2.2 **Credit Courses**

All subjects/courses are to be registered by the student in a semester to earn credits which are assigned to each subject/course in an L: T: P: C (Lecture periods: Tutorial periods: Practical periods: Credits) structure which is on the following general pattern.

- One credit for one Period/hour per week per semester for theory/lecture (L) courses.
- Half credit for one Period/hour per week per semester for laboratory/practical (P).

Courses like Environmental Science, Professional Ethics, Gender Sensitization lab, other social context courses, CRT and student activities like NCC/NSO, NSS are identified as mandatory courses. These courses do not carry any credits.

3.2.3 The structure of the Under Graduate Engineering Program:

S.NO.	CATEGORY	Suggested breakup of credits (Total 160)
01	Humanities and Social sciences including Management	9*
02	Basic Sciences	25*
03	Engineering Sciences courses including Workshop, Drawing,basics of Electrical/Mechanical/Computer etc.	18*
04	Professional Core Courses	66*
05	Professional Elective Courses relevant to chosenspecialization/branch	18*
06	Open Electives-Electives from other technical and/oremerging subjects	9*
07	Project work, Seminar and Internship in Industry orelsewhere	15*
08	Mandatory courses [Environmental Sciences, Induction Training, Indian Constitution, Essence of Indian Traditional Knowledge]	(non- credit)
	Total	**160***

***Variation is allowed as per the need of the respective disciplines.**

3.2.4 Subject Code Classification

The subject codes of various branches in TKREC Regulations are formulated using the following Procedure

Regulation, Branch, Semester, Classification, S.No.

Regulation	**20,21, 22, …., and so on**
UG Branch	**Corresponding branch code like CE,EE …..etc**
Semester	**I,II,III,IV,V,VI,VII,VIII**
Classification	**HS-Humanities and Sciences, BS-Basic Sciences,ES-Engineering Sciences, PC- Professional Core,PE-Professional Elective, OE-Open Elective, PW-Project Work**
S.No.	**1 to 9**

4.0 Course registration

4.1 An adviser /counselor or mentor from the faculty shall be assigned to a group of 20 students, who instructs the students regarding the Under Graduate Program, its course structure and curriculum, choice/option for subjects/courses, which is based on their competence, progress, pre-requisites and interest.

4.2 The academic section of the college invites 'registration forms' from students before the commencement of the semester through 'on-line registration' ensuring 'date and time stamping'. The on-line registration requests for any 'current semester' shall be completed before the commencement of the SEEs (Semester End Examinations) of the 'preceding semester', and for 1st semester students the online registration requests shall be completed four weeks from the date of admission.

4.3 A student can apply for on-line registration, only after obtaining the written approval from the faculty adviser/counselor or mentor, which should be submitted to the college academic section through the Head of the Department. A copy of it shall be retained with the Head of the Department, faculty advisor/counselor or mentor and the student.

4.4 A student should register for all the courses offered to him in that particular semester not exceeding nine subjects/courses, excluding the Mandatory Courses.

4.5 If the student submits ambiguous choices or multiple options during on-line registration for the subject /course under a given/specified course group/category as listed in the course structure, then the Head of the Department will allot a subject/course without considering the submission.

4.6 Subject/course options exercised through on-line registration are final and cannot be changed or inter-changed; further, alternate choices also will not be considered. However, if the subject/course that has already been listed for registration by the Head of the Department in a semester cannot be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to select an alternate choice either for a new subject (subject to offering of such subject), or another existing subject (subject to availability of seats). Such alternate arrangements will be made by the Head of the Department, with due notification and within a time-framed schedule, in the first week after commencement of the class-work for that semester.

4.7 Open electives: The students have to choose three/four open electives (OE-I), (OE-II) (OE- III), (OE-IV) depending upon the curriculum. The student cannot opt for open elective subjects offered by their own (parent) department. The student can choose an open elective subject from the list of subjects offered by any other department of the same college. Once, a subject is chosen under the open elective category it cannot be opted again.

4.8 Professional electives: Students have to choose six professional electives (PE-I, PE-II, PE-III, PE-IV, PE-V, PE-VI). However, the students may opt for professional elective subjects offered in the related area.

5.0 Subjects/courses to be offered

5.1 The class strength for each semester shall be 60.

5.2 A subject/ course may be offered to the students, only if a minimum of 20 students (1/3 of the section strength) opt for it. The maximum strength of a section is limited to 80 (60+ 1/3 of the

strength of the section).

5.3 More than one faculty member may offer the same subject (lab/practical may be included with the corresponding theory subject in the same semester) in any semester. However, selection of choice by the students will be based on – 'first come first serve basis and the CGPA criterion' (i.e. the primary shall be on on-line entry from the student for registration in that semester, and the focus that follows, if needed, will be on the CGPA of the student)

5.4 If more entries for registration of a subject comes into picture, then the concerned Head of the Department shall decide, whether or not to offer such a subject/ course for two (or multiple) sections.

5.5 An Elective Course is offered to the students if and only if there is a minimum of 1/3 strength of the sanctioned intake registers for that course.

6.0 Attendance requirements

6.1 A student shall be eligible to appear for the semester end examinations, if the student acquires a minimum of 75% of attendance in aggregate in all the subjects/courses including days of internal examinations (excluding attendance in mandatory courses like Environmental Science, Professional Ethics, Gender Sensitization Lab, NCC and NSS, subjects related to social context and CRT) for that semester.

6.2 For Mandatory Courses a 'Satisfactory Participation' report shall be issued to those students from the authorities concerned only after securing ≥ 65% attendance in such a course.

6.3 Shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be condoned by the college academic committee on valid grounds, like natural calamity, medical emergency, any sudden demise of close family members based on the students representation with supporting evidence/certificates.

6.4 A stipulated fee shall be paid to condone the shortage of attendance.

6.5 Shortage of attendance below 65% in aggregate shall, in no case be condoned.

6.6 Students whose shortage of attendance, is not condoned in a semester, are not eligible to take their end examinations of that semester. They get detained and their registration for that semester shall be cancelled. They will not be promoted to the next semester.

6.7 The students who are detained due to lack of attendance should seek re-admission into that semester as and when offered, and re-register all the courses offered in that semester.

6.8 A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same class, until completion of the VIII semester, even on payment of the requisite fees.

7.0 Academic requirements

The following academic requirements have to be satisfied; in addition to the attendance, requirements mentioned in item no 6.

7.1 A student shall be deemed to have satisfied the minimum academic requirements if he/she has earned the credits allotted to each subject/course, and has secured not less than 35% marks (26 out of 75) in the semester end examination, and a minimum of 40% of marks in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together in terms of letter grades. This implies securing 'C' grade or above in that subject/course

7.2 Promotion Rules:

S.No.	Promotion	Conditions to be fulfilled
1.	**I Semester to II Semester**	**Regular course of study of I semester bysatisfying attendance requirements.**

2.	**II Semester to III Semester**	**Regular course of study of II Semester, by satisfying attendance requirements. Must have secured at least 50% credits up to from the offered credits from all the relevant regular and supplementaryexaminations, whether the student takes those examinations or not.**
3.	**III Semester to IV Semester**	**Regular course of study of III semester, bysatisfying attendance requirements.**
4.	**IV Semester to V Semester**	**Regular course of study of IV semester, bysatisfying attendance requirements, andmust have secured at least credits i.e., 60%credits up to IV semester from the offeredcredits (rounding to near low value) from all the relevant regular and supplementary examinations, whether the students takes those examinations or not**
5.	**V Semester to VI Semester**	**Regular course of study of V Semester, bySatisfying attendance requirements.**
6	**VI Semester to VII Semester**	**Regular course study of VI semester, by satisfying attendance requirements. Must have secured at least 60% credits (rounding to near lower value) up to VI Semester from the offeredcredits from all the relevant regular andsupplementary examinations, whether the student takes those examinations or not.**
7	**VII Semester to VIII Semester**	**Regular course of study of VII Semester, bysatisfying attendance requirements.**

Promotion Rules for Lateral Entry Students

S.No.	Promotion	Conditions to be fulfilled
01	**III Semester to IV Semester**	**Regular course of study of Second Year first semester, by satisfying attendance requirements.**
02	**IV Semester to V Semester**	**Regular course of study of IV Semester by satisfying attendance requirements and a minimum of 50 % of credits (rounding to thenear lower value) from the offered credits, from one regular and one supplementary examinations of III semester, irrespective of the candidate takes the examination or not.**
03	**V Semester to VI Semester**	**Regular course of study of V Semester bysatisfying attendance requirements.**
04	**VI semester to VII Semester**	**Regular course of study of VI Semester bysatisfying academic requirements and aminimum of 60% of credits (rounding to thenear low value) from the offered credits,from two regular and two supplementaryexaminations of III Semester; two regularand one supplementary examinations of IV Semester; one regular and one Supplementary examination of V Semester.**
05	**VII Semester to VIII Semester**	**Regular course of study of VII semester bysatisfying the academic requirements.**

7.3 A student shall register for subjects covering 160 credits as specified and listed in the course

structure, fulfill all the attendance and academic requirements for 160 credits, 'earn all 160 credits' by securing SGPA ≥ 5.0 (in each semester) and CGPA (at the end of each successive semester ≥ 5.0) to successfully complete the Under Graduate Program.

7.4 A student eligible to appear in the end semester examination for any subject/course, but absent from it or failed (there by failing to secure 'c' grade or above) may reappear for that subject/course in the supplementary examination as and when conducted. In such cases, the CIE assessed earlier for that subject/course will be carried over, and added to the marks to be obtained in the SEE Supplementary examination for evaluating the performance in that subject.

7.5 A student **detained in a semester due to shortage of attendance, may be re-admitted when the same semester is offered in the next academic year for fulfillment of academic requirements.** The academic regulations under which the student has been readmitted shall be applicable. However, no grade allotments or SGPA/CGPA calculations will be done for the entire semester in which the student has been detained.

7.6 A student detained **due to lack of credits, shall be promoted to the next academic year only after acquiring the required academic credits.** The academic regulations under which the student has been re-admitted shall be applicable to him.

8.0 Evaluation – Distribution and Weightage of marks

8.1 The performance of a student in every subject/course (including Practical) will be evaluated for 100 marks each, with 25 marks allotted for CIE (Continuous Internal Evaluation) and 75 marks for SEE (Semester End Examination).

8.2 For theory subjects, during a semester there shall be two mid-term examinations and average of two internal examinations will be taken as the final marks for CIE. Each mid-term examination consists of only descriptive paper carrying 20 marks with the time duration of 1hour 20 minutes. The remaining 5 marks will be evaluated by the assignment given by the concerned faculty. The syllabus for the first mid examination shall be first 2.5 units. The second mid examination covers remaining 2.5 units of syllabus. **The total marks secured by the student for the whole CIE (Continuous Internal Evaluation) will be the average of two mid-terms.** If any student is absent from / would like to seek improvement in any subject of a mid- term examination, a computer based test will be conducted for him/her by the examination branch of the college, which will be scheduled after completion of both mid-term examinations.

The details of CIE exam question paper are as follows

- ❖ The pattern of Mid-term exam for CIE consists of 4 questions and no choice will be given.
- ❖ Each question carries 5 marks.
- ❖ There will be a CBT (Computer Based Test) for the students who are absent and secured less than 14 marks in the continuous internal evaluation. The CBT will be conducted before the announcement of the results of semester-end exams.
- ❖ The question bank for the CBT should cover entire syllabus of the corresponding course.

The details of the pattern of the end semester question paper are as follows

- ➢ The end semester examinations will be conducted for 75 marks.
- ➢ The question paper consists of two parts namely Part- A and Part-B.
- ➢ Part-A consists of 10 questions. Each question carries 2.5 marks each and no choice will be given. Two questions are from one unit and all the five units should be covered.
- ➢ Part-B consists of five questions (number from 2 to 6) carrying 10 marks each. Each of these questions is from one unit and may contain sub questions. For each question, there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

The details of evaluation of end semester exam are as follows

- Double evaluation of the answer scripts is followed.
- The average of the two evaluations shall be considered as final marks.
- If the difference of two valuations is more than or equal to15 marks, third evaluation shall be recommended.
- If any difference appeared in the marks after the third valuation also, average of two evaluations will be considered whose difference is minimum, as final marks.

The details of challenging valuation of end semester exam are as follows

- There shall not be any recounting or re-evaluation for all subjects as the double valuation was adopted. But, the students will be given a chance to apply for challenging valuation for all the theory Subjects (no Practical/lab subjects) within one week from the date of declaration of results.
- Whenever the students apply for challenge valuation of answer scripts of semester end examinations, the students should submit their applications (through the HOD) within one week from the date of declaration of the results to the Examination Branch by paying Rs.10,000 (Rupees Ten Thousand only) per subject, in the form of Demand Draft, Drawn in Favor of "TKREC AUTONOMOUS". Any application received after the due date of submission for Challenge valuation, shall not be accepted under any circumstances.

On receipt of the DD

The answer script of the applied subject will be shown to the candidate to verify whether it belongs to him or not and the script will be evaluated by the senior faculty of the college appointed by the Controller of examinations. If there is any change in marks (Equal or above 15% of the maximum marks) the new marks will be awarded to the student. Otherwise, there will be no change in old marks. If the change in marks (Equal or above 15% of the maximum marks) occurs, an amount of Rs.9,000/- will be refunded to the student. Otherwise, the student will forfeit the total amount which he/she paid.

8.3 For practical subjects there shall be a continuous internal evaluation during the semester for 25 marks and 75 marks for end semester practical examinations. The duration for both Internal and External Practical Examination is 3 hours. For 25 marks of Internal Evaluation of practical subjects, day-to-day evaluation in laboratory is done for 15 marks and internal practical examination will be assessed for 10 marks. The concerned laboratory subject teacher (Internal Examiner) will conduct the internal practical examination only. The external practical examination will have 2 examiners, one is the external examiner and the other is the internal examiner. The controller of examinations of the college will appoint the external examiner with the consultation of the chief superintendent of examinations from the three names given by the concerned department.

8.4 For the subjects that include design and/or drawing, (such as engineering graphics, engineering drawing, machine drawing and estimation), the distribution shall be 25 marks for continuous internal evaluation (15 marks for day-to-day evaluation and 10 marks for internal examination) and 75 marks for semester end examination. **There shall be two internal examinations in a semester and the average of the two shall be considered for the award of marks for internal examinations**.

8.5 (i) For subjects like **Engineering Graphics/ Engineering Drawing**, the SEE shall consist of five questions. For each question there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

(ii) For the Subject **Estimation, Costing and Project Management**, the SEE paper should consist of Part- A, Part-B and Part C. (i) Part – A, 1 out of 2 questions from Unit – I for 30 Marks, (ii) Part – B, 1 out of 2 questions from Unit – II for 15 Marks,(iii) Part – C, 3 out of 5 questions from Units – III, IV, V for 30 Marks.

(iii) For subjects **Structural Engineering – I & II (RCC & STEEL),** the SEE will be conducted for 75 marks consisting of 2 parts viz. (i) Part – A for 15 marks and, (i) Part – B for 60 marks. Part

– A is a compulsory question consisting of ten sub- questions. The first five sub-questions are from each unit relating to design theory and codal provisions and carry 2 marks each. The next five sub-questions are from each unit and carry 1 mark each. Part – B consists of 5 questions (numbered 2 to 6).

8.6 The student has to undergo a comprehensive MCQ TEST/ Seminar/Internship/industry oriented mini project/Project Work offered to him by their respective departments and subsequently should satisfy the requirements for completion to acquire the required credits.

8.7 There shall be an Internship in collaboration with an industry of their specialization. Students will register for this immediately after II year II semester examinations and pursue it during summer vacation for 15 days. The Internship shall be submitted in a report form and presented before the committee in III year I semester. It shall be evaluated for 100 internal marks. The committee consists of Head of the Department, supervisor of the Internship and a senior faculty member of the department.

8.8 There shall be an Industrial Oriented Mini Project in collaboration with an industry of their specialization. Students will register for this immediately after III year II semester examinations and pursue it during summer vacation for one month. Industrial Oriented Mini Project shall be submitted in a report form and presented before the committee in IV year I semester. It shall be evaluated for 100 external marks. The committee consists of an external examiner, Head of the Department, supervisor of the Industrial Oriented mini project and a senior faculty member of the department. There shall be no internal marks for Industrial Oriented Mini Project.

8.9 There shall be a seminar presentation in IV year I semester. For the seminar, the student shall collect the information on a specialized topic, prepare a technical report, and submit it to the department. It shall be evaluated by the departmental committee consisting of Head of the Department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 100 internal marks. There shall be no semester end examination for the seminar.

8.10 There shall be a comprehensive MCQ exam in IV year I semester. For the comprehensive MCQ exam covers the core subjects which are related to Graduate Aptitude Test in Engineering. It shall be evaluated by the departmental coordinator nominated by Head of the Department. The comprehensive MCQ exam shall be evaluated for 100 internal marks and consists of 50 MCQs. The student has to secure 40% of 100 marks i.e.40 marks. If any student is absent or failed in the comprehensive MCQ exam then he/she can appear for next supplementary exam like other end semester examinations.

8.11 UG project work shall be carried out in two stages: Project Stage – I during IV Year I Semester, Project Stage – II during IV Year II Semester. Each stage will be evaluated for 100 marks. Student has to submit project work report at the end of each semester. First report includes project work carried out in IV Year I semester and second report includes project work carried out in IV Year I & II Semesters. SEE for both project stages shall be completed before the commencement of SEE Theory examinations.

(i) For Project Stage – I, the departmental committee consisting of Head of the Department, project supervisor and a senior faculty member shall evaluate the project work for 75 marks and project supervisor shall evaluate for 25 marks. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - I or does not make a presentation of the same before the evaluation committee as per schedule, or (ii) secures less than 40% marks in the sum total of the CIE and SEE taken together. A student who has failed may reappear once for the above evaluation, when it is scheduled again; if he fails in such 'one re-appearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

(ii) For Project Stage – II, the external examiner shall evaluate the project work for 75 marks and the project supervisor shall evaluate it for 25 marks. The topics for industrial oriented mini project, seminar and Project Stage – I shall be different from one another. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - II, or does not make a presentation of the same before the external examiner as per schedule, or (ii) secures less than 40% marks in the sum '

total of the CIE and SEE taken together. For conducting viva-voce of project stage – II, the controller of examination will nominate an external examiner with the consultation of the chief superintendent from the list of experts in the relevant branch submitted by the concerned department. A student who has failed may re-appear once for the above evaluation in the current semester, when it is scheduled again; if student fails in such 'one re-appearance' evaluation also, he/she has to reappear for the same in the next subsequent semester, as and when it is scheduled.

(iii) Procedure for opting the MOOCs

- If any student got an opportunity to do the final year project as an internship in any reputed company (Approved by the departmental committee), the student can opt for MOOCs which are equivalent to the elective courses offered in VIII semester.
- The MOOCs should be approved by the concerned BOS.
- The selected MOOCs duration should be minimum of 12 weeks.
- A student is eligible to secure up to 12 credits only through MOOCs.

8.12 The laboratory marks, sessional marks, and the end examination marks awarded by the college are subject to scrutiny and scaling, if necessary, by a committee, constituted in this regard, with a university representative/under the guidance of the Director of Evaluation of the affiliating university. The recommendations of the committee are final and binding. The laboratory records, internal examination scripts and external examination scripts, shall be preserved as per the rules for two consecutive academic years if the respective subjects are cleared, and shall be produced before the committee as and when required, till preserved.

8.13 For mandatory courses related to Environmental Science, Constitution of India, Intellectual Property Rights, Gender Sensitization lab and Campus recruitment training a student has to secure 40 marks out of 100 marks (i.e. 40% of the marks allotted) in the continuous internal evaluation for passing the subject/course. **These marks should also be uploaded along with the internal marks of other subjects**

8.14 For all non-credit courses and mandatory courses, no marks or letter grade is allotted.

9.0 Grading Procedure

9.1 Marks will be awarded to the student to indicate the performance in each theory subject, laboratory/ practical's, seminar, project stage I and project stage II. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item no. 8 above, a corresponding letter grade shall be given.

9.2 As measure of the performance of a student, a 10-point absolute grading system using the following letter grades (as per UGC/AICTE/JNTUH guidelines) and corresponding percentage of marks shall be followed.

% of marks secured in a subject/course	Letter Grade	GradePoints
90% to 100%	O (Outstanding)	10
80 and less than 90%	A^+ (Excellent)	9
70 and less than 80%	A (Very Good)	8
60 and less than 70%	B^+ (Good)	7
50 and less than 60%	B (Average)	6
40 and less than 50%	C (Pass)	5
Below 40%	F (Fail)	0
Absent	Ab	0

**** Awarding of Letter Grade will be done for the benefit of the student.**

9.3 A student obtaining '**F**' grade in any subject shall be deemed to have **'failed'** and is required to reappear as a 'supplementary student' in the semester end examination, as and when offered. In

such cases, internal marks in those subjects will remain same as those obtained earlier.

9.4 A student who has not appeared for an examination in any subject '**Ab'** grade will be allocated in that subject, and the student shall be considered as **'failed'.** The student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered.

9.5 A letter grade will not indicate any specific percentage of marks, but states only the range of marks he/she has obtained.

9.6 A student earns Grade Point (GP) in each subject/course, based on the Grade Point the letter grade is awarded for that subject/course. The corresponding 'credit points' (CP) are computed by multiplying the grade point with credits for that particular subject/course.

Credit points (CP) = grade points (GP) x Credits for a course

9.7 The student passes the subject/course only when **GP ≥ 5 ('C' grade or above).**

9.8 The semester grade point average (SGPA) is calculated by dividing the sum of credit points (∑CP) secured from all subjects/course registered in a semester, by the total number of credits registered during the semester. SGPA is rounded off to two decimal places. SGPA is thus calculated as

SGPA = {∑*N*i=1*CiGi*}/ {∑*N* *Ci*} ….. For each semester,

where 'i' is the subject indicator index (takes into account all subjects, in a semester), 'N' is the no. of subjects registered for the semester (as specifically required and listed under the course structure of the parent department), Ci is the no. of credits allotted to the ith subject, and Gi represents the grade points (GP) corresponding to the letter grade awarded for the ith subject.

9.9 The cumulative grade point average (CGPA) is a measure of the overall cumulative performance of a student in **all semesters** considered for registration. The CGPA is the ratio of the total credit points secured by a student in all registered courses in all semesters, and the total number of credits registered in all the semesters. CGPA is rounded to **two** decimal places. CGPA is thus computed from the I year II semester onwards at the end of each semester as per the formula

CGPA = {∑Mj=1*CjGj*}/ {∑Mj=1 C j for all semester registered}

(i.e., up to and inclusive of S semesters, S ≥ 2),

where '**M'** is the **total no. of subjects** (as specifically required and listed under the course structure of the parent department) the student has '**registered**' i.e., from 1st semester onwards up to and inclusive of the 8th semester, 'j' is the subject indicator index (takes into account all subjects from 1 to 8 semesters), cj is the no. of credits allotted to the jth subject, and Gj represents the grade point (GP) corresponding to the letter grade awarded for that jth subject. After registration and completion of first year first semester, the SGPA of that semester itself can be taken as the CGPA, as there are no cumulative effects.

Illustration of calculation of SGPA

Course/subject	Credits	Grade points	Letter Grade	Credit Points
Course1	3	8	A	3 x 8 = 24
Course2	3	10	O	3 x 10 = 30
Course3	3	5	C	3 x 5 = 15
Course4	3	6	B	3 x 6 = 18
Course5	3	9	A+	3 x 9 = 27
Course6	1.5	7	B+	1.5x 7 = 10.5
	16.5			**124.5**

SGPA = 124.5/16.5 = 7.55

Illustration of calculation of CGPA up to 2nd Semester

Course/subject	Credits	LetterGrade	Gradepoints	Credit Points
I year I semester				
Course1	4	A	8	4 x 8 = 32
Course2	4	O	10	4 x 10 = 40
Course3	4	C	5	4 x 5 = 20
Course4	3	B	6	3 x 6 = 18
Course5	3	A+	9	3 x 9 = 27
Course6	3	B+	7	3 x 7 = 21
I year II semester				
Course7	4	B	6	4 x 7 = 28
Course8	4	O	10	4 x 10 = 40
Course9	4	C	5	4 x 5 = 20
Course10	3	B	6	3 x 6 = 18
Course11	3	A+	9	3 x 9 = 27
Course12	1.5	B+	7	1.5 x 7 = 10.5
Total Credits =	**40.5**		**Total Credit=**	**301.5**

CGPA = 301.5/40.5 = 7.44

The above illustrated calculation process of CGPA will be followed for each subsequent semester until 8th semester. The CGPA obtained at the end of 8th semester will become the final CGPA secured for entire B.Tech . Programme.

9.10 For merit ranking or comparison purposes or any other listing, **only** the '**rounded off'** values of CGPAs will be used.

9.11 For calculations listed in regulations 9.6 to 9.9, performance in failed subjects/courses (securing **F grade**) will also be taken into account, and the credits of such subjects/courses will be included in the multiplications and summations. After passing the failed subjects (s), newly secured grade points will be taken into account for calculation of SGPA and CGPA. However, mandatory courses will not be taken into consideration for calculation of CGPA and SGPA.

10.0 Passing standards

10.1 A student shall be declared successful or 'passed' in a semester, if the student secures a GP ≥ 5 ('C' grade or above) in every subject/course in that semester (i.e. when student gets an SGPA ≥ 5.00 at the end of that particular semester); also a student shall be declared successful or 'passed' in the entire under graduate Program, only when he/she gets a CGPA ≥ 5.00 for the award of the degree as required.

10.2 After the completion of each semester, a grade card or grade sheet (or transcript) shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. It will show the details of the courses registered (Course code, title, no. of credits, and grade earned etc.), credits earned, SGPA, and CGPA.

11.0 Declaration of results

11.1 Computation of SGPA and CGPA are done using the procedure listed in 9.6 to 9.9.

11.2 For final percentage of marks equivalent to the computed final CGPA, the following formula may be used.

% of marks = (CGPA-0.5) x 10

12 Award of degree

12.1 A student who registers for all the specified subjects/courses as listed in the course structure and

secures the required number of 160 credits (with CGPA ≥ 5.0), within 8 academic years from the date of commencement of the first academic year, shall be declared to have '**qualified'** for the award of the B.Tech degree in the chosen branch of Engineering as selected at the time of admission.

12.2 A student who qualifies for the award of the degree as listed in item 12.1 shall be placed in the following classes.

12.3 Students with the final CGPA (at the end of the under graduate Program) ≥ 8.00, and fulfilling the following condition will be awarded **'first class with distinction'; should have secured a final (at the end of the undergraduate Program) CGPA ≥ 8.00,** for each year of course study.
Students with final CGPA (at the end of the under graduate Program) ≥ **6.50 but <8.00**, shall be placed in '**first class'**.
Students with final CGPA (at the end of the under graduate Program) ≥ **5.50 but<6.50**, shall be placed in '**second class'**.
Students with final CGPA (at the end of the under graduate Program) ≥ **5.00 but <5.50,** and all other students who qualify for the award of degree (as per 12.1) with final CGPA ≥ **5.00 but <5.50**, shall be placed in **'pass class'**.
A student with final CGPA (at the end of the under graduate Program) **<5.00, will not be eligible** for the award of the degree**.**

12.4 Student who secures SGPA ≥ 8.00 consistently in all semesters will be eligible to compete for the awards of 'rank' and 'gold medal'.

13 Withholding of results

13.1 If the student has not paid the fees to the college at any stage, has dues pending due to any reason whatsoever, or if any case of indiscipline is pending, the result of the student may be withheld, and student will not be allowed to go into the next semester. The award or issue of the degree may also be withheld in such cases.

14.0 Transitory Regulations

14.1 A student, who has discontinued for any reason, is liable to completely pay his balance annual fees, up to discontinued year.

14.2 A student who is detained due to lack of credits or lack of attendance has to follow the existing regulations of the year in which he/she is re-admitted, with additional/substitute subjects if necessary.

15.0 Students Transfers

15.1 There shall be no branch transfers after the completion of the admission process.

15.2 There shall be no transfers from one branch to another branch within the constituent colleges and units of the affiliating university (JNTUH).

15.3 The students seeking transfer under the ceiling admission category to this college from any of the JNTUH affiliated Autonomous colleges or from various other Universities/institutions (National Importance, Autonomous) have to pass the failed subjects which are equivalent to the subjects of Teegala Krishna Reddy Engineering College and also pass the subjects of Teegala Krishna Reddy Engineering College which the students have not studied at the earlier institution/university. Further, though the students have passed some of the subjects at the earlier institution/university, if the same subjects are being offered in different semesters of Teegala Krishna Reddy Engineering College, the students have to study those subjects in Teegala Krishna Reddy Engineering College

in spite of the fact that those subjects are repeated.

15.4 The students transferred from other Universities/institutions to Teegala Krishna Reddy Engineering College, shall be provided a chance of writing online internal examination **for the failed subjects/and or subjects not studied** as per the equivalences recommended in the clearance letter issued by the university/institution, at the end of the semester as per the prescribed schedule by the college examination cell.

16.0 Scope

16.1 The academic regulations should be read as whole, for the purpose of any interpretation.

16.2 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman, Governing Body of Teegala Krishna Reddy Engineering College is final.

16.3 The college may change or amend the academic regulations, course structure or syllabi, at any time, and the changes or amendments made shall be applicable to all students with effect from the date of notification by the college authorities.

MALPRACTICES RULES
DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/ Improper conduct	**Punishment**
	If the Student	
1. (a)	Possesses or carries accessible in the examination hall, any paper, note book, programmable calculators, cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (materialshall include any marks on the body of the candidate which can be used as an aid in thesubject of the examination)	Expulsion fromthe examination hall and cancellationof the performance in that subject only.
(b)	Gives assistance or guidance or receives it fromany other candidate orally or byany other bodylanguage methods or communicates through cell phones with any candidate or persons in oroutside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellationof the performance in that subject only of all the candidates involved. In case of an outsider, he will behanded 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 subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellationof the performance in that subject and all other subjects the candidate has already appeared includingpractical examinations and project work and shall notbe permitted to appear for the remaining examinationsof the subjects of that Semester. The hall ticket of the candidate should be cancelled.
3.	Impersonates any other student in connection with the examination.	The student who has impersonated shall be expelled from the examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practical and project work) already appeared and shall not be allowed to appear for

		examinations of the remaining subjects of that semester. The student is also debarred for two consecutive semesters from class work and all end examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of the seat. If the impostersis an outsider, he will be handed over to the police and a case will be 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 cancellationof performance in that subject and all the other subjects the candidate has already appeared includingpractical examinations and project work and shall notbe permitted for the remaining examinations of the subjects of that semester. The student is also debarred for two consecutive semesters from class work and all end examinations. The continuation of the course by the student is subject to the academicregulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters tothe examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant Superintendent / 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 tohis person or to any of his relations whether	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shallnot be permitted to appear for the remaining examinations of the subjects of that semester. The candidates also are

		debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case will be registered against them.
	by words, either spoken or written or by signsor by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has thetendency to disrupt the orderly conduct of the examination	
7.	Leaves the exam hall taking away answerscript 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 inthat subject and all the other subjectsthe candidate has already appeared including practicalexaminations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred for two consecutive semesters from class work and all end examinations. The continuation of thecourse by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation ofthe performance inthat subject and all other subjectsthe candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat.

9.	Indulges in any malpractice or improperconduct mentioned in clause 6 to 8 and is not a student for the particular examination or not a person connected with the college.	Student of the college expulsion from the examinationhall and cancellation ofthe Performance inthat subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the college will be handed over to the 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 ofthe performance inthat subject and all other subjectsthe candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester.
11.	Is detected copying on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and allother subjects the candidate has appeared including practical examinations and project work of that semester examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall bereported to the PRINCIPAL / DIRECTOR forfurther action to award suitable punishment.	

I Year B.Tech. CE - I Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
01	20MA1BS01	BS	Mathematics - I	3	1	0	4
02	20PH1BS02	BS	Engineering Physics	3	1	0	4
03	20CS1ES01	ES	Programming for Problem Solving	3	1	0	4
04	20ME1ES02	ES	Engineering Graphics	1	0	4	3
05	20PH1BS03	BS	Engineering Physics Lab	0	0	3	1.5
06	20CS1ES03	ES	Programming for Problem Solving Lab	0	0	3	1.5
07	20MC1ES04	ES	Environmental Science	3	0	0	0
	Total						**18**

I Year B.Tech. CE - II Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
01	20MA2BS04	BS	Mathematics-II	3	1	0	4
02	20CH2BS05	BS	Chemistry	3	1	0	4
03	20ME2ES05	ES	Engineering Mechanics	3	1	0	4
04	20ME2ES06	ES	Engineering Workshop	1	0	3	2.5
05	20EN2HS01	HS	English	2	0	0	2
06	20CH2BS06	BS	Engineering Chemistry Lab	0	0	3	1.5
07	20EN2HS02	HS	English Language and Communication Skills Lab	0	0	2	1
	Total						**19**

II Year B.Tech. CE - I Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
01	20CM3BS07	BS	Probability and Statistics	3	1	0	4
02	20CE3PC01	PC	Strength of Materials – I	4	0	0	4
03	20CE3PC02	PC	Fluid Mechanics	4	0	0	4
04	20CE3PC03	PC	Engineering Geology	2	0	0	2
05	20CE3PC04	PC	Surveying and Geomatics	3	0	0	3
06	20CE3PC05	PC	Surveying Lab	0	0	3	1.5
07	20CE3PC06	PC	Strength of Materials Lab	0	0	3	1.5
08	20CE3PC07	PC	Engineering Geology Lab	0	0	2	1
09	20MC3HS01	HS	Professional and Engineering Ethics	2	0	0	0
10	20MC3BS02	BS	Quantitative Analysis-I	2	0	0	0
	Total						**21**

II Year B.Tech. CE - II Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
01	20ME4ES07	ES	Basic Mechanical Engineering forCivil	2	0	0	2
02	20CE4PC01	PC	Strength of Materials – II	3	0	0	3
03	20CE4PC02	PC	Hydraulics and Hydraulic Machinery	3	0	0	3
04	20CE4PC03	PC	Building Materials, Constructionand Planning	3	0	0	3
05	20CE4PC04	PC	Structural Analysis – I	3	0	0	3
06	20EE4ES08	ES	Basic Electrical and Electronics Engineering	3	0	0	3
07	20CE4PC05	PC	Hydraulics and Hydraulic Machinery Lab	0	0	3	1.5
08	20CE4PC06	PC	Computer Aided Civil Engineering Drawing	0	0	3	1.5
09	20EE4ES09	ES	Basic Electrical and ElectronicsEngineering Lab	0	0	2	1
10	20MC4HS03	MC	Gender Sensitization Lab	2	0	0	0
11	20MC4BS03	MC	Quantitative Logical & Reasoning	2	0	0	0
	Total						**21**

III Year B.Tech. CE - I Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
01	20CE5PC01	PC	Environmental Engineering	3	0	0	3
02	20CE5PC02	PC	Design of Reinforced ConcreteStructures	3	1	0	4
03	20CE5PC03	PC	Geotechnical Engineering	3	0	0	3
04	20CE5PC04	PC	Structural Analysis – II	3	0	0	3
05		PE	Professional Elective-I	3	0	0	3
06	20SM5HS05	HS	Engineering Economics andAccountancy	2	0	0	2
07	20CE5PC06	PC	Geotechnical Engineering Lab	0	0	3	1.5
08	20CE5PC07	PC	Environmental Engineering Lab	0	0	3	1.5
09	20CE5PW01	PW	Summer Internship	0	0	0	1
10	20CE5MC09	MC	Intellectual Property Rights	2	0	0	0
11	20CE5MC10	MC	Personality Development andSoft Skills	2	0	0	0
	Total						**22**

Professional Elective – I

S. No	Subject Code	Subject Name
1	20CE5PE01	Advanced StructuralAnalysis
2	20CE5PE02	Watershed Management
3	20CE5PE03	Traffic Engineering
4	20CE5PE04	Bridge Engineering

III Year B.Tech. CE - II Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
01	20CE6PC01	PC	Hydrology and Water ResourcesEngineering	3	1	0	4
02	20CE6PC02	PC	Concrete Technology	3	0	0	3
03	20CE6PC03	PC	Transportation Engineering – I	3	0	0	3
04	20CE6PC04	PC	Design of Steel Structures	3	1	0	4
05		PE	Professional Elective -II	3	0	0	3
06		OE	Open Elective – I	3	0	0	3
07	20CE6PC05	PC	Highway Engineering andConcrete Technology Lab	0	0	2	1
08	20CE6PC06	PC	Computer Aided StructuralDesign Lab – I	0	0	2	1
09	20EN6HS04	HS	Advanced CommunicationSkills Lab	0	0	2	1
10	20CE6MC08	MC	Basic Technical Training	0	0	2	0
	Total						**23**

Professional Elective – II

S. No	Subject Code	Subject Name
1	20CE6PE01	Rehabilitation and Retrofitting of Structures
2	20CE6PE02	Ground Improvement Techniques
3	20CE6PE03	Prestressed Concrete
4	20CE6PE04	Finite Element Methods forCivil Engineering

Open Elective–I

S. No	Subject Code	Subject Name
01		DISASTER MANAGEMENT
02		ENVIRONMENTAL IMPACT ASSESSMENT

*** Open Elective subjects' syllabus is provided at the end of the document.**

*** Open Elective – Students should take Open Electives from the List of Open Electives Offered by Other Departments/Branches Only.**

Ex: - A Student of Mechanical Engineering can take Open Electives from all other departments/branches except Open Electives offered by Mechanical Engineering Dept.

IV Year B.Tech. CE - I Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
01	20CE7PC01	PC	Estimation, Costing and ProjectManagement	3	1	0	4
02			Professional Elective – III	3	0	0	3
03		OE	Open Elective –II	3	0	0	3
04	20CE7HS01	HS	Professional Practice Law & Ethics	2	0	0	2
05	20CE7PC03	PC	Computer Aided Structural Design Lab – II	0	0	2	1
06	20CE7PW04	PC	Industrial Oriented Mini Project/Summer Internship	0	0	0	2
07	20CE7PW05	PC	Project – Stage I			6	3
08	20CE7PW06	PC	Seminar	0	0	2	1
09	20CE7PC07	PC	Comprehensive Exam	0	0	2	1
10	20CE7MC08	MC	Advanced Technical Training	0	0	2	0
	Total						**20**

Professional Elective – III

S. No	Subject Code	Subject Name
1	20CE7PE01	Waste Management
2	20CE7PE02	Construction Technologyand Management
3	20CE7PE03	Air Pollution and Control
4	20CE7PE04	Elements of EarthquakeEngineering

Open Elective–II

S. No	Subject Code	Subject Name
01		REMOTE SENSING AND GIS
02		AIR POLLUTION

Open Elective subjects' syllabus is provided at the end of the document.

*** Open Elective – Students should take Open Electives from the List of Open Electives Offered by Other Departments/Branches Only.**

Ex: - A Student of Mechanical Engineering can take Open Electives from all other departments/branches except Open Electives offered by Mechanical Engineering Dept.

IV Year B.Tech. CE - II Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
01		PE	Professional Elective – IV	3	0	0	3
02		PE	Professional Elective -V	3	0	0	3
03		OE	Open Elective - III	3	0	0	3
04	20CE8PW01	PC	Major Project	0	0	14	7
	Total						**16**

Professional Elective – IV

S. No	Subject Code	Subject Name
1	20CE8PE01	Transportation Engineering – II
2	20CE8PE02	Foundation Engineering
3	20CE8PE03	Ground Water Hydrology
4	20CE8PE04	Design and Drawing ofIrrigation Structure

Professional Elective – V

S. No	Subject Code	Subject Name
1	20CE8PE05	Disaster Management
2	20CE8PE06	Green Building Technology
3	20CE8PE07	Advanced Structural Design
4	20CE8PE08	Safety in Civil Engineering Practice

Open Elective–III

S. No	Subject Code	Subject Name
01		GREEN BUILDING TECHNOLOGY

*** Open Elective subjects' syllabus is provided at the end of the document.**

*** Open Elective – Students should take Open Electives from the List of Open Electives Offered by Other Departments/Branches Only.**

Ex: - A Student of Mechanical Engineering can take Open Electives from all other departments/branches except Open Electives offered by Mechanical Engineering Dept.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. CE - I Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20MA1BS01) MATHEMATICS – I

Course Objectives: To learn.

1. Types of matrices and their properties.
2. Concept of a rank of the matrix and applying this concept to know the consistency and solving the System of linear equations.
3. Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form.
4. Concept of Sequence.
5. Concept of nature of the series.
6. Geometrical approach to the mean value theorems and their application to the mathematical Problems.
7. Evaluation of surface areas and volumes of revolutions of curves.
8. Evaluation of improper integrals using Beta and Gamma functions.
9. Partial differentiation, concept of total derivative.
10. Finding maxima and minima of function of two and three variables.

Course outcomes: After learning the contents of this paper the student must be able to

1. Write the matrix form of a set of linear equations and to analyse the solution of the System of equations.
2. Reduce the quadratic form to canonical form.
3. Describe the nature of sequence and series.
4. Apply the mean value theorems.
5. Calculate the extreme values of functions of two variables with / without constraints.

UNIT-I

Matrices: Types of Matrices, Symmetric, Hermitian, Skew-symmetric, Skew-Hermitian, orthogonal matrices, Unitary Matrices, rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method. **System of linear equations:** solving system of Homogeneous and Non-Homogeneous equations. Gauss elimination method, Gauss Seidel Iteration Method.

UNIT-II

Eigen values and Eigen vectors: Linear Transformation and Orthogonal Transformation. Eigen values and Eigen vectors and their properties. Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem. Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation

UNIT-III

Sequences &Series: Sequence: Definition of a Sequence, limit, Convergent, Divergent and Oscillatory sequences. **Series:** Convergent, Divergent and Oscillatory Series, Series of positive terms. Comparison test, p-test, D-Alembert's ratio test, Raabe's test, Cauchy's Integral test, Cauchy's root test, logarithmic test. **Alternating series:** Leibnitz test; Alternating Convergent series: Absolute and Conditional Convergence.

UNIT-IV

Single Variable Calculus: Mean value theorems: Rolle's Theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series. **Applications of definite integrals:** To evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates). **Improper Integral:** Definitions of Beta and Gamma functions and their applications.

UNIT-V

Multivariable calculus: Definitions of Limit and continuity. Partial Differentiation, Euler's Theorem, Total derivative. **Jacobian:** Functional dependence & independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

TEXTBOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. G.B.Thomas and R.L.Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

REFERENCE BOOKS:

1. N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. CE - I Sem

L	T	P	C
3	1	0	4

(20PH1BS02) ENGINEERING PHYSICS

Course Objectives:

1. The course aims at making students to understand the basic concepts of Principles of Physics in a broader sense with a view to lay foundation for the various engineering courses.
2. Students will be able to demonstrate competency and understanding of the concepts found in Mechanics, Harmonic Oscillations, Waves in one dimension, wave Optics, Lasers, Fiber Optics and a broad base of knowledge in physics.
3. The main purpose of this course is to equip engineering undergraduates with an understanding of the scientific method, so that they may use the training beneficial in their higher pursuits.
4. Today the need is to stress principles rather than specific procedures, to select areas of contemporary interest rather than of past interest, and to condition the student to the atmosphereof change he will encounter during his career.

Course outcomes: After learning the contents of the syllabus, the student

1. Gain knowledge on mechanism of physical bodies upon the Action of forces in different coordinates.
2. Able to learn concepts of simple harmonic motion and applytheir knowledge in various damped harmonic oscillators.
3. Apply the knowledge of transmission and reflection of harmonic and Acoustic waves to analyze transmission laws andAbsorption coefficient
4. Understand the concepts of optics like interference andDiffraction.
5. Apply the concepts of lasers and fiber optics in Communication systems.

UNIT-I

INTRODUCTION TO MECHANICS: Transformation of scalars and vectors under Rotation transformation, Forces in Nature, Newton's laws and its completeness in describing particle motion, Forminvariance of Newton's second law, Solving Newton's equations of motion in polar coordinates, Problems including constraints and friction, Extension to cylindrical and spherical coordinates.

UNIT-II

HARMONIC OSCILLATIONS: Mechanical and electrical simple harmonic oscillators, Complex number notation and phasor representation of simple harmonic motion, damped harmonic oscillator: heavy, critical and light damping, Energy decay in a damped harmonic oscillator, Quality factor, Mechanical and electrical oscillators, Mechanical and electrical impedance, Steady state motion of forced damped harmonic oscillator, Power observed by oscillator.

UNIT-III

WAVES IN ONE DIMENSION: Transverse wave on a string, the wave equation on a string, Harmonic waves, Reflection and transmission of waves at a boundary, Impedance matching, standing waves and their Eigen frequencies, Longitudinal waves and the wave equations for them, Acoustic waves.

UNIT-IV

WAVE OPTICS: Huygens's principle, Superposition of waves and interference of light by wave front splitting and amplitude splitting, Young's double slit experiment, Newton's rings, Michelson's interferometer, Mach-Zehnder interferometer, types of diffraction, Fraunhofer diffraction from a single slit, N-slit sand circular aperture, and Diffraction grating resolving power.

UNIT-V

LASERS AND FIBRE OPTICS: Lasers: Introduction to interaction of radiation with matter, Coherence, Principle and working of Laser, Population inversion, Components of lasers, Types of Lasers: Ruby laser, Carbon dioxide (CO_2) laser, He-Ne laser, Applications of laser. Fibre Optics: Introduction, Optical fibre as a dielectric wave guide, Total internal reflection, Acceptance angle,

Acceptance cone and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, Applications of optical fibres. Optical fibres in communication system.

TEXTBOOKS:

1. Engineering Mechanics, 2nd ed.- MK Harbola, Cengage Learning
2. I. G. Main, "Vibrations and waves in physics', 3rdEdn, Cambridge University Press, 2018.
3. Ajoy Ghatak, "Optics", McGraw Hill Education,2012

REFERENCE BOOKS:

1. H. J. Pain, "The physics of vibrations and waves", Wiley, 2006
2. O. Svelto, "Principles of Lasers"
3. M.K.Verma, "Introduction to Mechanics", Universities Press

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. CE - I Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20CS1ES01) PROGRAMMING FOR PROBLEM SOLVING

Course Objectives:

1 To learn the fundamentals of computers.
2 To understand the various steps in program development.
3 To learn the syntax and semantics of C programming language.
4 To learn the usage of structured programming approach in solving problems

Course outcomes: The student will be able to

1. Built the algorithm for the given unsolved problem.
2. Apply the concept of arrays, strings, structures and pointers to find the solution for given problem.
3. Apply the various preprocessor commands in a given different real time situation.
4. Understand the dynamics of memory by pointers.
5. Dissect the problem in subfunction to develop modular reusable code.

UNIT - I

INTRODUCTION TO PROGRAMMING INTRODUCTION TO COMPONENTS OF A COMPUTER SYSTEM: Disks, primary and secondary memory, processor, operating system, compilers, creating, compiling and executing a program etc., Number systems Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code , Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments Bitwise operations: Bitwise AND, OR, XOR and NOT operators Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with it, if-else, switch-case, ternary operator, go to, Iteration with for, while, do-while loops I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr. Command line arguments

UNIT - II

ARRAYS, STRINGS, STRUCTURES AND POINTERS: Arrays: one- and two-dimensional arrays, creating, accessing and manipulating elements of arrays Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings Structures: Defining structures, initializing structures, unions, Array of structures. **POINTERS:** Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self - referential structures in linked list (no implementation) Enumeration data type.

UNIT - III

PREPROCESSOR AND FILE HANDLING IN C: Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

UNIT – IV

FUNCTION AND DYNAMIC MEMORY ALLOCATION: Functions: Designing structured programs, declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

UNIT - V

INTRODUCTION TO ALGORITHMS: Algorithms for finding roots of quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number, etc. Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexity through the example programs.

TEXTBOOKS:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, 3rd Edition, Cengage Learning

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. R.G. Dromey, how to solve it by Computer, Pearson (16th Impression)
3. Stephen G. Kochan, Programming in C, Fourth Edition, Pearson Education.
4. Herbert Schildt, C: The Complete Reference, 4th Edition, McGraw Hill.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. CE - I Sem	**L**	**T**	**P**	**C**
	1	**0**	**4**	**3**

(20ME1ES02) ENGINEERING GRAPHICS

Course Objectives: The objectives of the course are

1 To provide basic concepts in engineering drawing.
2 To impart knowledge about standard principles of orthographic projection of objects.
3 To draw sectional views and pictorial views of solids.

Course outcomes: At the end of the course, the student will be able to:

1. Apply the principles of Engineering Graphics to create Engineering Drawings of various geometric constructions, conic sections, curves and scales as per BIS standards.
2. Construct orthographic projections for points, lines and planes in different quadrants and Auxiliary views.
3. Draw the sectional views and true shape of sections of solids, by applying principles of projections.
4. Draw the development of surfaces and intersections of solids in real time situations.
5. Develop isometric and orthographic views of the objects.

UNIT - I

INTRODUCTION TO ENGINEERING DRAWING: Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Scales – Plain & Diagonal.

UNIT - II

ORTHOGRAPHIC PROJECTIONS: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. —Auxiliary Planes.

UNIT - III

PROJECTIONS OF REGULAR SOLIDS – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere.

UNIT – IV

DEVELOPMENT OF SURFACES OF RIGHT REGULAR SOLIDS – Prism, Cylinder,
Pyramid and Cone, Intersection of Solids: Intersection of – Prism vs Prism- Cylinder Vs Cylinder.

UNIT - V

ISOMETRIC PROJECTIONS: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having nonisometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions.

INTRODUCTION TO CAD: (For Internal Evaluation Weightage only): Introduction to CAD Software Package Commands. - Free Hand Sketches of 2DCreation of 2D Sketches by CAD Package.

TEXTBOOKS:

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing / N. S. Parthasarathy and Vela Murali/ Oxford

REFERENCE BOOKS:

1. Engineering Drawing / Basant Agrawal and Mc Agrawal/ McGraw Hill
2. Engineering Drawing/ M. B. Shah, B.C. Rane / Pearson.
3. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. CE - I Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20PH1BS03) ENGINEERING PHYSICS LAB

Course outcomes: The student

1. Able to learn different types of waves on string. Determine the rigidity modulus of wire using Torsional pendulum.
2. Able to examine the formation of interference pattern using Newton's rings.
3. Able to learn dispersive power of prism and diffraction grating of light usingspectrometer.
4. Able to interpret the characteristics of coupled oscillator, LCR and LASERcircuits.
5. Examine the bending losses and numerical aperture for different optical fibercables.

List of Experiments:

1. Melde's experiment: To determine the frequency of a vibrating bar or turning fork using Melde's arrangement.
2. Torsional pendulum: To determine the rigidity modulus of the material of the given wire using torsional pendulum.
3. Newton's rings: To determine the radius of curvature of the lens by forming Newton's rings.
4. Diffraction grating: To determine the number of lines per inch of the grating.
5. Dispersive power: To determine the dispersive power of prism by using spectrometer.
6. Coupled Oscillator: To determine the spring constant by single coupled oscillator.
7. LCR Circuit: To determine quality factor and resonant frequency of LCR circuit.
8. LASER: To study the characteristics of LASER sources.
9. OPTICAL FIBRE: To determine the bending losses of Optical fibres.
10. OPTICAL FIBRE: To determine the Numerical aperture of a given fibre.

Note: Any 8 experiments are to be performed

REFERENCE BOOKS:

1. Laboratory Manual of Engineering Physics by Dr.Y.Aparna & Dr.K.Venkateswara Rao (V.G.S Publishers)
2. Engineering physics practical's by Dr. B.Srinivasa Rao, V. K. V.Krishna, K.S.Rudramamba

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. CE - I Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20CS1ES03) PROGRAMMING FOR PROBLEM SOLVING LAB

Course outcomes:

1. work with an IDE to create, edit, compile, run and debug programs
2. To analyze the various steps in program development.
3. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
4. To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
5. To write programs using the Dynamic Memory Allocation concept.
6. To create, read from and write to text and binary files

Course Outcomes: The students will be able to:

1. Formulate the algorithms for simple problems
2. Translate given algorithms to C programs.
3. Correct logical errors found during program execution.
4. Make use of pointers in different types, modularize the code with functions.
5. Apply appropriate sorting techniques for the given list of elements

Practice sessions:

1. Write a simple program that prints the results of all the operators available in C (including pre/ post increment, bitwise and/or/not, etc.). Read required operand values from standard input
2. Write a simple program that converts one given data type to another using auto conversion and casting. Take the values form standard input.

Simple numeric problems:

a. Write a program for find the max and min from the three numbers.
b. Write the program for the simple, compound interest.
c. Write program that declares Class awarded for a given percentage of marks, where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.
d. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:
   5 x 1 = 5
   5 x 2 = 10
   5 x 3 = 15
e Write a program that shows the binary equivalent of a given positive number between 0 to255

Expression Evaluation:

a A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula s = ut+(1/2)at^2 where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).

b. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
C. Write a program that finds if a given number is a prime number is a prime number
d. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.
e A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
f Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
g Write a C program to find the roots of a Quadratic equation.

h Write a C program to calculate the following, where x is a fractional value. 1-x/2 +x^2/4-x^3/6

i Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: 1+x+x^2+x^3+ ..... +x^n. For example: if n is 3 and x is 5, then the program compute 1+5+25+125.

Arrays and Pointers and Functions:

a Write a C program to find the minimum, maximum and average in an array of integers.

b Write a function to compute mean, variance, Standard Deviation, sorting of n elements in single dimension array.

c Write a C program that uses functions to perform the following:

i. Addition of Two Matrices
ii. Multiplication of Two Matrices
iii. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be same.

d Write C programs that use both recursive and non-recursive functions

i. To find the factorial of a given integer.
ii. To find the GCD (greatest common divisor) of two given integers.
iii. To find x^n

e Write a program for reading elements using pointer into array and display the values using array.

f Write a program for display values reverse order from array using pointer.

g Write a program through pointer variable to sum of n elements from array.

Files:

a Write a C program to display the contents of a file to standard output device.

b Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.

c Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.

d Write a C program that does the following:
It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (Hint: convert the strings using atoi function) Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (Hint: use seek function)
The program should then read all 10 values and print them back.

e Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

Strings:

a Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.

b Write a C program that converts a number ranging from 1 to 50 to Roman equivalent

c Write a C program that uses functions to perform the following operations:

I. To insert a sub-string in to a given main string from a given position.
II. To delete n Characters from a given position in a given string.

d Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)

e Write a C program that displays the position of a character Ch in the string S or – 1 if S does ‘t contain Ch.

f Write a C program to count the lines, words and characters in a given text.

Miscellaneous:

a Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all
the choices are to be functions.
Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.

b Write a C program to construct a pyramid of numbers as follows:

1	*	1	1	*
1 2	* *	2 3	2 2	* *

1 2 3	* * *	4 5 6	3 3 3	* * *
			4 4 4 4	* *
				*

Sorting and Searching:

a Write a C program that uses non recursive function to search for a key value in a given list of integers using linear search method.

b Write a C program that uses non recursive function to search for a key value in a given sorted list of integers using binary search method.

c Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.

d Write a C program that sorts the given array of integers using selection sort in descending order

e Write a C program that sorts the given array of integers using insertion sort in ascending order

f Write a C program that sorts a given array of names

Suggested Reference Books for solving problems:

i Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

ii B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

iii Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice

iv Hall of India

v R.G. Dromey, how to solve it by Computer, Pearson (16th Impression)

vi Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.

vii Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

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I Year B.Tech. CE - I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**0**

(20MC1ES04) ENVIRONMENTAL SCIENCE

Course Objectives: The objectives of the course are:

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures
3. Understanding the environmental policies and regulations

Course Outcomes: The students will be able to:

1. Explain the concept of ecological perspective and the value of the environment.
2. Value the significance of various natural resources and its management.
3. Demonstrate a comprehensive understanding of the world's biodiversity and the importance of its conservation.
4. Identify different types of pollution and their control measures, effective methods of waste management with best possible solutions.
5. Develop an awareness about environmental laws and sustainable development.

UNIT - I

ECOSYSTEMS: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnifications, ecosystem value, services and carrying capacity, Field visits.

UNIT - II

NATURAL RESOURCES: CLASSIFICATION OF RESOURCES: Living and Non-Living resources, WATER RESOURCES: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. MINERAL RESOURCES: use and exploitation, environmental effects of extracting and using mineral resources, LAND RESOURCES: Forest resources, ENERGY RESOURCES: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies

UNIT - III

BIODIVERSITY AND BIOTIC RESOURCES: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In- Situ and Ex-situ conservation. National Biodiversity act

UNIT – IV

ENVIRONMENTAL POLLUTION AND CONTROL TECHNOLOGIES: ENVIRONMENTAL POLLUTION: Classification of pollution, AIR POLLUTION: Primary and secondary pollutants, Automobile and Industrial pollution, ambient air quality standards. WATER POLLUTION: Sources and types of pollution, drinking water quality standards. SOIL POLLUTION: Sources and types, Impacts of modern agriculture, degradation of soil. NOISE POLLUTION: Sources and Health hazards, standards, SOLID WASTE: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. POLLUTION CONTROL TECHNOLOGIES: Waste water Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. GLOBAL ENVIRONMENTAL ISSUES AND GLOBAL EFFORTS: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions /Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC- GoI Initiatives

UNIT - V

ENVIRONMENTAL POLICY, LEGISLATION & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water,

biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). Towards Sustainable Future: Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXTBOOKS:

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for UniversityGrants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL LearningPrivate Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHILearning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4thEdition, new age international publishers.
5. Text book of Environmental Science and Technology- Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. CE - II Sem

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3	1	0	4

(20MA2BS04) MATHEMATICS – II

Course Objectives: To learn

1. Methods of solving the differential equations of first and higher order.
2. Evaluation of multiple integrals and their applications.
3. The physical quantities involved in engineering field related to vector valued functions.
4. The basic properties of vector valued functions and their applications to line, Surface and volume integrals.

Course Outcomes: After learning the contents of this paper the student must be able to

1. Determine different types of ordinary differential equations of first order.
2. Apply the concept of differential equation to real world problems.
3. Apply the concept of multiple integrals to find areas, volumes.
4. Evaluate the Centre of mass and gravity for cubes, sphere and rectangular parallelopiped.
5. Calculate the line, surface and volume integrals and converting them from one to another.

UNIT - I

First Order Ordinary Differential Equations: Exact, linear and Bernoulli's equations. **Applications:** Newton's law of cooling, Law of natural growth and decay. **Equations not of first degree:** equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT - II

Ordinary Differential Equations of Higher Order: Second order linear differential equations with constant coefficients. Non-Homogeneous terms of the type e^{ax}, $\sin ax$, $\cos ax$, polynomials in x, $e^{ax}V(x)$ and $xV(x)$. Method of variation of parameters. **Equations reducible to linear ODE with constant coefficients:** Legendre's equation, Cauchy-Euler equation.

UNIT - III

Multiple Integrals: Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form). **Evaluation of Triple Integrals:** Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallelepiped).

UNIT – IV

Vector Differentiation: Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

UNIT - V

Vector Integration: Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

TEXT BOOKS:

1. **B.S. Grewal**, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. **Erwin kreyszig**, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. **G.B. Thomas and R.L. Finney**, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

REFERENCE BOOKS:

1. **Paras Ram**, Engineering Mathematics, 2nd Edition, CBS Publishers.
2. **S. L. Ross**, Differential Equations, 3rd Ed., Wiley India, 1984.

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I Year B.Tech. CE - II Sem

L	T	P	C
3	1	0	4

(20CH2BS05) CHEMISTRY

Course Objectives: The objectives of the course are

1. To bring adaptability to the concepts of chemistry and to acquire the required skills to becomea perfect engineer.
2. To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.
3. To acquire the knowledge of electrochemistry, corrosion and water treatment which areessential for the Engineers and in industry
4. To acquire the skills pertaining to spectroscopy and to apply them for medical field etc.
5. To impart then knowledge of stereochemistry and synthetic aspects useful for understanding reaction pathways

Course Outcomes: At the end of the course, the students will be able to:

1. Analyze microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
2. Measure various parameters of water and its significance in industrial and domestic purpose.
3. Make use of essential aspects of Electro chemistry and Corrosion in industry.
4. Explain stereochemistry and synthetic aspects useful for understanding reaction pathways.
5. Apply the basic principles of various Spectroscopic techniques in chemical industry and medical field.

UNIT - I

Molecular structure and Theories of Bonding: Atomic and Molecular orbitals. Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N_2, O_2 and NO molecules. Bond order. Crystal Field Theory (CFT): Salient Features of CFT Crystal Field Splitting of transition metal ion d- orbitals in Tetrahedral, Octahedral and square planar geometries. Factors affecting in magnitude of splitting. Magnetic and color properties. Band structure of solids and effect of doping on conductance. N-doping, P-doping.

UNIT - II

WATER AND ITS TREATMENT: Introduction – hardness of water – Causes of hardness. Types of hardness: temporary and permanent. Expression and units of hardness. Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in treatment of water Disinfection of water by chlorination and ozonation. Boiler feed water –Boiler troubles Scale, Sludge, Priming, Foaming and Caustic embrittlement. Treatment. Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water. Ion exchange process. Desalination of water – Reverse osmosis. Numerical problems.

UNIT - III

ELECTROCHEMISTRY AND CORROSION: Electrochemical cells – electrode potential, standard electrode potential, types of electrodes – Calomel, Quinhydrone and glass electrode. Nernst equation Determination of pH of a solution by using quinhydrone and glass electrode. Electrochemical series and its applications. Numerical problems. Potentiometric titrations. Batteries – Primary (Lithium cell) and secondary batteries (Lead – acid storage battery and Lithium-ion battery).

Causes and effects of corrosion

Theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion. Typesof corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of electro chemical corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current cathodic methods. Surface coatings – metallic coatings –Methods of coating- Hot dipping, cementation – Hot Dipping-Galvanization and Tinning. Electroless plating of copper.

UNIT – IV

STEREOCHE MISTRY, REACTION MECHANISMAND SYNTHESIS OF DRUG MOLECULES: Representation of 3-dimensional structures, Isomers-Structural and stereoisomers, Enantiomers, diastereomers, symmetry and chirality. Optical activity Absolute configuration. Conformational analysis of n- butane. Substitution reactions: Nucleophilic substitution reactions: Mechanism of SN1, SN2 reactions. Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff and anti Markownikoff's additions. Grignard additions on carbonyl compounds. Elimination reactions: DE hydro halogenation of alkyl halides. Saytzeff rule. Oxidation reactions: Oxidation of alcohols using KMnO4 and CrO3. Reduction reactions: Reduction of carbonyl compounds using LiAlH4& NaBH4.Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

UNIT - V

SPECTROSCOPIC TECHNIQUES AND APPLICATIONS: Principles of electronic spectroscopy: Beer's Lamberts law, numerical problems. Types of electronic excitations. Applications of uv-visible spectroscopy. IR Spectroscopy: Principle, modes of vibrations, selection rules, Force constant, some common organic Functional groups wave no. regions (C-H, NH, OH, -COOH, C=0, C□N, C=C and C□C) Applications of IR Spectroscopy, H NMR (NMR Spectroscopy) Principle of NMR spectroscopy Chemical shift, chemical shifts of some common organic protons. Introduction to MRI.

TEXT BOOK

1. Text book of Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing company (P) Ltd. NewDelhi.

REFERENCE BOOKS:

1. Physical Chemistry, by P.W. Atkins
2. Engineering Chemistry (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S. Krishnan
3. University Chemistry, by B.H. Mahan
4. Fundamentals of Molecular Spectroscopy, by C.N. Banwell
5. Organic Chemistry: Structure and Function by K.P.C. Volhardt and N.E. Schore, 5th Edition

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. CE - II Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20ME2ES05) ENGINEERING MECHANICS

Course Objectives: The objectives of this course are to:

1. Explain the resolution of a system of forces, compute their resultant and solve problems
2. Using equations of equilibrium
3. Perform analysis of bodies lying on rough surfaces.
4. Locate the centroid of a body and compute the area moment of inertia and mass moment ofinertia of standard and composite sections
5. Explain kinetics and kinematics of particles, projectiles, curvilinear motion, centroidal motionand plane motion of rigid bodies.
6. Explain the concepts of work-energy method and its applications to translation, rotation and plane motion and the concept of vibrations

Course Outcomes: At the end of the course, the students will be able to:

1. Solve problems related to resultant of forces acting on a body and equilibrium of a body subjected to a system of forces.
2. Solve problem of bodies subjected to friction and find Centre of Gravity
3. Calculate moment of inertia of a given section.
4. Solve problem on Particle dynamics and work kinetic energy.
5. Solve problem of D'Alembert's principle and its applications, work energy principle and kinetics of rigid body rotation

UNIT - I

INTRODUCTION TO ENGINEERING MECHANICS – Force Systems: Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy.

UNIT - II

FRICTION: Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, screw jack & differential screw jack; Centroid and Centre of Gravity -Centroid of Lines, Areas and Volumes from first principle, centroid of composite sections; Centre of Gravity and its implications. – Theorem of Pappus

UNIT - III

AREA MOMENT OF INERTIA – Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Product of Inertia, Parallel Axis Theorem, Perpendicular Axis Theorem Mass Moment of Inertia: Moment of Inertia of Masses - Transfer Formula for Mass Moments of Inertia – Mass moment of inertia of compositebodies.

UNIT – IV

REVIEW OF PARTICLE DYNAMICS – Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique).

UNIT - V

KINETICS OF RIGID BODIES – Basic terms, general principles in dynamics; Types of motion, Instantaneous center of rotation in plane motion and simple problems; D'Alembert's principle and its applications in plane motion and connected bodies; Work Energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation.

TEXT BOOK

1. Shames and Rao (2006), Engineering Mechanics, Pearson Education.
2. Reddy Vijay Kumar K. and J. Suresh Kumar (2010), Singer's Engineering Mechanics – Statics &Dynamics

REFERENCE BOOKS:

1. Timoshenko S.P. and Young D.H., "Engineering Mechanics", McGraw Hill International Edition, 1983.
2. Andrew Pytel, Jaan Kiusalaas, "Engineering Mechanics", Cengage Learning, 2014.
3. Beer F.P. & Johnston E.R Jr. Vector, "Mechanics for Engineers", TMH, 2004.
4. Hibbeler R.C & Ashok Gupta, "Engineering Mechanics", Pearson Education, 2010.
5. Tayal A.K., "Engineering Mechanics – Statics & Dynamics", Umesh Publications, 2011.
6. Basudeb Bhattacharyya, "Engineering Mechanics", Oxford University Press, 2008.
7. Meriam. J. L., "Engineering Mechanics", Volume-II Dynamics, John Wiley & Sons, 2008.

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I Year B.Tech. CE - II Sem	**L**	**T**	**P**	**C**
	1	**0**	**3**	**2.5**

(20ME2ES06) ENGINEERING WORKSHOP

Course Objectives The objectives of this lab are:

1. To study of different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools,equipment's and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at work place.
5. To explain the construction, function, use and application of different working tools,equipment and machines.
6. To study commonly used carpentry joints.
7. To have practical exposure to various welding and joining processes.
8. To identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

Course Outcomes: At the end of the course, the students will be able to:

1. Apply different workshop trades like fitting,carpentry, foundry and welding.
2. Practice workshop trades like Tim smithy, Blacksmithy.
3. Apply suitable tools for different trades of engineering processes including drilling, material removing, measuring, chiseling.
4. Apply basic electrical engineering knowledge for house wiring practice.
5. Demonstrate various machines, tools and their operations.

TRADES FOR EXERCISES:

At least two exercises from each trade:

i. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
ii. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
iii. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
iv. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
v Welding Practice – (Arc Welding & Gas Welding)
vi. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
vii. Black Smithy – (Round to Square, Fan Hook and S-Hook)

TRADES FOR DEMONSTRATION & EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and WoodWorking

TEXT BOOK

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.

REFERENCE BOOKS:

1. Workshop Manual - P. Kannaiah/ K. L. Narayana/ SciTech
2. Workshop Manual / Venkat Reddy/ BSP

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I Year B.Tech. CE - II Sem	**L**	**T**	**P**	**C**
	2	**0**	**0**	**2**

(20EN2HS01) ENGLISH

Course Objectives The objectives of this lab are:

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
3. Develop study skills and communication skills in formal and informal situations.

Course Outcomes: At the end of the course, the students will be able to:

1. Use English Language effectively in spoken and written communication.
2. Comprehend the given texts and respond appropriately.
3. Communicate confidently in various contexts and different cultures.
4. Demonstrate basic proficiency in English including reading and listening comprehension, writing and speaking skills.
5. Improve language proficiency to meet their academic and professional needs.

UNIT - I

'The Raman Effect' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary Building: The Concept of Word Formation --The Use of Prefixes and Suffixes. Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading: Reading and Its Importance- Techniques for Effective Reading.

Basic Writing Skills: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely – Paragraph writing – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT - II

'Ancient Architecture in India' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Synonyms and Antonyms.

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Improving Comprehension Skills – Techniques for Good Comprehension

Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, Job Application with Resume

UNIT - III

'Blue Jeans' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading: Sub-skills of Reading- Skimming and Scanning

Writing: Nature and Style of Sensible Writing- Defining- Describing Objects, Places and Events – Classifying- Providing Examples or Evidence.

UNIT – IV

'What Should You Be Eating' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Comprehension- Intensive Reading and Extensive Reading

Writing: Writing Practices--Writing Introduction and Conclusion - Essay Writing-Précis Writing.

UNIT - V

'How a Chinese Billionaire Built Her Fortune' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Technical Vocabulary and their usage

Grammar: Common Errors in English

Reading: Reading Comprehension-Exercises for Practice

Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

TEXT BOOK

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.

REFERENCE BOOKS:

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P. (2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006). Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.
7. Raju, Yadava B, B T Sujatha & C, Murali Krishna. English for Better Performance, Orient Blackswan, Pvt.,Ltd, 2014

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I Year B.Tech. CE - II Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20CH2BS06) ENGINEERING CHEMISTRY LAB

Course Objectives: The chemistry laboratory course consists of experiments related to the principles of chemistry required to the engineering student. The course will make the student to learn:

1. Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
2. To determine the rate constant of reactions from concentrations as a function of time.
3. The measurement of physical properties like adsorption and viscosity.
4. To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.

Course Outcomes: The experiments will make the student gain basic skills on

1. An ability to analyze the quality of water by determining its chemical parameters.
2. The synthesis of common drugs like Paracetamol and Aspirin.
3. Determination of rate constant of a reaction from concentration – time relationships.
4. Determination of physical properties like adsorption and viscosity of lubricants.
5. Estimation of different types of qualitative and quantitative measurements of a given compound.

List of Experiments:

1. Determination of total hardness of water by complexometric method using EDTA
2. Estimation of Fe^{+2} by Dichrometry.
3. Estimation of HCl by Conductometric titrations
4. Estimation of Acetic acid by Conductometric titrations
5. Estimation of HCl by Potentiometric titrations
6. Estimation of Fe^{2+} by Potentiometry using $KMnO_4$
7. Determination of rate constant of acid catalysed hydrolysis of methyl acetate
8. Synthesis of Aspirin and Paracetamol
9. Thin layer chromatography calculation of Rf values. Eg:ortho and para nitro phenols
10. Determination of acid value of coconut oil
11. Verification of Freundlich adsorption isotherm-adsorption of acetic acid on charcoal
12. Determination of viscosity of Coconut oil and ground nut oil by using Ostwald's viscometer.
13. Determination of surface tension of a given liquid using stalagmometer.
14. Determination of partition coefficient of acetic acid between n-butanol and water

REFERENCE BOOKS:

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand & Co., Delhi)
2. An introduction to practical chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, N.Delhi)
3. Vogel's text book of practical organic chemistry 5th edition.
4. Text book on Experiments and calculations in Engineering chemistry – S.S. Dara

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I Year B.Tech. CE - II Sem	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1**

(20EN2HS02) ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

Course Objectives: The objectives of the course are:

1. To facilitate computer-assisted multi-media instruction enabling individualized and independentlanguage learning
2. To sensitize students to the nuances of English speech sounds, word accent, intonation andrhythm
3. To bring about a consistent accent and intelligibility in students‟ pronunciation of English byproviding an opportunity for practice in speaking
4. To improve the fluency of students in spoken English and neutralize their mother tongue influence
5. To train students to use language appropriately for public speaking and interviews

Course Outcomes: At the end of the course, students will be able to

1. Employ the nuances of English language through audio-visual experience and group activities.
2. Articulate a neutral accent of English for intelligibility by overcoming mother tongue influence.
3. Develop the skill of using appropriate language in various speaking contexts.
4. Take part in oral presentations using formal language.
5. Improve speaking skills with clarity and confidence which in turn enhance their interpersonal skills.

EXERCISE – I
CALL Lab:
Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening.
Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants.
ICS Lab:
Understand: Communication at Work Place- Spoken vs. Written language.
Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings –Taking Leave – Introducing Oneself and Others.
EXERCISE – II
CALL Lab:
Understand: Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context.
Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.
ICS Lab:
Understand: Features of Good Conversation – Non-verbal Communication.
Practice: Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and
Seeking Permissions - Telephone Etiquette.
EXERCISE – III
CALL Lab:
Understand: Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI).
Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.
ICS Lab:
Understand: How to make Formal Presentations.
Practice: Formal Presentations.
EXERCISE – IV
CALL Lab:
Understand: Listening for General Details. Practice: Listening Comprehension Tests. ICS Lab:
Understand: Public Speaking – Exposure to Structured Talks.
Practice: Making a Short Speech – Extempore.
EXERCISE – V

CALL Lab:

Understand: Listening for Specific Details.
Practice: Listening Comprehension Tests.
ICS Lab:
Understand: Interview Skills.
Practice: Mock Interviews.

TEXTBOOKS:

1. ELCS Lab Manual
   (The course content is prescribed for the English Language and Communication Skills Lab based on Unit-6 of AICTE Model Curriculum 2018 for B.Tech. First English)

REFERENCE BOOKS:

1. Suresh Kumar, E. & Sreehari, P. 2009. A Handbook for English Language Laboratories. NewDelhi:
2. Speaking English Effectively 2nd Edition by Krishna Mohan and N. P. Singh, 2011. MacmillanPublishers India Ltd. Delhi.
3. Sasi Kumar, V & Dhamija, P.V. How to Prepare for Group Discussion and Interviews. TataMcGraw Hill
4. Hancock, M. 2009. English Pronunciation in Use. Intermediate. Cambridge: CUP
5. Spoken English: A Manual of Speech and Phonetics by R. K. Bansal & J. B. Harrison. 2013. OrientBlack swan. Hyderabad.
6. Hewing's, M. 2009. English Pronunciation in Use. Advanced. Cambridge: CUP Marks, J. 2009.English Pronunciation in Use. Eleme
7. English Pronouncing Dictionary Daniel Jones Current Edition with CD.
8. A textbook of English Phonetics for Indian Students by T. Balasubramanian (Macmillan) Cambridge: CUP.

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II Year B.Tech. CE - I Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20CM3BS07) PROBABILITY & STATISTICS

Course Objectives: To learn

1. The ideas of Probability and random variables and various discrete and continuous Probability distribution and their properties
2. The basic idea of statistics including measurers of central tendency, Correlation and Regression
3. The Statistical Methods of studying data samples.

Course Outcomes: After learning the contents of this paper the students must able to

1. Apply Statistical Methods and random variables for analyzing experimental data.
2. Apply concept of probability distributions to find out finite and infinite values
3. Estimate Statistical Measures by using Statistical parameters.
4. Able to calculate the Co-relation and co-Variance of random variables
5. Apply the concept of Probability and random variables in solving given real time problems.

UNIT - I

Random Variables: Introduction, Random variables and discrete and continuous random variables, Expectation of Random variables, Moments, Variance of random variables, Covariance of random variables.

UNIT - II

Discrete probability distributions: Binomial, Poisson, evaluation of statistical parameters for these distributions, Poisson approximation to the binomial distribution.

UNIT - III

Continuous Random Variable and distributions: Continuous random variables and their properties, distribution function and densities, Normal, Exponential and Gamma distributions, evaluation of statistical parameter for these distributions.

UNIT – IV

Applied Statistics: Curve fitting by method of least squares-Fitting of straight lines, second degree parabolas and more general curves, correlation and Regression-Rank correlation.

UNIT - V

Testing of Hypothesis: Test of significance, large sample test for single proportion, difference of proportions, single mean, difference of means, Test for single mean, difference of means for small samples, text for ratio of variances for small samples.

TEXTBOOKS:

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability and Statistics for engineers and scientists, 9th edition, Pearson publications.
2. C.Guptha and V.K. Kapoor, Fundamentals of Mathematical Statistics, Khanna Publications.
3. D.K.Murugesan & Guruswamy, Probability & Statistics for Engineers, Anuradha Publications.

REFERENCE BOOKS:

1. Miller and Freund's Probability and Statistics for Engineers, 8th Edition, Pearson Educations.
2. **S.Ross,** A First Course in Probability, 6th Ed., Pearson Education India, 2002.

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II Year B.Tech. CE - I Sem	**L**	**T**	**P**	**C**
	4	**0**	**0**	**4**

(20CE3PC01) STRENGTH OF MATERIALS – I

Course Objectives: The objectives of this Course are:

1. To understand the nature of stresses developed in simple geometries such as bars, cantilevers and beams for various types of simple loads
2. To calculate the elastic deformation occurring in simple members for different types ofloading.
3. To show the plane stress transformation with a particular coordinate system for differentorientation of the plane.
4. To know different failure theories adopted in designing of structural members

Course Outcomes: On completion of the course, the student will be able to

1. Calculate stresses, strains and strain energy for sections and conditions.
2. Calculate shear force and Bending Moment diagram for different types of beams with different loading conditions.
3. Calculate flexural and shear stresses for different sections of beams.
4. Calculate slope and deflection for different types of beams using different methods.
5. Calculate principal stresses and application of theories of failures.

UNIT - I

SIMPLE STRESSES AND STRAINS: Concept of stress and strain- St. Venant's Principle- Stress and Strain Diagram - 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 – Pure shear and Complementary shear - Elastic module, Elastic constants and the relationship between them – Bars of varying section – composite bars – Temperature stresses. STRAIN ENERGY – Resilience – Gradual, sudden, and impact loadings – simple applications.

UNIT - II

SHEAR FORCE AND BENDING MOMENT: Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported including overhanging beams subjected to point loads, uniformly distributed load, uniformly varying load, couple 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: Theory of simple bending – Assumptions – Derivation of bending equation- Section Modulus Determination of flexural/bending stresses of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections – Design of simple beam sections. SHEAR STRESSES: Derivation of formula for shear stress distribution – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle and channel sections.

UNIT – IV

DEFLECTION OF BEAMS: Slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L, uniformly varying load and couple -Mohr's theorems – Moment area method – Application to simple cases.

CONJUGATE BEAM METHOD: Introduction – Concept of conjugate beam method - Difference between a real beam and a conjugate beam - Deflections of determinate beams with constant and different moments of inertia.

UNIT - V

PRINCIPAL STRESSES: Introduction – Stresses on an oblique plane 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 – Principal stresses – Mohr's circle of stresses – ellipse of stress – Analytical and graphical solutions.

THEORIES OF FAILURE: Introduction – Various theories of failure - Maximum Principal Stress Theory, Maximum Principal Strain Theory, Maximum shear stress theory- Strain Energy and Shear Strain Energy Theory (Von Mises Theory).

TEXTBOOKS:

1. Strength of Materials by R. K Rajput, S. Chand & Company Ltd.
2. Mechanics of Materials by Dr. B.C Punmia, Dr. Ashok Kumar Jain and Dr. Arun Kumar Jain.
3. Strength of Materials by R. Subramanian, Oxford University Press.
4. Strength of Materials by Rattan. S. S, Tata McGraw Hill Education Private Limited, NewDelhi, 2012

REFERENCE BOOKS:

1. Mechanics of material by R.C. Hibbeler, Prentice Hall publications.
2. Engineering Mechanics of Solids by Egor P. Popov, Prentice Hall publications.
3. Strength of Materials by T.D.Gunneswara Rao and M. Andal, Cambridge Publishers.
4. Strength of Materials by R.K. Bansal, Lakshmi Publications House Pvt. Ltd.
5. Strength of Materials by B.S.Basavarajaiah and P.Mahadevappa, 3rdEdition,Universities Press.
6. Junnarkar.S.B. and Shah.H.J, "Mechanics of Structures", Vol I, Charotar Publishing House,New Delhi 2016.
7. Strength of Materials by Singh. D.K., Ane Books Pvt. Ltd., New Delhi, 2016.

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II Year B.Tech. CE - I Sem	**L**	**T**	**P**	**C**
	4	**0**	**0**	**4**

(20CE3PC02) FLUID MECHANICS

Course Objectives: The objectives of this Course are:

1. Introduce the concepts of fluid mechanics useful in Civil Engineering applications
2. Provide a first level exposure to the students to fluid statics, kinematics and dynamics.
3. Learn about the application of mass, energy and momentum conservation laws for fluid flows
4. Train and analyse engineering problems involving fluids with a mechanistic perspective is essential for the civil engineering students
5. Obtain the velocity and pressure variations in various types of simple flows
6. Prepare a student to build a good fundamental background useful in the application- intensive courses covering hydraulics, hydraulic machinery and hydrology

Course Outcomes: Upon completion of this course, students should be able to

1. Calculate fluid pressure.
2. Calculate problems based on fluid kinematics and fluid dynamics.
3. Calculate flow in pipes, notches and weirs.
4. Determine loss of head, minor losses, power transmission through pipes and analysis of pipe network.
5. Degerming flow in laminar and turbulent conditions.

UNIT - I

PROPERTIES OF FLUID: Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapor pressure, boiling point, cavitations; surface tension, capillarity, Bulk modulus of elasticity, compressibility.

FLUID STATICS: Fluid Pressure: Pressure at a point, Pascals law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micromanometers. pressure gauges. Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

UNIT - II

FLUID KINEMATICS: Classification of fluid flow: steady and unsteady flow; uniform and non- uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two- and three-dimensional flows; Stream line,
path line, streak line and stream tube; stream function, velocity potential function. One, two- and three-dimensional continuity equations in Cartesian coordinates.

FLUID DYNAMICS: Surface and Body forces -Euler's and Bernoulli's equation; Energy correction factor; Momentum equation. Vortex flow – Free and Forced. Bernoulli's equation to real fluid flows.

UNIT - III

FLOW MEASUREMENT IN PIPES: Practical applications of Bernoulli's equation: venturi meter, orifice meter and pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend.

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

UNIT – IV

FLOW THROUGH PIPES: Reynolds experiment, Reynolds number, Loss of head through pipes, Darcy-Wies batch equation, minor losses, total energy line, hydraulic grade line, Pipes in series, equivalent pipes, pipes in parallel, siphon, branching of pipes, three reservoir problem, power transmission through pipes.
Analysis of pipe networks: Hardy Cross method, water hammer in pipes and control measures.

UNIT - V

LAMINAR & TURBULENT FLOW: Laminar flow through: circular pipes, annulus and parallel plates.

BOUNDARY LAYER CONCEPTS: Boundary Layer Analysis-Assumption and concept of boundary layer theory. Boundary-layer thickness, displacement, momentum & energy thickness, laminar and turbulent boundary layers on a flat plate; Laminar sub-layer, smooth and rough boundaries. Local and average friction coefficients. Separation and Control. Definition of Drag and Lift and types drag, Magnus effect.

TEXTBOOKS:

1. Fluid Mechanics by Modi and Seth, Standard Book House.
2. Fluid Mechanics and Hydraulic machines by Manish Kumar Goyal, PHI learning Private Limited, 2015.
3. Fluid Mechanics by R.C. Hibbeler, Pearson India Education Services Pvt. Ltd.
4. Fluid Mechanics" (Including Hydraulic Machines), by Jain.A.K., Khanna Publishers, Twelfth Edition, 2016.
5. Fluid Mechanics by Rajput.R.K. , S.Chand and Co, New Delhi, 2008.

REFERENCE BOOKS:

1. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill
2. Introduction to Fluid Mechanics and Fluid Machines by SK Som, Gautam Biswas, Suman Chakraborty, Mc Graw Hill Education (India) Private Limited
3. Fluid Mechanics and Machinery, C.S.P. Ojha, R. Berndtsson and P. N. Chadramouli, OxfordUniversity Press, 2010
4. Fluid mechanics & Hydraulic Machines, Domkundwar & Domkundwar Dhanpat Rai & Co.
5. Fluid Mechanics and Hydraulic Machines, R. K. Bansal, Laxmi Publication Pvt Ltd.
6. Fluid Mechanics by White, F.M., Tata McGraw Hill, 5th Edition, New Delhi, 2017.
7. Fluid Mechanics and Machinery by Mohd. Kaleem Khan, Oxford University Press, New Delhi, 2015.

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II Year B.Tech. CE - I Sem	**L**	**T**	**P**	**C**
	2	**0**	**0**	**2**

(20CE3PC03) ENGINEERING GEOLOGY

Course Objectives: The objectives of this Course are:

1. To give the basics knowledge of Geology that is required for constructing various Civil Engineering Structures, basic Geology, Geological Hazardous and EnvironmentalGeology
2. To focus on the core activities of engineering geologists–site characterization and geologic hazard identification and mitigation. Planning and construction of major CivilEngineering projects

Course Outcomes: At the end of the course, the student will be able to:

1. Understand importance of geology in civil engineering and weathering of rocks.
2. Understand about Mineralogy and Petrology.
3. Illustrate about structural geology and ground water.
4. Demonstrate about earthquakes and geophysical studies.
5. Illustrate about geology of Dams, Reservoir and Tunnels.

UNIT - I

INTRODUCTION: Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.

WEATHERING OF ROCKS: Its effect over the properties of rocks importance of weathering with reference to dams, reservoirs and tunnels weathering of common rock like "Granite" Scale of Weathering.

UNIT - II

MINERALOGY: Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties. Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite.

PETROLOGY: Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of igneous. Sedimentary and metamorphic rocks. Their distinguishing features, Megascopic and microscopic and microscopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate, Distinction between Igneous, Sedimentary and Metamorphic Rocks.

UNIT - III

STRUCTURAL GEOLOGY: Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints - their important types and case studies. Their importance in situ and drift soils, common types of soils, their origin and occurrence in India, Stabilization of soils. Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration.

UNIT – IV

EARTH QUAKES: Causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Landslides, their causes and effect; measures to be taken to prevent their occurrence, Plate Tectonics – Earth Quakes- Seismic Zones in India.

IMPORTANCE OF GEOPHYSICAL STUDIES: Principles of geophysical study by Gravitymethods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc. Fundamental aspects of Rock mechanics and Environmental Geology.

UNIT - V

GEOLOGY OF DAMS, RESERVOIRS, AND TUNNELS: Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factors contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs - Purposes of tunneling, Effects of Tunneling on theground Role of Geological Considerations (i.e. Lithological, structural and ground water) in tunnelingover break and lining in Tunnels, Fundamentals of Hydrogeological Investigations and mining.

TEXTBOOKS:

1. Engineering Geology by N. Chennakesavulu, McMillan, India Ltd. 2005
2. Engineering Methods by D. Venkat Reddy; Vikas Publishers 2015.
3. Engineering Geology by S K Duggal, H K Pandey Mc Graw Hill Education Pvt Ltd 2014
4. Principles of Engineering Geology by K.V.G.K. Gokhale – B.S publications.
5. Textbook of Engineering Geology by Chenna Kesavulu. N., Macmillan India Ltd., 2009.
6. Text book of Engineering and General Geology by Parbin Singh. A., Katson publishinghouse, Ludhiana 2009.

REFERENCE BOOKS:

1. F.G. Bell, Fundamental of Engineering B.S. Publications, 2005.
2. Krynine & Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distribution.
3. Engineering Geology by Subinoy Gangopadhyay, Oxford university press.
4. Engineering Geology for Civil Engineers – P.C. Varghese PHI.
5. Geology for Engineers by Blyth F.G.H. and de Freitas M.H., Edward Arnold, London, 2010.
6. An introduction to geophysical prospecting by Dobrin, M.B., McGraw Hill, New Delhi, 1988.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. CE - I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20CE3PC04) SURVEYING AND GEOMATICS

Course Objectives: The objectives of this Course are to:

1. Know the principle and methods of surveying.
2. Measure horizontal and vertical- distances and angles
3. Recording of observation accurately
4. Perform calculations based on the observation
5. Identification of source of errors and rectification methods
6. Apply surveying principles to determine areas and volumes and setting out curves
7. Use modern surveying equipment's for accurate results

Course Outcomes: Course will enable the students to:

1. Calculate distance, directions using chains, tapes, prismatic compass and plane table.
2. Determine levels, areas and volumes using levelling instruments.
3. Apply theodolite surveying for various calculations.
4. Illustrate about curves, tacheometric surveying and modern surveying methods.
5. Explain Photogrammetry surveying.

UNIT - I

INTRODUCTION AND BASIC CONCEPTS: Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying.

MEASUREMENT OF DISTANCES AND DIRECTIONS LINEAR DISTANCES: Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections. Indirect methods- optical methods-E.D.M. method

PRISMATIC COMPASS: Bearings, included angles, Local Attraction, Magnetic Declination anddip

PLANE TABLE SURVEY: Two Point and Three Point problem, Radiation, Intersection Method.

UNIT - II

LEVELING: Types of levels and leveling staves, temporary adjustments, methods of leveling, booking and Determination of levels, HI Method-Rise and Fall method, Effect of Curvature of Earth and Refraction.

CONTOURING: Characteristics and uses of Contours, methods of contour surveying, interpolation and sketching of Contours.

AREAS: Determination of areas consisting of irregular boundary and regular boundary.

VOLUMES: Computation of areas for level section and two-level sections with and without transverse slopes, Determination of volume of earth work in cutting and embankments for level section, volume of borrow pits, capacity of reservoirs.

UNIT - III

THEODOLITE SURVEYING: Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical leveling when base is accessible and inaccessible.

TRAVERSING: Methods of traversing, traverse computations and adjustments, Gale's traverse table, Omitted measurements.

UNIT – IV

CURVES: Types of curves and their necessity, elements of simple, compound, reverse, transition and vertical curves. Introduction to compound curves.

TACHEOMETRIC SURVEYING: Principles of Tacheometry, stadia and tangential methods of Tacheometry.

MODERN SURVEYING METHODS: Principle and types of E.D.M. Instruments, Total station-advantages and Applications. Field Procedure for total station survey, Errors in Total Station Survey, Global Positioning System- Principle and Applications.

UNIT - V

PHOTOGRAMMETRY SURVEYING: Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetric, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereo plotting instruments, mosaics, map substitutes.

TEXTBOOKS:

1. Surveying (Vol–1,2&3), by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain.Laxmi Publications (P) Ltd., New Delhi.
2. Surveying (Vol–1&2), by Duggal SK, Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.
3. Surveying (Vol-1&2), by K.R.Arora,Rajson's Publications
4. Surveying and Levelling, Parts 1 & 2 by Kanetkar.T.P and Kulkarni.S.V., Pune VidyarthiGriha Prakash an, Pune, 2008
5. Surveying, Theory and Practice by James M. Anderson and Edward M. Mikhail., 7th Edition,McGraw Hill, 2001.
6. Surveying by Bannister and S. Raymond., 7th Edition, Longman 2004.
7. Electronic Surveying in Practice by Laurila, S.H., John Wiley and Sons Inc, 1993.
8. Text book of Surveying by Venkatramaiah, University press, New Delhi, 2014.

REFERENCE BOOKS:

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw-Hill–2000.
2. Chandra AM, "Plane Surveying", New Age International Pvt.Ltd., New Delhi, 2002.
3. Surveying by Bhavikatti; Vikas publishing house Ltd.
4. Surveying and leveling by R.Subramanian, Oxford university press, New Delhi.
5. Chandra AM, "Higher Surveying", New age International Pvt. Ltd., Publishers, NewDelhi, 2002.
6. Hoffman. B, H. Lichtenegga and J. Collins, Global Positioning System –Theory and Practice, Springer-Verlag Publishers, 2001.
7. Arora KR "Surveying Vol. (1,2&3), Standard Book House, Delhi, 2004.
8. Advanced Surveying, Madhu & Gobi, Pearson India.
9. Geomatics Engineering, Arora & Badjatia, Nem Chand & Co.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. CE - I Sem

L	T	P	C
0	0	3	1.5

(20CE3PC05) SURVEYING LAB

Course Objectives: The objectives of this Course are to:

1. To impart the practical knowledge in the field- measuring distances, directions, angles,
2. To determine R.L.'s areas and volumes
3. To set out Curves
4. To stake out points
5. To traverse the area
6. To draw Plans and Maps

Course Outcomes: At the end of the course, the student will be able to:

1. To understand the principle of surveying for civil Engineering Applications.
2. To understand Calculation of areas, drawing plans and contour maps using different measuring equipment at field level.
3. Apply radiation method, intersection methods.
4. Apply principles of tachometric surveying.
5. Apply write a technical laboratory report.

List of Experiments:

1. Surveying of an area by chain, and compass survey (closed traverse) & plotting.
2. Chaining across obstacles.
3. Determine of distance between two inaccessible points with compass.
4. Survey of a given area by prismatic compass (closed traverse) and plotting after adjustment.
5. Two point and three-point problems in plane table survey.
6. Radiation method, intersection methods by plane table survey.
7. Levelling – Longitudinal and cross-section and plotting.
8. Measurement of Horizontal and vertical angle by theodolite.
9. Trigonometric leveling using theodolite by Base accessible.
10. Trigonometric leveling using theodolite by Base Inaccessible.
11. Height and distances using principles of tachometric surveying.
12. Distance between inaccessible points by using theodolite.
13 Setting out Curve using total station.

REFERENCE BOOKS:

1. Elements of plane surveying by Arthur R Benton and Philip J Taety, McGraw Hill.
2. Plane Surveying by Chandra A.M,New Age International Pvt. Ltd., New Delhi.
3. Surveying by Bhavikatti,Vikas Publishing House Ltd.
4. Surveying and leveling by R.Subramanian, Oxford university press, New Delhi.
5. Global Positioning System Theory and Practice by Hoffman.B,H.Lichtenegga & J.Collins, Springer –Verlag Publications
6. Surveying (volume 1,2 &3) by Arora KR, Standard Book House New Delhi.
7. Advanced surveying by Madhu & Gobi, Pearson India.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. CE - I Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20CE3PC06) STRENGTH OF MATERIALS LAB

Course Objectives: The objectives of this Course are to:

1. Make measurements of different strains, stress and elastic properties of materials used in Civil Engineering.
2. Provide physical observations to complement concepts learnt
3. Introduce experimental procedures and common measurement instruments, equipment, devices.
4. Exposure to a variety of established material testing procedures and techniques
5. Different methods of evaluation and inferences drawn from observations

Course Outcomes: At the end of the course, the student will be able to:

1. Configure & operate a data acquisition system using various testing machines of solid materials
2. Compute and Analyze engineering values (e.g., stress or strain) from laboratory measurements.
3. Compute and Analyze deflection of material and Modulus of Rigidity.
4. Compute and Analyze hardness of material and different forces acting on material
5. Write a technical laboratory report

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

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. CE - I Sem	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1**

(20CE3PC07) ENGINEERING GEOLOGY LAB

Course Objectives: The objectives of this Course are to:

1. Provide practical knowledge about physical properties of minerals, rocks, drawing of geological maps, showing faults, uniformities etc.

Course Outcomes: At the end of the course, the student will be able to:

1. Understands the method and ways of investigations required for civil engineering projects
2. Identify the various rocks, minerals depending on geological classifications
3. Learn to couple geologic expertise with the engineering properties of rock and unconsolidated materials in the characterization of geologic sites for civil work projects and the quantification of processes such as rock slides and settlement.
4. Apply of outcrop patterns of different types of Rocks land forms
5. Write a technical laboratory report

List of Experiments:

1. Study of physical properties of minerals.
2. Study of different group of minerals.
3. Study of Crystal and Crystal system.
4. Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena, Gypsum.
5. Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties, Trachyte.
6. Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and its varieties.
7. Identification of rocks (Metamorphic Petrolody): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite, Phyllite.
8. Study of topographical features from Geological maps. Identification of symbols in maps.
9. Simple structural Geology Problems (Folds, Faults & Unconformities)
10. Study of outcrop patterns of different types of Rocks land forms

LAB EXAMINATION PATTERN

1. Description and identification of SIX minerals
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)
3. Interpretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.
5. Microscopic identification of rocks

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. CE - I Sem	**L**	**T**	**P**	**C**
	2	**0**	**0**	**0**

(20MC3HS01) PROFESSIONAL AND ENGINEERING ETHICS

Course Objectives: The objective of this course is:

- To enable the students to imbibe and internalize the Values and Ethical Behaviour in the personal and Professional lives.

Course Outcomes: After completing this course, the students will be able:

- The students will understand the importance of Values and Ethics in their personal lives and professional careers.
- The students will learn the rights and responsibilities as an employee, team member and a global citizen.

UNIT - I

INTRODUCTION TO PROFESSIONAL ETHICS: Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

UNIT - II

BASIC THEORIES: Basic Ethical Principles, Moral Developments, Deontology, Utilitarianism, Virtue Theory, Rights Theory, Casuist Theory, Moral Absolution, Moral Rationalism, Moral Pluralism, Ethical Egoism, Feminist Consequentialism, Moral Issues, Moral Dilemmas, Moral Autonomy.

UNIT - III

PROFESSIONAL PRACTICES IN ENGINEERING: Professions and Norms of Professional Conduct, Norms of Professional Conduct vs. Profession; Responsibilities, Obligations and Moral Values in Professional Ethics, Professional codes of ethics, the limits of predictability and responsibilities of the engineering profession. Central Responsibilities of Engineers - The Centrality of Responsibilities of Professional Ethics; lessons from 1979 American Airlines DC- 10 Crash and Kansas City Hyatt Regency Walk Away Collapse.

UNIT – IV

WORK PLACE RIGHTS & RESPONSIBILITIES: Ethics in changing domains of Research, Engineers and Managers; Organizational Complaint Procedure, difference of Professional Judgment within the Nuclear Regulatory Commission (NRC), the Hanford Nuclear Reservation. Ethics in changing domains of research - The US government wide definition of research misconduct, research misconduct distinguished from mistakes and errors, recent history of attention to research misconduct, the emerging emphasis on understanding and fostering responsible conduct, responsible authorship, reviewing & editing.

UNIT - V

GLOBAL ISSUES IN PROFESSIONAL ETHICS: Introduction – Current Scenario, Technology Globalization of MNCs, International Trade, World Summits, Issues, Business Ethics and Corporate Governance, Sustainable Development Ecosystem, Energy Concerns, Ozone Deflection, Pollution, Ethics in Manufacturing and Marketing, Media Ethics; War Ethics; Bio Ethics, Intellectual Property Rights.

TEXT BOOKS:

1. Professional Ethics: R. Subramanian, Oxford University Press, 2015.

2. Ethics in Engineering Practice & Research, Caroline Whitbeck, 2e, Cambridge University Press2015.

REFERENCE BOOKS:

1. Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S Pritchard, Michael J Rabins,4e, Cengage learning, 2015.
2. Business Ethics concepts & Cases: Manuel G Velasquez, 6e, PHI, 2008

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. CE - I Sem	**L**	**T**	**P**	**C**
	2	**0**	**0**	**0**

(20MC3HS02) QUANTITATIVE ANALYSIS – I

Course Objectives: The objective of this course is:

1. To improve the problem-solving skills.
2. To enhance the employability skills among students to meet out the corporate expectations.
3. To enhance the student's interest towards industry expectations.
4. To prepare students for the campus recruitment program.
5. To produce the most competitive man power to fit in all scenario of the job market.

Course Outcomes: After completing this course, the students will be able:

1. To Understand and Practice Simplifications.
2. To Understand and Practice the Problems on Ages.
3. To Understand and Practice the Quadratic Equations.
4. To Understand and Practice arrangement and selection in their daily life.
5. To Understand and Practice commercial mathematics.

UNIT - I

Numbers, H.C.F & L.C.M. of Numbers, Decimal Fractions & Simplifications.

UNIT - II

Square Roots & Cube Roots, Problems on Ages, Pipes & Cistern.

UNIT - III

Average, Time & Distance, Time & Work, Logarithm, Set Theory, Progressions, QuadraticEquations and Surds.

UNIT – IV

Permutation & Combination, Probability, Co-ordinate Geometry, Inequalities, Functions,Alligation & Mixtures, Number System.

UNIT - V

Partnership, Profit & Loss, Simple & Compound Interest, Percentage, Ratio & Proportion, Mensuration 2D & 3D.

TEXT BOOKS:

1. R.S. Aggarwal, Quantitative Aptitude for Competitive Examinations.
2. R.S. Aggarwal, A Modern Approach to Logical Reasoning.

REFERENCE BOOKS:

1. Arun Sharma, Teach Yourself Quantitative Aptitude.
2. Rajesh Verma, Fast Track Objective Arithmetic.
3. Dinesh Khattar, The Pearson Guide to Quantitative Aptitude For Competitive Examination.
4. Abhijit Gupta, Quantitative Aptitude for all Competitive Exam

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II Year B.Tech. CE - II Sem	**L**	**T**	**P**	**C**
	2	**0**	**0**	**2**

(20ME4ES07) BASIC MECHANICAL ENGINEERING FOR CIVIL ENGINEERS

Course Objectives: The objective of this course is:

1. Study the basic machine elements.
2. Understand the sources of energy and power generation.
3. Impart knowledge on various manufacturing processes, power transmission elements, material handling equipment.

Course Outcomes: After completing this course, the students will be able:

1. Understand types of Cams and Followers, Basic Materials and riveted joints.
2. Understand the Working Principles of power transmitting elements and various industrial material equipment's.
3. Understand Power generation, Refrigeration, modes and mechanism of heat transfer.
4. Understand various manufacturing process, welding and casting.
5. To understand about machine tools, operations of lathe, drilling, milling and grinding machines.

UNIT - I

MACHINE ELEMENTS: Cams: Types of cams and followers.

INTRODUCTION TO ENGINEERING MATERIALS: Metals, ceramics, composites-Heat treatment of metals

RIVETED JOINTS: Methods of failure of riveted joints-strength equations-efficiency of riveted joints – eccentrically loaded riveted joints.

UNIT - II

POWER TRANSMISSION ELEMENTS: Gears terminology of spur, helical and bevel gears, gear trains. Belt drives (types). Chain drives.

MATERIAL HANDLING EQUIPMENT: Introduction to Belt conveyors, cranes, industrial trucks, bull dozers.

UNIT - III

ENERGY: POWER GENERATION: External and internal combustion engines (layouts, element/component description, advantages, disadvantages, applications).

REFRIGERATION: Mechanical Refrigeration and types – units of refrigeration – Air Refrigeration system, details and principle of operation –calculation of COP

MODES AND MECHANISMS OF HEAT TRANSFER: Basic laws of heat transfer –Generaldiscussion about applications of heat transfer.

UNIT – IV

MANUFACTURING PROCESSES: Sheet Metal Work: Introduction – Equipment's – Tools and accessories – Various processes (applications, advantages / disadvantages).

WELDING: Types – Equipment's –Techniques employed –welding positions-defects-applications, advantages / disadvantages – Gas cutting – Brazing and soldering.

CASTING: Types, equipment's, applications

UNIT - V

BASIC MACHINING OPERATIONS: Turning, Drilling, Milling and Grinding.

MACHINE TOOLS: Introduction to lathe, drilling machine, milling machine, grinding machine-Operations performed

TEXT BOOKS:

1. Kumar, T., Leenus Jesu Martin and Murali, G., Basic Mechanical Engineering, Suma Publications, Chennai, 2007

REFERENCE BOOKS:

1. Prabhu, T. J., Jai Ganesh, V. and Jebaraj, S., Basic Mechanical Engineering, SciTech Publications, Chennai, 2000.
2. Hajra Choudhary, S.K. and Hajra Choudhary, A. K., Elements of Workshop Technology Vols. I & II, Indian Book Distributing Company Calcutta, 2007.
3. Nag, P.K., Power Plant Engineering, Tata McGraw-Hill, New Delhi, 2008.
4. Rattan, S.S., Theory of Machines, Tata McGraw-Hill, New Delhi, 2010

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. CE - II Sem

L	T	P	C
3	0	0	3

(20CE4PC01) STRENGTH OF MATERIALS – II

Course Objectives: The objective of this course is:

1. Understand the nature of stresses developed in simple geometries shafts, springs, columns &cylindrical and spherical shells for various types of simple loads.
2. Calculate the stability and elastic deformation occurring in various simple geometries for different types of loading.
3. Understand the unsymmetrical bending and shear center importance for equilibriumconditions in a structural member of having different axis of symmetry.

Course Outcomes: On completion of the course, the student will be able to:

1. Calculate torsion for circular shafts and deflection of springs.
2. Evaluate columns and struts for different types of loadings.
3. Calculate direct and bending stresses for different sections and structures.
4. Evaluate thin and thick cylinders for different stresses.
5. Evaluate sections for unsymmetrical bending's.

UNIT - I

TORSION OF CIRCULAR SHAFTS: Theory of pure torsion – Derivation of Torsion equation Assumptions made in the theory of pure torsion – Polar section modulus – Power transmitted by shafts – Combined bending and torsion – Design of shafts according to theories of failure. SPRINGS: Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel.

UNIT - II

COLUMNS AND STRUTS: Introduction – Types of columns – Short, medium and long columns Axially loaded compression members – Crushing load – Euler's theorem for long columns assumptions-derivation of Euler's critical load formulae for various end conditions – Equivalent length of a column – slenderness ratio – Euler's critical stress – Limitations of Euler's theory– Long columns subjected to eccentric loading – Secant formula – Empirical formulae — Ranking – Gordon formula Straight line formula – Prof. Perry's formula. BEAM COLUMNS: Laterally loaded struts – subjected to uniformly distributed and concentrated loads.

UNIT - III

DIRECT AND BENDING STRESSES: Stresses under the combined action of direct loading and bending moment, core of a section – determination of stresses in the case of retaining walls, chimneys and dams – conditions for stability-Overturning and sliding – stresses due to direct loading and bending moment about both axis.

UNIT – IV

THIN CYLINDERS: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in dia, and volume of thin cylinders – Thin spherical shells.

THICK CYLINDERS: Introduction - Lame's theory for thick cylinders – Derivation of Lame's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage

UNIT - V

UNSYMMETRICAL BENDING: Introduction – Centroidal principal axes of section –Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis. SHEAR CENTRE: Introduction - Shear centre for symmetrical and unsymmetrical (channel, I, T and L) sections

TEXT BOOKS:

1. Strength of Materials by R.K Rajput, S. Chand & Company Ltd.
2. Mechanics of Materials by Dr. B. C Punmia, Dr. Ashok Kumar Jain and Dr. Arun Kumar Jain
3. Strength of Materials by R. Subramanian, Oxford University Press.
4. Strength of Materials by Rattan.S.S., Tata McGraw Hill Education Pvt. Ltd., New Delhi,2011

REFERENCE BOOKS:

1. Mechanics of Materials by R.C. Hibbeler, Pearson Education
2. Engineering Mechanics of Solids by Popov E.P. Prentice-Hall Ltd
3. Strength of Materials by T.D.Gunneswara Rao and M.Andal, Cambridge Publishers
4. Strength of Materials by R. K. Bansal, Lakshmi Publications House Pvt. Ltd.
5. Fundamentals of Solid Mechanics by M. L. Gambhir, PHI Learning Pvt. Ltd.
6. Theory and Problems of Strength of Materials by William A. Nash, Schaum's Outline Series,Tata McGraw Hill Publishing company, 2007.
7. Strength of Materials by Singh. D.K., Ane Books Pvt. Ltd., New Delhi, 2016
8. Engineering Mechanics of Solids by Egor P Popov, 2nd edition, PHI Learning Pvt. Ltd., NewDelhi, 2012.

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II Year B.Tech. CE - II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20CE4PC02) HYDRAULICS AND HYDRAULIC MACHINERY

Course Objectives: The objective of this course is:

1. Define the fundamental principles of water conveyance in open channels.
2. Discuss and analyze the open channels in uniform and non-uniform flow conditions.
3. Study the characteristics of hydroelectric power plant and its components.
4. Analyze and design of hydraulic machinery and its modeling.

Course Outcomes: At the end of the course the student will able to:

1. Apply knowledge of fluid mechanics in addressing problems in open channel flow and critical flow.
2. Solve problems of gradually varied flow and rapidly varied flow in open channels.
3. Apply dimensional analysis, the model, prototype and similitude conditions and turbo machinery for practical problems.
4. Apply the principles of Turbines.
5. Illustrate about Centrifugal pumps and Hydropower engineering

UNIT - I

OPEN CHANNEL FLOW – I: Introduction to Open channel flow-Comparison between open channel flow and pipe flow, Classification of open channels, Classification of open channel flows, Velocity distribution. Uniform flow – Characteristics of uniform flow, Chezy's, Manning's and Bazin formulae for uniform flow – Factors affecting Manning's Roughness Coefficient "n". Most economical sections. Computation of Uniform flow, Normal depth.

CRITICAL FLOW: Specific energy – critical depth - computation of critical depth – critical, sub critical and super critical flows. Channel transitions.

UNIT - II

OPEN CHANNEL FLOW – II: Non-uniform flow – Gradually Varied Flow - Dynamic equation for G.V.F; Classification of channel bottom slopes – Classification and characteristics of Surface profiles – Computation of water surface profiles by Numerical and Analytical approaches. Direct stepmethod.

RAPIDLY VARIED FLOW: Elements and characteristics (Length and Height) of Hydraulic jump in rectangular channel– Types, applications and location of hydraulic jump, Energy dissipation and other uses – Positive and Negative Surges (Theory only).

UNIT - III

DIMENSIONAL ANALYSIS AND HYDRAULIC SIMILITUDE: Dimensional homogeneity – Rayleigh's method and Buckingham's pi methods – Dimensionless groups. Similitude, Model studies, Types of models. Application of dimensional analysis and model studies to fluid flow problems. Distorted models.

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.

UNIT – IV

HYDRAULIC TURBINES – I: Elements of a typical Hydropower installation – Heads and efficiencies – Classification of turbines – Pelton wheel – Franci's turbine – Kaplan turbine – working, working proportions, velocity diagram, work done and efficiency, hydraulic design. Draft tube – Classification, functions and efficiency.

HYDRAULIC TURBINES – II: Governing of turbines – Surge tanks – Unit and specific turbines

Unit speed – Unit quantity – Unit power – Specific speed – Performance characteristics – Geometric similarity – Cavitation. Selection of turbines.

UNIT - V

CENTRIFUGAL PUMPS: Pump installation details – classification – work done – Manometric head

– minimum starting speed – losses and efficiencies – specific speed. Multistage pumps – pumps in parallel – performance of pumps – characteristic curves – NPSH – Cavitation

HYDROPOWER ENGINEERING: Classification of Hydropower plants – Definition of terms – load factor, utilization factor, capacity factor, estimation of hydropower potential.

TEXT BOOKS:

1. Fluid Mechanics by Modi and Seth, Standard Book House.
2. Fluid Mechanics and Hydraulic machines by Manish Kumar Goyal, PHI learning Private Limited, 2015
3. Fluid mechanics & Hydraulic Machines, Domkundwar & Domkundwar Dhanpat Rai & Co

REFERENCE BOOKS:

1. Fluid Mechanics by R. C. Hibbeler, Pearson India Education Services Pvt. Ltd
2. Fluid Mechanic & Fluid Power Engineering by D. S. Kumar (Kataria & Sons PublicationsPvt. Ltd.).
3. Open channel flow by V.T. Chow (McGraw Hill Book Company).
4. Introduction to Fluid Mechanics and Fluid Machines by SK Som, Gautam Biswas, SumanChakraborthy, Mc Graw Hill Education (India) Private Limited
5. Hydraulic Machines by Banga & Sharma (Khanna Publishers).
6. Fluid Mechanics" (Including Hydraulic Machines) by Jain.A.K., Khanna Publishers, TwelfthEdition, 2016.
7. Fluid Mechanics and Hydraulic Machines by Subramanya.K., Tata McGraw Hill EducationPrivate Limited, New Delhi, 2010.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. CE - II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20CE4PC03) BUILDING MATERIALS, CONSTRUCTION AND PLANNING

Course Objectives: The objectives of this course are to:

1. List the construction material.
2. Explain different construction techniques.
3. Understand the building bye-laws.
4. Highlight the smart building materials

Course Outcomes: After the completion of the course student should be able to:

1. Illustrate different types of Stones, Bricks, Tiles, Timber, Aluminum, glass, paints and plastics.
2. Explain about cement, concrete and admixtures.
3. Demonstrate different types of Building components and services.
4. Explain about Mortars, Masonry, finishing mortars and formwork.
5. Illustrate about building planning and its bye-laws.

UNIT - I

STONES AND BRICKS, TILES: Building stones – classifications and quarrying – properties – structural requirements – dressing – Tests on stones – Deterioration and preservation of stone works. Bricks – Types: Sun Dried, Fly Ash, Concrete, Burnt Clay, Fire Bricks – Composition of Brick earth manufacturing process and structural requirements – Tests on Brick: Compressive Strength, Water Absorption, Efflorescence – Deleterious material, Fly ash, Ceramics.

TIMBER, ALUMINUM, GLASS, PAINTS AND PLASTICS: Wood - structure – types and properties – seasoning – defects; alternate materials for Timber – GI / fibre – reinforced glass bricks, steel & aluminum, Plastics.

UNIT - II

CEMENT: Ingredients of cement – Types of Cement – Chemical composition – - Manufacturing Process – Hydration – field & lab tests.

CONCRETE: Ingredients, Constituents, Short term and long-term properties.

ADMIXTURES: Introduction to Mineral & Chemical Admixtures – uses.

UNIT - III

BUILDING COMPONENTS: Lintels, Arches, walls, vaults – stair cases – types of floors, types of roofs – flat, curved, trussed; foundations –types; Damp Proof Course – Causes of dampness, effects of dampness, methods of damp proofing; Joinery – doors – windows – materials – types.

BUILDING SERVICES: Plumbing Services: Water Distribution, Sanitary – Lines & Fittings; Ventilations: Functional requirements systems of ventilations. Air-conditioning – Essentials and Types; Acoustics – characteristic – absorption – Acoustic design; Fire protection – Fire Hazards – Classification of fire-resistant materials and constructions.

UNIT – IV

MORTARS, MASONRY AND FINISHING'S MORTARS: Lime and Cement Mortars Brick masonry – types – bonds; Stone masonry – types; Composite masonry – Brick-stone composite; Concrete, Reinforced brick.

FINISHERS: Plastering, Pointing, Painting, Claddings – Types – Tiles – ACP.

FORM WORK: Types: Requirements – Standards – Scaffolding – Design; Shoring, Underpinning.

UNIT - V

BUILDING PLANNING: Principles of Building Planning, Classification of buildings and building by laws.

TEXT BOOKS:

1. Building Materials and Construction – Arora & Bindra, Dhanpat Roy Publications.

2. Building Materials and Construction by G C Sahu, Joygopal Jena McGraw hill Pvt Ltd 2015.
3. Building Construction by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) ltd., New Delhi.
4. Engineering Materials by Rajput. R.K., & S. Chand and Company Ltd., 2008.
5. Building Materials by Duggal.S.K., 4th Edition, New Age International, 2008.

REFERENCE BOOKS:

1. Building Materials by Duggal, New Age International.
2. Building Materials by P. C. Varghese, PHI.
3. Building Construction by PC Varghese PHI.
4. Construction Technology – Vol – I & II by R. Chubby, Longman UK.
5. Alternate Building Materials and Technology, Jagadish, Venkatarama Reddy and others; NewAge Publications.
6. Alternative Building Materials Technology by Jagadish. K.S, New Age International, 2007.
7. Building Materials, products, properties and systems by Gambhir. M.L., & Neha Jamwal., Tata McGraw Hill Educations Pvt. Ltd, New Delhi, 2012.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. CE - II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20CE4PC04) STRUCTURAL ANALYSIS – I

Course Objectives: The objectives of this course are to:

1. Differentiate the statically determinate and indeterminate structures.
2. Understand the nature of stresses developed in perfect frames and three hinged arches forvarious types of simple loads
3. Analyse the statically indeterminate members such as fixed bars, continuous beams and for various types of loading.
4. Understand the energy methods used to derive the equations to solve engineering problems
5. Evaluate the influence on a beam for different static & moving loading positions

Course Outcomes: After the completion of the course student should be able to:

1. Analyze different types of frames.
2. Analyze different types of Arches.
3. Analyze propped cantilever and fixed beams for different load conditions, supports and sections.
4. Analyze continuous beams and bay frames.
5. Analyze structures using energy theorems and ILD for moving loads.

UNIT - I

ANALYSIS OF FRAMES: Types of frames - Perfect, Imperfect and Redundant pin jointed plane frames - Analysis of determinate pin jointed plane frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads and inclined loads.

UNIT - II

ARCHES – Introduction – types of arches: two hinged and three hinged - Analysis of two hinged parabolic arches – Secondary stresses in two hinged arches due to temperature and elastic shortening of rib – Analysis of Three hinged arches - Linear Arch – Eddy's theorem, Normal Thrust and radial shear and bending moment – Geometrical properties of parabolic and circular arches – Three hinged parabolic circular arches having supports at different levels.

UNIT - III

PROPPED CANTILEVER AND FIXED BEAMS: Determination of static and kinematic indeterminacies for beams- Analysis of Propped cantilever and fixed beams, including the beams with different moments of inertia - subjected to uniformly distributed load - point loads - uniformly varying load, couple and combination of loads - Shear force, Bending moment diagrams and elastic curve for Propped Cantilever and Fixed Beams - Deflection of Propped cantilever and fixed beams - effect of sinking of support, effect of rotation of a support.

UNIT – IV

SLOPE DEFLECTION METHOD: Derivation of slope-deflection equation, application to continuous beams with and without sinking of supports - Determination of static and kinematic indeterminacies for frames - Analysis of Single Bay, Single storey Portal Frames by Slope Deflection Method including Side Sway - Shear force and bending moment diagrams and Elastic curve.

CONTINUOUS BEAMS: Introduction-Continuous beams – Clapeyron's theorem of three moments-Analysis of continuous beams with constant and variable moments of inertia with one or both ends fixed-continuous beams with overhang - effect of sinking of supports.

UNIT - V

ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano's Theorem-Unit Load Method Deflections of simple beams and pin- jointed plane frames - Deflections of statically determinate bent frames.

MOVING LOADS: Introduction maximum SF and BM at a given section and absolute maximum

shear force and bending moment due to single concentrated load, uniformly distributed load longer than the span, uniformly distributed load shorter than the span, two-point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal lengths

TEXT BOOKS:

1. Basic Structural Analysis' by K.U. Muthu et.all, I.K International
2. Structural Analysis Vol –I & II by V. N. Vazirani and M. M. Ratwani, Khanna Publishers.
3. Structural Analysis Vol I & II by G. S. Pandit and S. P. Gupta, Tata McGraw Hill EducationPvt. Ltd.
4. Mechanics of Structures Vol – I and II by H. J. Shah and S. B. Junnarkar, Charotar PublishingHouse Pvt. Ltd.

REFERENCE BOOKS:

1. Structural Analysis by R. C. Hibbeler, Pearson Education
2. Structural Analysis by Devdas Menon, Narosa Publishing House.
3. Basic Structural Analysis by C. S. Reddy., Tata McGraw Hill Education Pvt. Ltd.
4. Fundamentals of Structural Analysis by M. L. Gamhir, PHI Learning Pvt. Ltd
5. Structural Analysis -I by S. S. Bhavikatti, Vikas Publishing House Pvt. Ltd.
6. Theory of Structures by S.Ramamrutham, R.Narayan, Dhanpat Rai Publishing Company.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. CE - II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20EE4ES08) Basic Electrical and Electronics Engineering

Course Objectives: The objectives of this course are to:

1. To introduce the concepts of electrical circuits and its components
2. To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
3. To study and understand the different types of DC/AC machines and Transformers.
4. To import the knowledge of various electrical installations.
5. To introduce the concept of power, power factor and its improvement.
6. To introduce the concepts of diodes & transistors, and
7. To impart the knowledge of various configurations, characteristics and applications.

Course Outcomes: At the end of the course the student will able

1. Solve electrical circuits using network laws and theorems.
2. Analyze basic Electric and Magnetic circuits
3. Teach different parts of a DC machine & understand its operation
4. Demonstrate components of Low Voltage Electrical Installations
5. Sketch the characteristics of diodes and various types of transistors.
6. Interpret diode as rectifier.
7. Prepare the various types of filter circuits.

UNIT - I

D.C. CIRCUITS: Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation.

A.C. CIRCUITS: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits, Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT - II

ELECTRICAL INSTALLATIONS: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

UNIT - III

ELECTRICAL MACHINES: Working principle of Single-phase transformer, equivalent circuit, losses in transformers, efficiency, Three-phase transformer connections. Construction and working principle of DC generators, EMF equation, working principle of DC motors, Torque equations and Speed control of DC motors, Construction and working principle of Three-phase Induction motor, Torques equations and Speed control of Three-phase induction motor. Construction and working principles of synchronous generators.

UNIT – IV

P-N JUNCTION AND ZENER DIODE: Principle of Operation Diode equation, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Zener diode characteristics and applications.

RECTIFIERS AND FILTERS: P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor -Full Wave Rectifier, Bridge Rectifier, Harmonic components in Rectifier Circuits, Filters – Inductor Filters, Capacitor Filters, L- section Filters, π- section Filters.

UNIT - V

BIPOLAR JUNCTION TRANSISTOR (BJT): Construction, Principle of Operation, Amplifying Action, Common Emitter, Common Base and Common Collector configurations, Comparison of CE, CB and CC configurations.

FIELD EFFECT TRANSISTOR (FET): Construction, Principle of Operation, Comparison of BJT

and FET, Biasing FET.

TEXT BOOKS:

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University
2. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath, McGraw Hill Education

REFERENCE BOOKS:

1. Electronic Devices and Circuits – R. L. Boylestad and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH,2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6thedition.
4. Linear circuit analysis (time domain phasor and Laplace transform approaches) - 2nd edition byRaymond A. De Carlo and Pen-Min-Lin, Oxford University Press-2004.
5. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
7. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
8. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
9. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. CE - II Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20CE4PC05) HYDRAULICS AND HYDRAULIC MACHINERY LAB

Course Objectives: The objectives of this course are to:

1. Identify the behavior of analytical models introduced in lecture to the actual behavior of real fluid flows.
2. Explain the standard measurement techniques of fluid mechanics and their applications.
3. Illustrate the students with the components and working principles of the hydraulic
4. Machines- different types of turbines, pumps, and other miscellaneous hydraulics machines.
5. Analyze the laboratory measurements and to document the results in an appropriate format.

Course Outcomes: On completion of this course, the students will be able to:

1. Describe the basic measurement techniques of fluid mechanics and its appropriate application.
2. Interpret the results obtained in the laboratory for various experiments.
3. Discover the practical working of hydraulic machines- different types of turbines, pumps, and other miscellaneous hydraulics machines.
4. Compare the results of analytical models introduced in lecture to the actual behavior of real fluid flows and draw correct and sustainable conclusions.
5. Write a technical laboratory report.

List of Experiments:

1. Verification of Bernoulli's equation
2. Determination of Coefficient of discharge for a small orifice by a constant head method
3. Calibration of Venturi meter/Orifice Meter
4. Calibration of Triangular / Rectangular/Trapezoidal Notch
5. Determination of Minor losses in pipe flow
6. Determination of Friction factor of a pipe line
7. Determination of Energy loss in Hydraulic jump
8. Determination of Manning's and Chezy's constants for Open channel flow.
9. Impact of jet on vanes
10. Performance Characteristics of Pelton wheel turbine
11. Performance Characteristics of Francis turbine
12. Performance characteristics of Keplan Turbine
13 Performance Characteristics of a single stage / multi stage Centrifugal Pump

TEXT BOOKS:

1. Computer Aided Design Laboratory by M. N. Sesha Praksh&Dr. G. S. Servesh –Laxmi Publications.
2. Engineering Graphics by P. J. Sha – S. Chand & Co.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. CE - II Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20CE4PC06) COMPUTER AIDED CIVIL ENGINEERING DRAWING

Course Objectives: The objective of this lab is to:

1. Teach the student usage of AutoCAD and basic drawing fundamentals in various civil engineering applications, especially in building drawing.

Course Outcomes: At the end of the course, the student will be able to:

1. Use the AutoCAD commands for drawing 2D & 3D building drawings required for different civil engineering applications.
2. Plan and draw Civil Engineering Buildings as per aspect and orientation.
3. Apply of 2D and 3D plan
4. Present drawings as per user requirements and preparation of technical report Course.
5. Understand the steel roof truss and built-up sections

List of Experiments:

1. Introduction to computer aided drafting and different coordinate system
2. Drawing of Regular shapes using Editor mode
3. Introduction GUI and drawing of regular shapes using GUI
4. Exercise on Draw tools
5. Exercise on Modify tools
6. Exercise on other tools (Layers, dimensions, texting etc.)
7. Drawing of building components like walls, lintels, Doors, and Windows. using CADsoftware
8. Drawing a plan of Building and dimensioning
9. Drawing a plan of a residential building using layers
10. Developing a 3-D plan from a given 2-D plan
11. Developing sections and elevations for given a) Single storied buildings b) multi storied buildings
12. Drafting of steel roof truss.
13 Drafting of steel beams-built-up sections.

TEXT BOOKS:

1. Computer Aided Design Laboratory by M. N. Sesha Praksh&Dr. G. S. Servesh –Laxmi Publications.
2. Engineering Graphics by P. J. Sha – S. Chand & Co.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. CE - II Sem	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1**

(20EE4ES09) Basic Electrical and ElectronicsEngineering Lab

Course Objectives: The objectives of this course are:

1. To introduce the concepts of electrical circuits and its components
2. To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
3. To study and understand the different types of DC/AC machines and Transformers.
4. To import the knowledge of various electrical installations.
5. To introduce the concept of power, power factor and its improvement.
6. To introduce the concepts of diodes & transistors, and
7. To impart the knowledge of various configurations, characteristics and applications.

Course Outcomes: On completion of this lab the students will be able:

1. Solve electrical circuits using network laws and theorems.
2. Analyze basic Electric and Magnetic circuits
3. Teach the working principles of Electrical Machines
4. Demonstrate components of Low Voltage Electrical Installations
5. Sketch the characteristics of diodes and various types of transistors
6. Explain to Start and control the Different AC and DC motors.
7. Interpret the concepts of rotating magnetic fields

List of experiments/demonstrations:

1. Verification of KVL and KCL
2. (i) Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
   ii) Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta star, Star-Star) in a Three Phase Transformer
3. Measurement of Active and Reactive Power in a balanced Three-phase circuit
4. Performance Characteristics of a Separately Excited DC Shunt Motor
5. Performance Characteristics of a Three-phase Induction Motor
6. No-Load Characteristics of a Three-phase Alternator

PART B: ELECTRONICS

1. Study and operation of (i) multi-meters (ii) Function Generator (iii) Regulated Power Supplies (iv) CRO.
2. PN Junction diode characteristics
3. Zener diode characteristics and Zener as voltage Regulator
4. Input & Output characteristics of Transistor in CB / CE configuration
5. Full Wave Rectifier with & without filters
6. Input and Output characteristics of FET in CS configuration

TEXT BOOKS:

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University
2. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath, McGraw Hill Education

REFERENCE BOOKS:

1. Electronic Devices and Circuits – R. L. Boylestead and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH,2/e, 1998.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. CE - II Sem	**L**	**T**	**P**	**C**
	2	**0**	**0**	**0**

(20MC4HS03) GENDER SENSITIZATION LAB

COURSE DESCRIPTION

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programs combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Course Objectives:

1. To develop students' sensibility with regard to issues of gender in contemporary India.
2. To provide a critical perspective on the socialization of men and women.
3. To introduce students to information about some key biological aspects of genders.
4. To expose the students to debates on the politics and economics of work.
5. To help students reflect critically on gender violence.
6. To expose students to more egalitarian interactions between men and women.

Course Outcomes: On completion of this lab the students will be able:

1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
4. Students will acquire insight into the gendered division of labour and its relation to politics and economics.
5. Men and women students and professionals will be better equipped to work and live together as equals.
6. Students will develop a sense of appreciation of women in all walks of life.
7. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

UNIT - I

UNDERSTANDING GENDER: Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male. First lessons in Caste.

UNIT - II

GENDER ROLES AND RELATIONS: Two or Many? -Struggles with Discrimination-

Gender Roles and Relations-Types of Gender Roles-Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences-Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary.

UNIT - III

GENDER AND LABOUR: Division and Valuation of Labour-Housework: The Invisible Labor-"My Mother doesn't Work." "Share the Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. - Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

UNIT – IV

GENDER – BASED VIOLENCE: The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "*Chupulu".* Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life"

UNIT - V

GENDER AND CULTURE: Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks-The Brave Heart.

TEXT BOOK

"*Towards a World of Equals:* *A Bilingual Textbook on Gender" written* by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu published by Telugu Akademi, Telangana Government in 2015.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. CE - II Sem	**L**	**T**	**P**	**C**
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(20MC4BS03) QUANTITATIVE LOGICAL AND REASONING

Course Objectives: The students learn

1. To improve the Logical Ability and Reasoning skills among the students to meet the expectations of Industry.
2. To counsel the students to improve their career exposure across the industry
3. To improve the Data Sequences & Calendars problems.
4. To enhance Non-Verbal Reasoning among the students as per the industry requirements
5. To improve the graphical representation skills among the students.

Course Outcomes: The students able

1. To understand and practice logical reasoning
2. To understand and practice the different classifications
3. To understand and practice different Sitting Arrangements, Data Sequences.
4. To understand and practice the Non-Verbal Reasoning.
5. To understand and practice the graphs.

UNIT - I

Coding Decoding, Directions, Blood Relations & Alphabet Test.

UNIT - II

Statements & Arguments, Analogy Classification & Clocks.

UNIT - III

Sitting Arrangements, Data Sequences & Calendars and Syllogism.

UNIT – IV

Puzzle Test, Non-Verbal Reasoning, Cubs & Dice.

UNIT - V

Tabulation, Bar Graphs, Pie Charts and Line

TEXT BOOKS:

1. R.S. Aggarwal, A Modern Approach to Logical Reasoning.
2. R.S. Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning

REFERENCE BOOKS

1. R.V.Praveen, Quantitative Aptitude and Reasoning.
2. Praxis groups, Campus Recruitment Complete Reference.
3. BS Sijwalii & Indu Sijwali, A New Approach to Reasoning Verbal, Non-Verbal & Analytical.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. CE - I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20CE5PC01) ENVIRONMENTAL ENGINEERING

Course Objectives: This subject provides the knowledge of water sources, water treatment, design of distribution system waste water treatment, and safe disposal methods. The topics of characteristics of waste water, sludge digestion is also included.

Course Outcomes: At the end of the course, the student will be able to:

1. Understand quality of water, water demand and sources.
2. Illustrate water treatment and distribution.
3. Illustrate about sewage collection and disposal process.
4. Explain about waste water treatment plant.
5. Explain about Air Pollution.

UNIT - I

Introduction: Waterborne diseases – protected water supply – Population forecasts, design period – types of water demand – factors affecting – fluctuations – fire demand – water quality and testing– drinking water standards: sources of water - Comparison from quality and quantity and other considerations – intakes – infiltration galleries – Sources: Surface and Subsurface sources – Suitability with regard to quality and quantity.

UNIT - II

Layout and general outline of water treatment units – sedimentation – principles – design factors – coagulation-flocculation clarifier design – coagulants - feeding arrangements. Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design offilters – troubles in operation – comparison of filters – disinfection – theory of chlorination, chlorine demand - other disinfection practices–Design of distribution systems–pipe appurtenances.

UNIT - III

characteristics of sewage –waste water collection–Estimation of waste water and storm water
decomposition of sewage, examination of sewage – B.O.D. Equation – C.O.D. Design of sewers – shapes and materials – sewer appurtenances, manholes – inverted siphon – catch basins – flushing tanks – ejectors, pumps and pump houses – house drainage – plumbing requirements – sanitary fittings-traps – one pipe and two pipe systems of plumbing – ultimate disposal of sewage – sewage farming–self-purification of rivers.

UNIT – IV

Waste water treatment plant – Flow diagram - primary treatment Design of screens – grit chambers – skimming tanks – sedimentation tanks – principles of design – Biological treatment – trickling filters – ASP– Construction and design of oxidation ponds. Sludge digestion – factors effecting – design of Digestion tank – Sludge disposal by drying – septic tanks working principles and design – soak pits.

UNIT - V

Air pollution – classification of air pollution– Effects air pollution–Global effects– Meteorological parameters affecting air pollution–Atmospheric stability–Plume behavior – Control of particulates – Gravity settlers, cyclone filters, ESPs–Control of gaseous pollutants–automobile pollution and control – Effect of Air Pollutants on man, material and vegetation; Global effects of air pollution – Green House Effect, Heat islands, Acid Rains, Ozone Holes.

TEXT BOOKS:

1. Environmental Engineering by H. S Peavy, D. R. Rowe, G. Tchobanoglous, McGraw Hill Education (India) Pvt Ltd, 2014
2. Environmental Engineering by D. P. Sincero and G.A Sincero, Pearson 2015.
3. Environmental Engineering, I and II by BC Punmia, Std. Publications.
4. Environmental Engineering, I and II by SK Garg, Khanna Publications.
5. Environmental Pollution and Control Engineering CS Rao,Wiley Publications

REFERENCE BOOKS

1. Water and Waste Water Technology by Steel, Wiley
2. Waste water engineering by Metcalf and Eddy, McGraw Hill, 2015.
3. Water and Waste Water Engineering by Fair Geyer and Okun, Wiley, 2011
4. Water and Waste Water Technology by Mark J Hammar and Mark J. Hammar Jr.Wiley, 2007.
5. Introduction to Environmental Engineering and Science by Gilbert Masters, PrenticeHall, New Jersey.
6. Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan, Thompson /Brooks/Cole; Second Edition 2008.
7. Integrated Solid Waste Management, Tchobanoglous, Theissen & Vigil. McGraw Hill Publication

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. CE - I Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20CE5PC02) DESIGN OF REINFORCED CONCRETE STRUCTURES

Course Objectives: The objectives of the course are to:

1. Identify the basic components of any structural system and the standard loading forthe RC structure
2. Identify and tell the various codal provisions given in IS. 456
3. Describe the salient feature of limit state method, compare with other methods and theconcepts of limit state of collapse and limit state of serviceability
4. Evaluate the behavior of RC member under flexure, shear and compression, torsionand bond.

Course Outcomes: After the completion of the course student should be able to:

1. Understand IS456 Code provisions and Design of beams as per IS Code Provisions.
2. Design shear, torsion, development length as per IS Code Provisions.
3. Design Slabs and Staircase as per IS Code Provisions.
4. Design columns as per the IS code provisions.
5. Design footing as per the IS code provisions.

UNIT - I

Introduction- Structure - Components of structure - Different types of structures - Equilibrium and compatibility– Safety and Stability - Loads – Different types of Loads – Dead Load, Live Load, Earthquake Load and Wind Load– Forces – What is meant by Design? – Different types of materials – RCC, PSC and Steel – Planning of structural elements- Concepts of RCC Design – Different methods of Design- Working Stress Methodand Limit State Method – Load combinations as per Limit state method – Materials – Characteristic Values – Partial safety factors – Behavior and Properties of Concrete and Steel- Stress Block Parameters as per IS 456 -2000.

Limit state Analysis and design of sections in Flexure – Behavior of RC section under flexure - Rectangular, T and L-sections, singly reinforced and doubly reinforced Beams – Detailing of reinforcement.

UNIT - II

Design for Shear, Bond and Torsion - Mechanism of shear and bond failure - Design of shearusing limit state concept – Design for Bond –Anchorage and Development length of bars - Design of sections for torsion - Detailing of reinforcement.

UNIT - III

Design of Two-way slabs with different end conditions, one-way slab, and continuous slab Using I S Coefficients - Design of dog-legged staircase – Limit state design for serviceability for deflection, cracking and codal provisions.

UNIT – IV

Design of compression members - Short Column - Columns with axial loads, uni-axial and bi-axial bending – Use of design charts- long column – Design of long columns - I S Code provisions.

UNIT - V

Design of foundation – Different types of footings – Design of wall footing – Design of flatisolated square, rectangular, circular footings and combined footings for two columns.

TEXT BOOKS:

1. Limit state designed of reinforced concrete – P.C. Varghese, PHI Learning Pvt. Ltd.
2. Reinforced concrete design by S. Unnikrishna Pillai & Devdas Menon, Tata McGrawHill.
3. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishers.

4. Krishnaraju.N "Design of Reinforced Concrete Structures ", CBS Publishers & Distributors Pvt. Ltd., New Delhi.
5. Ramachandra, "Limit state Design of Concrete Structures "Standard Book House,New Delhi.

REFERENCE BOOKS

1. Reinforced concrete structures, Vol. 1, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd.
2. Fundamentals of Reinforced concrete design by M. L. Gambhir, Prentice Hall of India Pvt. Ltd.
3. Design of Reinforced Concrete Structures by N.Subramanian, Oxford University Press
4. Design of concrete structures by J.N.Bandhyopadhyay PHI Learning Private Limited.
5. Design of Reinforced Concrete Structures by I. C. Syal and A. K. Goel, S. Chand & company.
6. Design of Reinforced Concrete Foundations – P.C.Varghese Prentice Hall of India.
7. Limit State Theory and Design of Reinforced Concrete by Shah V L Karve S R Structures Publications, Pune, 2013.
8. Reinforced Concrete Design by Unnikrishna Pillai, S., Devdas Menon, Tata McGrawHill Publishing Company Ltd., 2009.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. CE - I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20CE5PC03) GEOTECHNICAL ENGINEERING

Course Objectives: The objectives of the course are to:

1. Understand the formation of soil and classification of the soils
2. Determine the index & engineering properties of soils
3. Determine the flow characteristics & stresses due to externally applied loads
4. Estimate the consolidation properties of soils
5. Estimate the shear strength and seepage loss

Course Outcomes: At the end of the course the student will able to:

1. Classify the Soils.
2. Estimate Permeability, seepage, stresses under various loading conditions and flow-net characteristics.
3. Determine stress distribution in soil and illustrate compaction.
4. Determine consolidation of soil.
5. Determine shear strength of soil.

UNIT - I

Introduction: Soil formation and structure – moisture content – Mass, volume relationships
Specific Gravity-Field density by core cutter and sand replacement methods-Relative density.
Index Properties of Soils: Grain size analysis – consistency limits and indices – I.S. Classification of soils.

UNIT - II

Permeability: Soil water – capillary rise – flow of water through soils – Darcy's law- permeability – Factors affecting permeability – laboratory determination of coefficient of permeability – Field measurement, pumping out in unconfined and confined aquifer - Permeability of layered soils.
Effective Stress & Seepage Through Soils: Total, neutral and effective stress – principle of effective stress – quick sand condition – Seepage through soils – Flow nets: Characteristics and Uses.

UNIT - III

Stress Distribution in Soils: Bossiness's and Westergaard's theories for point load, uniformly loaded circular and rectangular areas, pressure bulb, variation of vertical stress under point load along the vertical and horizontal plane, and Newmark's influence chart for irregular areas.
Compaction: Mechanism of compaction – factors affecting compaction – effects of compaction on soil properties – Field compaction Equipment – compaction quality control.

UNIT – IV

Consolidation: Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log(p) curves – normally consolidated soil, over consolidated soil and under consolidated soil - reconsolidation pressure and its determination - Terzaghi's 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods - computation of total settlement and time rate of settlement.

UNIT - V

Shear Strength of Soils: Importance of shear strength – Mohr's– Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on drainage conditions strength envelops – Shear strength of sands - dilatancy – critical void ratio., Introduction to stress path method.

TEXT BOOKS:

1. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt Ltd,
2. Soil Mechanics and Foundation Engineering by VNS Murthy, CBS Publishers and Distributors.
3. Foundation Engineering by P.C. Varghese, PHI.
4. Soil Mechanics and Foundation Engineering by Arora, K.R., Standard Publishers and Distributors, New Delhi, 7th Edition, 2017(Reprint).
5. Soil Mechanics and Foundations by Punmia, B.C., Laxmi Publications Pvt. Ltd. NewDelhi, 16th Edition, 2017.

REFERENCE BOOKS

1. Principals of Geotechnical Engineering by Braja M. Das, Cengage Learning Publishers.
2. Geotechnical Engineering by C. Venkataramiah, New age International Pvt. Ltd, (2002).
3. Geotechnical Engineering Principles and Practices by Cuduto, PHI International.
4. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata McGraw-HillPublishers New Delhi.
5. Soil Mechanics by Palanikumar.M., Prentice Hall of India Pvt. Ltd, Learning Private Limited Delhi, 2013.
6. Soil Mechanics by Craig.R.F., E & FN Spon, London and New York, 2012.
7. Soil Mechanics and Foundations Engineering by Purushothama Raj. P - 2nd Edition, Pearson Education, 2013.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. CE - I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20CE5PC04) STRUCTURAL ANALYSIS – II

Course Objectives: The objectives of the course are to:

1. Identify the various actions in arches.
2. Understand classical methods of analysis for statically indeterminate structures.
3. Differentiate the approximate and numerical methods of analysis for indeterminate structures.
4. Find the degree of static and kinematic indeterminacies of the structures.
5. Plot the variation of S.F and B.M when a moving load passes on indeterminate structure

Course Outcomes: After the completion of the course student should be able to:

1. Analyze continuous beams and bay frames by different methods.
2. Analyze suspension bridges.
3. Analysis of multistory frames by different methods.
4. Analysis by matrix method.
5. Analysis of influence lines for shear force and Bending moment.

UNIT – I

Moment Distribution Method – Analysis of continuous beams with and without settlementof supports using – Analysis of Single Bay Single Storey Portal Frames including side Sway
Analysis of inclined frames – Shear force and Bending moment diagrams, Elastic curve.

Kani's Method: Analysis of continuous beams including settlement of supports – Analysisof single bay single storey and single bay two Storey Frames including Side Sway using Kani's Method – Shear force and bending moment diagrams – Elastic curve.

UNIT – II

Cables and suspension bridges: Equilibrium of a Suspension Cable subjected to concentrated loads and uniformly distributed loads – Length of a cable – Cable with differentsupport levels – Suspension cable supports – Suspension Bridges – Analysis of Three HingedStiffening Girder Suspension Bridges.

UNIT – III

Approximate Methods of Analysis: Introduction – Analysis of multi-storey frames for lateral loads: Portal Method, Cantilever method and Factor method – Analysis of multi-storey frames for gravity loads – Substitute Frame method – Analysis of Mill bents.

UNIT – IV

Matrix Methods Of Analysis: Introduction to Flexibility and Stiffness matrix methods of analyses using 'system approach' upto three degree of indeterminacy– Analysis of continuous beams including settlement of supports using flexibility and stiffness methods – Analysis of pin-jointed determinate plane frames using flexibility and stiffness methods- Analysis of single bay single storey portal frames using stiffness method – Shear force and bending moment diagrams – Elastic curve.

UNIT- V

Influence Lines – Definition of influence line for shear force and bending moment – load position for maximum shear force and maximum bending Moment at a section – Point loads,uniformly distributed load longer than the span, uniformly distributed load shorter than the span- Influence lines for forces in members of Pratt and Warren trusses – Equivalent uniformly distributed load –Focal length.

For Indeterminate Beams: Influence line diagram for shear force and bending moment fortwo span continuous beam with constant and different moments of inertia – influence line diagram for shear force and bending moment for propped cantilever beams.

TEXT BOOKS:

1. Structural Analysis Vol –I &II by Vazarani and Ratwani, Khanna Publishers.
2. Structural Analysis Vol I & II by G.S. Pandit S.P. Gupta Tata McGraw Hill EducationPvt. Ltd.
3. Indeterminate Structural Analysis by K.U. Muthu et al., I.K. International Publishing House Pvt. Ltd.
4. Structural Analysis, Vol.1 & 2 by Bhavikatti, S.S – Vikas Publishing House Pvt.Ltd., NewDelhi-4, 2014.
5. Theory of structures by Punmia.B.C, Ashok Kumar Jain and Arun Kumar Jain – Laxmi, Publications, 2004.

REFERENCE BOOKS

1. Structural analysis T. S Thandavamoorthy, Oxford university Press
2. Mechanics of Structures Vol –II by H.J. Shah and S.B. Junnarkar, CharotarPublishing House Pvt. Ltd.
3. Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers.
4. Examples in Structural Analysis by William M.C. McKenzie, Taylor & Francis.
5. Structural Analysis by R. C. Hibbeler, Pearson Education
6. Structural Analysis by Devdas Menon, Narosa Publishing House.
7. Advanced Structural Analysis by A.K. Jain, Nem Chand & Bros.
8. Structural Analysis by Negi.L.S and Jangid R.S., Tata McGraw-Hill Publishers, 2004.
9. Basic Structural Analysis by Reddy C.S., Tata McGraw Hill Publishing Co.Ltd.2002.
10. Fundamentals of Structural Mechanics and Analysis by Gambhir.M.L., PHIL earningPvt. Ltd.,2011

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. CE - I Sem

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3	0	0	3

(20CE5PE01) ADVANCED STRUCTURAL ANALYSIS
(Professional Elective – I)

Course Objectives: The objectives of the course are to:

1. Understand the matrix method of analysis statically indeterminate frames and trusses.
2. Know the transformation of coordinates and assembly of stiffness matrices
3. Differentiate between flexibility and stiffness methods of analysis of beams, framesand plane trusses
4. Understand the structural behavior of large frames with or without shear walls

Course Outcomes: After the completion of the course student should be able to:

1. Analyze by matrix method.
2. Solve by stiffness matrix method
3. Analyze plane-truss, continuous beam, plane frame and grids by flexible methods.
4. Analyze plane-truss, continuous beam, plane frame and grids by stiffness methods.
5. Analysis of static condensation and sub structuring and shear walls.

UNIT - I

Introduction to matrix methods of analysis statically indeterminacy and kinematics indeterminacy degree of freedom-coordinate system-structure idealization stiffness and flexibility matrices-suitability element stiffness equations-elements flexibility equations- mixed force-displacement equations-for truss element, beam element and tensional element Transformation of coordinates-element stiffness matrix-and load vector-local and global coordinates.

UNIT - II

Assembly of stiffness matrix from element stiffness matrix-direct stiffness method-general procedure bank matrix-semi bandwidth-computer algorithm for assembly by direct stiffnessmatrix method.

UNIT - III

Analysis of plane truss-continuous beam-plane frame and grids by Flexible methods.

UNIT – IV

Analysis of plane truss-continuous beam-plane frame and grids by stiffness methods.

UNIT - V

Special analysis procedures-static condensation and sub structuring-initial and thermal stresses. Shear Walls Necessity-structural behavior of large frames with and without shear walls-approximate methods of analysis of shear walls.

TEXT BOOKS:

1. Matrix methods of structural analysis by Willam Weaver and gere, CBS Publishers.
2. Advanced Structural Analysis by A.K. Jain Nemchand Publishers

REFERENCE BOOKS

1. Advanced Structural Analysis by Devdas Menon, Narosa publishing house.
2. Matrix methods of structural analysis by Pandit and Gupta
3. Matrix methods of structural analysis by J Meek
4. Structural Analysis by Ghali and Neyveli

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. CE - I Sem

L	T	P	C
3	0	0	3

(20CE5PE02) WATERSHED MANAGEMENT
(Professional Elective – I)

Course Objectives: The objectives of the course are to:

1. Understand different watershed behavior
2. Be able to interpret runoff data and quantify erosion by using various modeling methods.
3. Understand land use classification and impact of land use changes on hydrologicalcycle parameters.

Course Outcomes: After the completion of the course student should be able to:

1. Illustrate about watershed.
2. Explain about Soil Erosion.
3. Design water harvesting and groundwater recharge structures
4. Explain about Artificial recharge.
5. Illustrate about Reclamation of saline soils, micro farming, biomass management

UNIT - I

Introduction, - concept of watershed, need for watershed management, concept of sustainable development. Hydrology of small watersheds.

Characteristics of the watershed: size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socio-economic characteristics, basic data on watersheds.

UNIT - II

Principles of soil erosion- causes of soil erosion, types of soil erosion, estimation of soil erosion from small watersheds, Control of soil erosion, methods of soil conservation – structural and non-structural measures.

UNIT - III

Principles of water harvesting, methods of rainwater harvesting, design of rainwater harvesting structures.

UNIT – IV

Artificial recharge of groundwater in small watersheds-, methods of artificial recharge.

UNIT - V

Reclamation of saline soils – Micro farming -, biomass management on the farm.

TEXT BOOKS:

1. Murthy, V.V.N. and M.K. Jha Land and Water Management, Kalyani Publishers, 2015
2. Watershed Management by Madan Mohan Das and M.D. Saikia, Prentice Hall of India, 2013
3. Watershed Management Muthy, J. V. S., , New Age International Publishers, 1998

REFERENCE BOOKS

1. Watershed Hydrology by P E Black, Prentice Hall Englewood Cliffs, 1991
2. Watershed Hydrology by R Suresh, Standard Publishers and Distributors, Delhi, 2007

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. CE - I Sem

L	T	P	C
3	0	0	3

(20CE5PE03) TRAFFIC ENGINEERING
(Professional Elective-I)

Course Objectives: The objectives of the course are to:

1. To provide engineering techniques to achieve the safe and efficient movement ofpeople and goods on roadways.

Course Outcomes: At the end of the course, the student will be able to:

1. Illustrate about traffic studies.
2. Analysis of traffic studies.
3. Determine capacity and LOS.
4. Design signals and effective movement of traffic.
5. Analyze the transportation system management

UNIT - I

Traffic Studies (Part- I): Basic principles of Traffic, Volume, Speed and Density; Definitions and their interrelationships; Traffic Volume studies - Objectives, Methods of Volume counts, Presentation of Volume Data; Speed studies- Types of Speeds, Objectives, Methods of speed studies, Statistical Methods for speed data Analysis, Presentation of speed data. Delay Studies; Head ways and Gap Studies - Headway and Gap acceptance, Origin and Destination Studies.

UNIT - II

Traffic Studies (Part-II): Parking Studies: parameters of parking, definitions, Parking inventory study, Parking survey by Patrolling method; Analysis of Parking Survey data; Accident studies- Causative factors of Road accidents, Accident data collection: Accident analysis and modeling, Road Safety Auditing, Measures to increase Road safety.

UNIT - III

Capacity and LOS Analysis: Introduction to Traffic capacity, Analysis concepts, Level of Service, Basic definitions, Factors affecting Capacity and LOS, Capacity of Urban/Rural Highway, With or without access control, Basic freeway segments - Service flow rate of LOS, Lane width or Lateral clearance adjustment; Heavy vehicle adjustment; Driver population adjustment.

UNIT – IV

Signal Designing – Fixed Time signals, Determination of Optimum Cycle length and Signal setting for Fixed Time signals, Warrants for Signals, Time Plan Design for Pre-Timed Control- Lane group analysis, Saturation flow rate, and Adjustment factors, Uniform and Incremental Delay, Vehicle Actuated Signals, Signal Coordination.

UNIT - V

Transportation System Management - Measures for Improving vehicular flow – one-way Streets, Signal Improvement, Transit Stop Relocation, Parking Management, Reversible lanes- Reducing Peak Period Traffic - Strategies for working hours, Congestion Pricing, Differential Toll Policies. Promotion and integration of public transportation, Intelligent Transport System (ITS) for traffic management.

TEXT BOOKS:

1. Traffic Engineering and Transport Planning - Kadiyali. L.R., Khanna Publishers, Delhi, 2013
2. Indian Roads Congress (IRC) Specifications: Guidelines and Special Publications on TrafficPlanning and Management.

3 Highway Traffic Analysis and design - Salter. R.I and Hounsell N.B, Macmillan Press Ltd.1996.

REFERENCE BOOKS

1. Traffic Engineering and Transportation Planning – L.R. Kadiyali, Khanna Publishers
2. Principles of Highways Engineering and Traffic Analysis - Fred Mannering & Walter Kilareski, John Wiley & Sons Publication
3. Fundamentals of Transportation Engineering - C. S. Papacostas, Prentice Hall India.IRC Codes
4. Traffic Engineering - Theory & Practice - Louis J. Pignataro, Prentice Hall Publication.
5. Traffic Engineering by Roger P. Roess, William R. Mc. Shane, Elena S. Prassas, Prentice Hall, 1977.
6. Transportation Engineering – An Introduction - C. Jotin Khisty, Prentice HallPublication
7. Fundamentals of Traffic Engineering – McShane & Rogers.
8. Highway Capacity Manual, 2000.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. CE - I Sem

L	T	P	C
3	0	0	3

(20CE5PE04) BRIDGE ENGINEERING
(Professional Elective-I)

Course Objectives: The objectives of the course are to:

1. To study different types of bridges, forces that act on bridges, Design of bridge.

Course Outcomes: At the end of the course, the student will be able to

1. Design the T beam bridge and substructures.
2. Design the RCC Bridges.
3. Design the steel bridges.
4. Apply Hydraulic & Structural Design.
5. Design bridge foundation.

UNIT - I

Introduction: Definition, components of bridge, classification of bridges, selection of site, economical span, aesthetics consideration, necessary investigations and essential design data.

Standard Specifications for Roads and Railways Bridges: General, Indian Road Congress Bridge Code, width of carriage way, clearance, various loads to be considered for the design of roads and railway bridges, detailed explanation of IRC standard live loads.

UNIT - II

Design Consideration for R. C. C. Bridges: Various types of R.C.C. bridges (brief description of each type), design of R.C.C. culvert and T-beam bridges.

UNIT - III

Design Consideration for Steel Bridges: Various types of steel bridges (brief description ofeach), design of truss and plate girder bridges.

UNIT – IV

Hydraulic & Structural Design: Piers, abutments, wing-wall and approaches.
Brief Description: Bearings, joints, articulation and other details.

UNIT - V

Bridge Foundation: Various types, necessary investigations and design criteria of wellfoundation

TEXT BOOKS:

1. Essentials of Bridge Engineering, D.J.Victor, Oxford & IBH Pub, N. Delhi.
2. Design of Bridges, N. Krishna Raju, Oxford & IBH, N. Delhi.
3 Bridge Deck Analysis, R. P. Pama & A. R. Cusens, John Wiley & Sons.
4. Design of Bridge Structures, T. R. Jagadish & M.A.Jairam, Prentice Hall of India, N.Delhi.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. CE - I Sem

L	T	P	C
2	0	0	2

(20SM5HS05) ENGINEERING ECONOMICS AND ACCOUNTANCY

Course Objectives: The objectives of the course are to:

1. To prepare engineering students to analyze cost/ revenue/ financial data and to make economic and financial analysis in decision making process and to examine the performance of companies engaged in engineering.

Course Outcomes: At the end of the course, the student will be able to

1. Evaluate the economic theories, cost concepts and pricing policies.
2. Understand the measures of national income, the functions of banks and concepts of globalization.
3. Analyze the profitability of various projects using capital budgeting techniques.
4. Apply the concepts of financial management for project appraisal.
5. Understand accounting systems and analyze financial statements using ratio analysis.
6. Understand the impact of inflation, taxation, depreciation. Financial planning, economic basis for replacement, project scheduling, and legal and regulatory issues are introduced and applied to economic investment and project-management problems.

UNIT - I

Introduction to Engineering Economics- Basic Principles and Methodology of Engineering Economics–Fundamental Concepts- Demand – Demand Determinants - Law of Demand- Demand Forecasting and Methods- Elasticity of Demand- Theory of Firm – Supply- Elasticity of Supply

UNIT - II

Macroeconomic Concepts: National Income Accounting - Methods of Estimation- Various Concepts of National Income - Inflation – Definition – Causes of Inflation and Measures to Control Inflation – New Economic Policy 1991 (Industrial policy, Trade policy, and Fiscal policy) Impact on Industry.

UNIT - III

Cash Flows and Capital Budgeting: Significance of Capital Budgeting - Time Value of Money- Choosing between alternative investment proposals- Methods of Appraisal Techniques- Pay Back Period - Average Rate of Return – Net Present Value- Internal Rate ofReturn – Profitability Index.

UNIT – IV

Borrowings on Investment: Equity Vs Debt Financing- Leverages- Concept of Leverage- Types of Leverages: Operating Leverage- Financial Leverage and Composite Leverage. (Simple Problems)

UNIT - V

Introduction to Accounting: Accounting Principles- procedure- Double entry system - Journal-ledger-Trial balance- Trading and Profit and Loss account- Balance Sheet. Cost Accounting, Introduction-Classification of costs- Breakeven Analysis, Meaning and its application, Limitations. (Simple Problems).

TEXT BOOKS:

1. Henry Malcom Steinar-Engineering Economics, Principles, McGraw Hill Pub.
2. D.D. Chaturvedi, S.L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. CE - I Sem	**L**	**T**	**P**	**C**
	0	0	3	1.5

(20CE5PC06) GEOTECHNICAL ENGINEERING LAB

Course Objectives: The objectives of the course are to:

1. Obtain index and engineering properties of locally available soils
2. Understand the behavior of these soils under various loads.

Course Outcomes: At the end of the course, the student will be able to

1. Understand the limits
2. Understand the field density and relative density
3. Understand the specific gravity of soil grain size.
4. Analyse the Permeability of soil
5. Analyse the Proctor's Compaction Test
6. Classify and evaluate the behavior of the soils subjected to various loads.

LIST OF EXPERIMENTS

1. Atterberg Limits (Liquid Limit, Plastic Limit, and shrinkage limit)
2. a) Field density by core cutter method and
3. b) Field density by sand replacement method
4. Determination of relative density (demonstration only)
5. Determination of Specific gravity of soil Grain size distribution by sieve analysis
6. Permeability of soil by constant and variable head test methods
7. Standard Proctor's Compaction Test
8. Determination of Coefficient of consolidation (square root time fitting method)
9. Unconfined compression test
10. Direct shear test
11. Vane shear test

REFERENCE:

1. Measurement of Engineering Properties of Soils by. E. Saibaba Reddy & K. Rama Sastri, New Age International

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. CE - I Sem	**L**	**T**	**P**	**C**
	0	0	3	1.5

(20CE5PC07) ENVIRONMENTAL ENGINEERING LAB

Course Objectives: The objectives of the course are to:

1. Perform the experiments to determine water and waste water quality
2. Understand the water & waste water sampling, their quality standards
3. Estimate quality of water, waste water, Industrial water

Course Outcomes: At the end of the course, the student will be able to

1. Understand about the equipment used to conduct the test procedures
2. Perform the experiments in the lab
3. Examine and Estimate water, waste water, air and soil Quality
4. Compare the water, air quality standards with prescribed standards set by the local governments
5. Develop a report on the quality aspect of the environment

LIST OF EXPERIMENTS

1. Determination of Turbidity
2. Determination of pH
3. Determination of Electrical Conductivity
4. Determination of Total Solids (Organic and inorganic)
5. Determination of Acidity
6. Determination of Alkalinity
7. Determination of Hardness (Total, Calcium and Magnesium Hardness)
8. Determination of Chlorides
9. Determination of Iron
10. Determination of Bleaching Powder
11. Determination of optimum coagulant Dosage
12. Determination of Dissolved Oxygen (Winkler Method)
13. Determination of COD
14. Determination of BOD/DO
15. Determination of Residual Chlorine
16. Total Count No.
17. Noise level measurement

TEXT/REFERENCE BOOKS

1. Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey.
2. Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan,
3. Thompson / Brooks/ Cole; Second Edition 2008.
4. Peavy, H.s, Rowe, D.R, Tchobanoglous, G. Environmental Engineering, Mc-Graw – Hill International Editions, New York 1985.
5. MetCalf and Eddy. Wastewater Engineering, Treatment, Disposal and Reuse, Tata McGraw-Hill, New Delhi.
6. Manual on Water Supply and Treatment. Ministry of Urban Development, NewDelhi.
7. Plumbing Engineering. Theory, Design and Practice, S.M. Patil, 1999
8. Integrated Solid Waste Management, Tchobanoglous, Theissen & Vigil. McGraw Hill Publication
9. Manual on Sewerage and Sewage Treatment Systems, Part A, B and C. Central Public Health and Environmental Engineering Organization, Ministry of Urban Development.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. CE -I Sem	**L**	**T**	**P**	**C**
	2	0	0	0

(20CE5MC09) INTELLECTUAL PROPERTY RIGHTS

Course Objectives: The objectives of the course are to:

1. Understand the concept of IPR, its need and importance along with the agencies involved in IPR activities.
2. Know about trademarks and their obtaining processes.
3. Acquire a detailed knowledge on the copyright issues, copyright registration process, and international copyright laws.
4. Get familiarized with Trade Secrets, Misappropriation right of publicity, and False advertising.
5. Know the recent developments in IPR movement.

Course Outcomes: At the end of the course, the student will be able to

1. Realize the importance of IPR and the problems associated with IPR
2. Know how to acquire trade mark rights and the registration process.
3. Understand the copyright ownership issues, copy right registration, international copyright law, and how to file a patent.
4. Differentiate between the genuine and false advertising, and clear understanding of trade secrets.
5. Get themselves with latest developments on IPR.

UNIT - I

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT - II

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

UNIT - III

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer.

UNIT – IV

Trade Secrets: Trade secret law, determination of trade secret status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation. Unfair competition: Misappropriation right of publicity, false advertising.

UNIT - V

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual property, international – trade mark law, copy right law, international patent law, and international development in trade secrets law.

TEXT/REFERENCE BOOKS

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
2. Intellectual property right – Unleashing the knowledge economy, Prabuddha Ganguli,Tata McGraw Hill Publishing company Ltd.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. CE -I Sem	**L**	**T**	**P**	**C**
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(20CE5MC10) PERSONALITY DEVELOPMENT AND SOFT SKILLS

Course Objectives: The objectives of the course are to:

1. Projecting the Right First Impression
2. Polishing manners to behave appropriately in social and professional circles
3. Enhancing the ability to handle casual and formal situations in terms of personal grooming, dining and entertaining etiquette
4. Developing and maintaining a positive attitude and being assertive
5. Mastering Cross Cultural Etiquette
6. Handling difficult situations with grace, style, and professionalism
7. To understand the importance of oral & written Communication Skills in Corporate Sector.

Course Outcomes: At the end of the course, the student will be able to

1. Students will possess the personality development techniques and communication skills.
2. Students will possess knowledge about leadership.
3. Students will be able to acquire the skills to manage stress and conflict.
4. Students will able to acquire Problem Solving & Critical Thinking.
5. Students will able to acquire different resume preparation & Essay Writing Techniques.

UNIT - I

Personality Development: Body Language: Professional and Casual attire, Public Speaking, Strengths & Weakness, Organizational Skills, Self-Assessment

UNIT - II

Goal Setting: Time Management, Stress Management, Career Management, Confidence/ Motivation, Tolerance of Change and Uncertainty.

UNIT - III

Soft Skills Grammar: Noun, Pronoun, Adjectives, Tenses, Verb, Subject + Verb, Agreement, Adverb, Preposition, Article, Conjunction.

Vocabulary: Synonyms & Antonyms, Words often Confused & Misused

Verbal Ability: Sentence Improvement, Reading Comprehension, Cloze Test, Sentence Rearrangements, Fill in the Blanks, Theme Detection Analogy

UNIT – IV

Just A Minute (JAM), Group Discussion (GD), Debate, Role Play, Cognitive Skills, Leadership Qualities, Work Ethics, Problem Solving & Adaptability, Critical Thinking, Random Words, and Interview Skills: Tell me about yourself.

UNIT - V

Team Work, Self-Awareness and Presentation Skills, Resume Building: Normal Resume Preparation, Video Resume & Career Specific Resume, Email Etiquette, Essay Writing.

TEXT/REFERENCE BOOKS

1. Personality Development and Soft Skills - Barun K. Mitra
2. Personality Development and Soft Skills: Preparing for Tomorrow - Shikha Kapoor
3. Soft Skills Personality Development for Life Success – Prashanth Sharma.

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III Year B.Tech. CE -II Sem	**L**	**T**	**P**	**C**
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(20CE6PC01) HYDROLOGY AND WATER RESOURCES ENGINEERING

Course Objectives: The objectives of the course are to:

1. Provide the description of hydrological cycle and derive various formulas used in estimation of different basic components of surface and Ground water cycle and its components. Further
2. Explain the water requirement for irrigation and connectivity of hydrology to the field requirement.

Course Outcomes: At the end of the course, the student will be able to

1. Analyze hydro metrological data.
2. Estimate abstraction from precipitation and runoff.
3. Analyze hydrographs from given data.
4. Compute yield from surface and subsurface basin.
5. Analyse canal system and water logging

UNIT - I

Introduction: Concepts of Hydrologic cycle, Global Water Budget, Applications in Engineering. Sources of data.

Precipitation: Forms of precipitation, characteristics of precipitation in India, measurement of precipitation: Recording and non-recording types, rain gauge network: mean precipitationover an area: Arithmetic, Theissen's and Isohyetal methods, Missing Rainfall Data – Estimation, Consistency of Rainfall records, depth area-duration relationships, maximum intensity/depth-duration-frequency relationship, Probable Maximum Precipitation (PMP), rainfall data in India.

UNIT - II

Abstractions from precipitation: Evaporation process, evaporimeters, analytical methods of evaporation estimation, reservoir evaporation and methods for its reduction, evapotranspiration, measurement of evapotranspiration, evapotranspiration equations: Penman and Blaney & Criddle Methods, potential evapotranspiration over India, actual evapotranspiration, interception, depression storage, infiltration, infiltration capacity, measurement of infiltration, modelling infiltration capacity, classification of infiltration capacities, infiltration indices.

Runoff: Components of Runoff, Factors affecting runoff, Basin yield, SCS-CN method of estimating runoff, Flow duration curves, Mass curve of runoff – Analysis.

UNIT - III

Hydrographs: Hydrograph – Factors affecting Hydrograph – Distribution of Runoff – Hydrograph Analysis Flood Hydrograph – Effective Rainfall – Base Flow – Base Flow Separation – Direct Runoff Hydrograph Unit pulse and Unit step function – Unit Hydrograph, definition, limitations and applications of Unit hydrograph, derivation of Unit Hydrograph from Direct Runoff Hydrograph and vice versa - S-hydrograph, Synthetic Unit Hydrograph.

UNIT – IV

Groundwater Hydrology: Occurrence, movement and distribution of groundwater, aquifers
types, Specific Yield, Permeability, Storage coefficient, Transmissibility, Darcy's Law.
Well Hydraulics - Steady radial flow into well for confined and unconfined aquifers, Recuperation tests. Well constants.
Crop Water Requirements – Water requirement of crops-Crops and crop seasons in India, cropping pattern, duty and delta; Quality of irrigation water; Soil-water relationships,
root zone soil water, infiltration, consumptive use, irrigation requirement, frequency of irrigation; Methods of applying water to the fields: surface, sub-surface, sprinkler and trickle / drip irrigation.

UNIT - V

Canal Systems: Canal systems, alignment of canals, canal losses, estimation of design discharge. Design of channels- rigid boundary channels, alluvial channels, Regime channels, Kennedy's and Lacey's theory of regime channels. Canal outlets: non-modular, semi-modular and modular outlets.

Water logging: causes, effects and remedial measures. Lining of canals-Types of lining- Advantages and disadvantages. Drainage of irrigated lands- necessity, methods.

TEXT BOOKS:

1. Hydrology by K. Subramanya (Tata McGraw-Hill)
2. Irrigation Engineering and Hydraulic structures by Santhosh Kumar Garg Khanna publishers.
3. G L Asawa, Irrigation Engineering, Wiley Eastern.
4. Hydrology by Jayarami Reddy.P, Tata McGraw Hill, 2008.
5. Water Resources Engineering by Linsley, R.K. and Franzini, J.B., McGraw Hill International Book Company, 1995.

REFERENCE BOOKS:

1. Elements of Engineering Hydrology by V.P. Singh (Tata McGraw-Hill)
2. Ground water Hydrology by David Keith Todd, John Wiley & Son, New York.
3. Elements of Water Resources Engineering by K.N.Duggal and J.P.Soni (New Age International).
4. Groundwater Hydrology by David Keith Todd, John Wiley & Sons, Inc. 2007
5. Applied Hydrology by Ven Te Chow, Maidment, D.R. and Mays, L.W., McGraw Hill International Book Company, 1998.
6. Hydrology by Raghunath H.M., Wiley Eastern Ltd., 1998

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III Year B.Tech. CE -II Sem

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(20CE6PC02) CONCRETE TECHNOLOGY

Course Objectives: The objectives of the course are to:

1. Know different types of cement as per their properties for different field applications.
2. Understand Design economic concrete mix proportion for different exposure conditions and intended purposes.
3. Know field and laboratory tests on concrete in plastic and hardened stage.

Course Outcomes: At the end of the course, the student will be able to

1. Explain about cement and its characteristics.
2. Explain about aggregates and its characteristics.
3. Explain about fresh concrete and its properties.
4. Explain about hardened concrete and its properties.
5. Illustrate about mix design and special concretes.

UNIT - I

Cement: Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrated cement – Tests on physical properties – Different grades of cement. Admixtures: Types of admixtures – mineral and chemical admixtures. IS specification of cement.

UNIT - II

Aggregates: Classification of aggregate – Particle shape & texture – Bond, strength & othermechanical 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, Manufactured sand and coarse Aggregates – Gap graded aggregate – Maximum aggregate size- Properties Recycled aggregate.

UNIT - III

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, vibration and revibrating of concrete – Steps in manufacture of concrete – Quality of mixing water.

UNIT – IV

Hardened Concrete: Water / Cement ratio – Abram's Law – Gel/space ratio – Gain of strength of concrete – Maturity concept – Strength in tension and compression – Factors affecting strength – Relation between compression and tensile strength - Curing.

Testing of Hardened Concrete: Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Pull-out test, Non-destructive testing methods – codal provisions for NDT.

Elasticity, Creep & Shrinkage: Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep &time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

UNIT - V

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: IS Method, ACI Method, DOE Method – BIS method of mix
design.

Special Concretes: Introduction to Light weight concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Polymer concrete – High performance concrete – Self compacting concrete – Ready mixed concrete – Testing methods
– Codal standards – principle – mechanism – properties – applications Process of manufacturing of

ready-mix concrete, methods of transportation, placing and curing

TEXT BOOKS:

1. Concrete Technology by M.S. Shetty. – S. Chand & Co.; 2004
2. Concrete Technology by A.R. Santhakumar, 2nd Edition, Oxford university Press, New Delhi
3. Concrete Technology by M. L. Gambhir. – Tata Mc. Graw Hill Publishers, NewDelhi.
4. Concrete Technology by Gupta.B.L., Amit Gupta - Jain Book Agency, 2010.
5. Concrete Technology by

REFERENCE BOOKS:

1. Properties of Concrete by A. M. Neville – Low priced Edition – 4th edition
2. Concrete: Micro structure, Properties and Materials – P.K. Mehta and J.M. Monteiro, Mc-Graw Hill Publishers
3. Concrete Technology by Job Thomas - Cengage Learning India Pvt. Ltd., Delhi, 2015

IS Codes:

1. IS 383
2. IS 516
3. IS 10262 - 2009

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III Year B.Tech. CE -II Sem	**L**	**T**	**P**	**C**
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(20CE6PC03) TRANSPORTATION ENGINEERING – I

Course Objectives: The objectives of the course are to:

1. Provide a comprehensive insight of various elements of Highway transportation engineering.
2. Cover the topics related to the highway development, characterization of different materials needed for highway construction, structural and geometric design of highway pavements along with the challenges and possible solutions to the traffic related issues.

Course Outcomes: At the end of this course, the students will

1. Illustrate the importance of highways and its developments.
2. Illustrate various geometric designs of Highways.
3. Demonstrate about traffic engineering.
4. Explain about tests and bitumen concrete mix design.
5. Design various types of pavements.

UNIT - I

Introduction, History and Importance of Highways, Characteristics of road transport, Current road development plans in India, Highway development in India, Highway planning, Highway alignment, Engineering surveys for Highway alignment, Highway projects, Highway drawings and reports, Detailed Project Report preparation, PPP schemes of Highway Development in India, Government of India initiatives in developing the highways and expressways in improving the mobility and village road development in improving the accessibility.

UNIT - II

Introduction to Highway Geometric Design; Width of Pavement, Formation and Land, CrossSlopes etc.; Concept of Friction: Skid and Slip; Elements of geometric design of highways; Sight Distances: Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance; Horizontal alignment: Design of horizontal curves, super elevation, extra widening of pavement at curves; Vertical Alignment: Gradients, Compensation in Gradient. Design of summit curves and valley curves using different criteria; Integration of Horizontal and Vertical Curves. Typical cross section of different type of roads – problems.

UNIT - III

Traffic Engineering: Basic Parameters of Traffic, Volume, Speed and Density Road Accidents, Causes and Preventive measures - Accident Data Recording - Condition Diagram and Collision Diagrams. Road Traffic Signs - Types and Specifications - Road markings - Types of Road Markings - Design of Traffic Signals - Webster Method - IRC Method, Intelligent Transportation Systems Typical architectures, Highway lighting.

UNIT – IV

Tests on soils: CBR, Field CBR, modulus of sub-grade reaction, Tests on Aggregates: specific gravity, shape (flakiness and elongation indices), angularity number, water absorption, impact, abrasion, attrition, crushing resistance, durability (weathering resistance), stone polishing value of aggregates; Tests on bitumen: spot, penetration, softening point, viscosity, ductility, elastic recovery, flash and fire points, Introduction to modified bituminous binders like crumb rubber modified, natural rubber modified and polymermodified bitumen binders; Bituminous Concrete: Critical parameters controlling bituminousconcrete mixture design, aggregate blending concepts viz. Rothfuch's method, trial and error procedure. Introduction to advanced concretes for road applications.

UNIT - V

Introduction to Pavement Design: Types of pavements and their typical cross sections: flexible, rigid and composite; Flexible Pavement analysis and design: Introduction to multi layered analysis, IRC 37-2012 method of flexible pavement design; Rigid pavement analysisand design: Factors controlling rigid pavement design, types of stresses in rigid pavements, critical load positions, load stresses and temperature stresses in interior, corner and edge locations of jointed plain cement concrete pavement

slabs, IRC 58-2015 method of rigid pavement design; Overlay Designs: Types of overlays on flexible and rigid pavements.

TEXT BOOKS:

1. Khanna, S.K, Justo, A and Veeraragavan, A, 'Highway Engineering', Nem Chand & Bros. Revised Tenth Edition, 2014
2. Kadiyali L.R. and Lal N B, Principles and Practices of Highway Engineering; SeventhEdition, First Reprint; Khanna Publishers, New Delhi, 2018

Code of Provisions:

1. Design Codes: IRC 37-2012, IRC 58-2015, IRC 81-1997

REFERENCE BOOKS:

1. Papacoastas, C. S. and Prevedouros, Transportation Engineering and Planning, ThirdEdition, Third Impression; Pearson Education, 2018.
2. Khisty C J and Lall B Kent; Transportation Engineering: An Introduction, Third Edition, 1st Indian Adaptation; Pearson India Education Service Pvt. Ltd, New Delhi2017.
3. Subhash C Saxena, Text Book of Highway and Traffic Engineering; First Edition; CBS Publishers and Distributors. New Delhi, 2014
4. C Venkatramaih, Transportation Engineering Volume 1 – Highway Engineering, 1stEdition, Universities Press, 2016
5. Garber, N.J. and Hoel, L.A. Traffic and Highway Engineering, Fourth Edition; Cengage Learning, Stamford, CT, USA, 2010
6. Partha chakroborty and Animesh Das, Principles of Transportation Engineering, PHI,2013
7. Nicholas J Garber and Lester A Hoel, Traffic and Highway Engineering, 5th Edition,Cengage Learning India Private Limited, New Delhi, 5th Indian Reprint, 2015.

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III Year B.Tech. CE -II Sem

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(20CE6PC04) DESIGN OF STEEL STRUCTURES

Course Objectives: The objectives of the course are to:

1. Explain the mechanical properties of structural steel, plasticity, yield.
2. Describe the salient features of Limit State Method of design of Steel structures.
3. Identify and explain the codal provisions given in IS. 800.
4. Analyze the behavior of steel structures under tension, compression and flexure.
5. Design the tension, compression, flexural members and plate girder
6. Design the connection in steel structure, build - up member and (bolted and welded).

Course Outcomes: After the completion of the course student should be able to:

1. Design of connections and IS Code provisions.
2. Design the tension members, compression members and column bases and joints and connections
3. Analyze and design the beams including built-up sections and beam and connections.
4. Identify and design the various components of welded plate girder includingstiffeners
5. Apply the roof trusses and design of structural members

UNIT - I

Introduction to Materials – Types of structural steel: Mechanical properties of steel, relativeadvantages and limitations, Modes of failure – Concepts of plasticity – yield strength - Loadsand Stresses – Local buckling behavior of steel. Concepts of limit State Design – Different Limit States – Load combinations for different Limit states - Design Strengths – deflection limits – serviceability – stability check. Design of Connections– Different types of connections – Bolted connections – Design strength – efficiency of joint– prying action - Welded connections – Types of welded joints – Design requirements - Design of Beam- column connections - Eccentric connections – Type I and Type II connection – Framed connection– stiffened / seated connection.

UNIT - II

Design of tension members: Types, behavior and failure – Simple and built-up members - Design strength – Design procedure for splicing – lug angle. Design of compressionmembers: Types, behavior and failure – Buckling class – slenderness ratio – Design of simple compression members – laced – battened columns – splice – column base – slab base – Current Code Provisions.

UNIT - III

Plastic Analysis; Plastic moment – Plastic section modulus - Plastic analysis of continuous beams Design of Flexural Members – Laterally supported and unsupported Beams – Design of laterally supported beams - Bending and shear strength/buckling – Built-up sections - Beam splice.

UNIT – IV

Design of welded plate girders – elements – economical depth – design of main section – connections between web and flange – design of stiffeners - bearing stiffener– intermediate stiffeners – Design of web splice and flange splice.

UNIT - V

Design of Industrial Structures; Types of roof trusses - loads on trusses – wind loads - Purlindesign – truss design – Design of welded Gantry girder.

Note: Design of structural members includes detailed sketches.

TEXT BOOKS:

1. Design of steel structures by S.K.Duggal, Tata Macgrawhill publishers,2000,2ndEdition.
2. Design of steel structures by N.Subramanian, Oxford University press,2008.
3. Design of steel structures by K.S.Sairam,Pearson Educational India, 2nd Edition,2013.
4. Fundamentals of Structural Steel Design by Gambhir. M.L., McGraw Hill Education India Pvt. Ltd., 2013

REFERENCE BOOKS:

1. Design of steel structures by Edwin H.Gayrold and Charles Gayrold,Tata Mac-Grawhill publishers,1972
2. Design of steel structures by L.S.Jaya Gopal, D.Tensing, Vikas Publishing House.
3. Teaching Resource on Structural Steel Design by Narayanan. R.et. al., INSDAG, Ministry of Steel Publications, 2002.
4. Limit State Design in Structural Steel by Shiyekar. M.R., Prentice Hall of India Pvt. Ltd, Learning Pvt. Ltd., 2nd Edition, 2013.

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III Year B.Tech. CE -II Sem

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(20CE6PE01) REHABILITATION AND RETROFITTING OF STRUCTURES
(Professional Elective-II)

Course Objectives: The objectives of the course are to:

1. Understand the various concepts of rehabilitation and retrofitting of structures.
2. Get familiarized with the Corrosion Assessment in Reinforcements in RCC Elementsand Components in Steel Structure.
3. Comprehend the Visual Inspection and Testing through diagnosis of distress, damageassessment, rebound hammer test, etc.
4. Get acquainted with the repair of structures by various retrofitting methods.
5. Understand the concept of health monitoring of structures.

Course Outcomes: After the completion of the course student should be able to:

1. Illustrate maintenance and repair strategies.
2. Demonstrate effect on serviceability and durability by various causes.
3. Demonstrate various testing methods.
4. Explain about various repair and retrofitting materials.
5. Demonstrate about health monitoring techniques and its maintenance

UNIT - I

Repair, Retrofitting, Strengthening and rehabilitation: Introduction – Deterioration of Structures – Distress in Structures – Types of Distress – Causes and Prevention. Mechanismof Damage – Types of Damage – Causes of Damage – Preventive and Remedial Measures ofDamage – Evaluation of structural damages to the concrete structural elements.

UNIT - II

Influence on Serviceability and Durability: Effects due to climate, temperature, chemicals, wear and erosion, Effects of cover thickness and cracking, methods of corrosion protection, corrosion inhibitors. Corrosion of Steel Reinforcement: corrosion resistant steels, coatings, and cathodic protection – Causes – Mechanism and Prevention – Corrosion Assessment in Reinforcements in RCC Elements and Components in Steel Structure – Damage of Structures due to Fire – Fire Rating of Structures – Phenomena of Desiccation.

UNIT - III

Visual Inspection and Testing – Symptoms and Diagnosis of Distress – Damage assessment –NDT – Ground Penetrating Radar, Ultrasonic Testing of Concrete – Rebound hammer test – Surface Electrical Resistivity – Intrusive Methods.

UNIT – IV

Repair and Retrofitting Materials: Artificial fibre reinforced polymer like CFRP, GFRP, AFRP and natural fiber like Sisal and Jute. Adhesive like, Epoxy Resin, Special concretes and mortars, concrete chemicals, special elements for accelerated strength gain – Repair of Structure – Common Types of Repairs – Repair in Concrete Structures –Repairs in Under Water Structures – Gunting – Shot Create – Underpinning. Strengthening of Structures – Strengthening Methods – Retrofitting – Jacketing.

UNIT - V

Health Monitoring of Structures – Use of Sensors – Building Instrumentation – SHM in Practice – Vibration SHM – Model based Techniques.

Maintenance: Definition, Facts of Maintenance and importance of Maintenance Need for retrofitting, retrofitting of structural members i.e., column and beams by Jacketing technique, externally bonding (ERB) technique, near surface mounted (NSM) technique, External post- tensioning, Section enlargement and guidelines for seismic rehabilitation of existing building

TEXT BOOKS:

1. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications.
2. Concrete Technology by A.R. Santa Kumar, Oxford University press.
3. Rehabilitation
4. Maintenance Repair and Rehabilitation & Minor works of building by Varghese.,Prentice Hall India Pvt Ltd., 2014.
5. Concrete Structures by Dodge Woodson. R, Protection, Repair and Rehabilitation, Butterworth- Heinemann, Elsevier, New Delhi 2012.
6. Sidney, M. Johnson, "Deterioration, Maintenance and Repair of Structures"
7. Denison Campbell, Allen & Harold Roper, "Concrete Structures – Materials,Maintenance and Repair"- Longman Scientific and Technical.

REFERENCE BOOKS:

1. Defects and Deterioration in Buildings, EF & N Spon, London
2. Non-Destructive Evaluation of Concrete Structures by Bungey – Surrey University Press
3. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W.H.Ranso, (1981)
4. Building Failures: Diagnosis and Avoidance, EF & N Spon, London, B.A. Richardson, (1991).
5. R.T.Allen and S.C. Edwards, "Repair of Concrete Structures"-Blakie and Sons Raiker R.N., "Learning for failure from Deficiencies in Design, Construction and Service"-R&D Center (SDCPL).

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III Year B.Tech. CE -II Sem

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(20CE6PE02) GROUND IMPROVEMENT TECHNIQUES
(Professional Elective-II)

Course Objectives: The objectives of the course are to:

1. Know the need of ground improvement
2. Acquire the knowledge on the various ground improvement techniques available andtheir applications for different types of soils
3. Understand suitable ground improvement technique for given soil conditions.

Course Outcomes: At the end of the course the student able to:

1. Demonstrate necessity of Engineering ground modifications.
2. Demonstrate about mechanical ground modifications.
3. Demonstrate about Hydraulic ground modifications.
4. Demonstrate about Physical and Chemical ground modifications.
5. Apply the Modification by Inclusions and Confinement.

UNIT - I

Introduction to Engineering Ground Modification: Need and objectives, Identification ofsoil types, Insitu and laboratory tests to characterize problematic soils; Mechanical, Hydraulic, Physico-chemical, Electrical, Thermal methods, and their applications.

UNIT - II

Mechanical Modification: Shallow Compaction Techniques- Deep Compaction Techniques- Blasting- Vibrioception- Dynamic Tamping and Compaction piles.

UNIT - III

Hydraulic Modification: Objectives and techniques, traditional dewatering methods and their choice, Design of dewatering system, Electro-osmosis, Electro-kinetic dewatering- Filtration, Drainage and Seepage control with Geosynthetics, Preloading and vertical drains,

UNIT – IV

Physical and Chemical Modification – Modification by admixtures, Modification Grouting, Introduction to Thermal Modification including freezing.

UNIT - V

Modification by Inclusions and Confinement - Soil reinforcement, reinforcement with strip, and grid reinforced soil. In-situ ground reinforcement, ground anchors, rock bolting andsoil nailing.

TEXT BOOKS:

1. Hausmann, M. R. (1990) – Engineering Principles of Ground Modifications, McGraw Hill publications
2. M. P. Moseley and K. Krisch (2006) – Ground Improvement, II Edition, Taylor andFrancis.
3. Purushothama Raj. P, “Ground Improvement Techniques”, Lakshmi Publications, 2ndEdition, 2016.
4. Koerner, R.M. “Construction and Geotechnical Methods in Foundation Engineering”,McGraw Hill, 1994.
5. Nihar Ranjan Patra, “Ground Improvement Techniques”, Vikas Publishing House, First Edition, 2012.

REFERENCE BOOKS:

1. Koerner, R. M (1994) – Designing with Geosynthetics – Prentice Hall, New Jersey
2. Jones C. J. F. P. (1985) – Earth Reinforcement and soil structures – Butterworths, London.
3. Xianthakos, Abreimson and Bruce - Ground Control and Improvement, John Wiley & Sons,

1994.
4. K. Krisch & F. Krisch (2010) - Ground Improvement by Deep Vibratory Methods, Spon Press, Taylor and Francis
5. Donald P Coduto – Foundation Design Principles and Practices, 2nd edition, Pearson, Indian edition, 2012.
6. Winterkorn, H.F. and Fang, H.Y. "Foundation Engineering Hand Book". Van Nostrand Reinhold, 1994.
7. Das, B.M., "Principles of Foundation Engineering" (seventh edition), Cengage learning, 2010.
8. Coduto, D.P., "Geotechnical Engineering – Principles and Practices", Prentice Hall of India Pvt. Ltd. New Delhi, 2011.

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III Year B.Tech. CE -II Sem

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(20CE6PE03) PRESTRESSED CONCRETE

(Professional Elective-II)

Course Objectives: The objectives of the course are to:

1. Provide various aspects of prestressing and design techniques.
2. Get the students exposed to the analysis and design of Prestressed concrete structures.
3. Comprehend various methods of failures such as shear and flexure
4. Make the students learn how to analyse/study composite beams, deflections, etc.
5. Get familiarized with various IS codes the analysis and design of Prestressed concrete structures.

Course Outcomes: At the end of the course the student able to:

1. Explain about general principles of PSC.
2. Calculate losses of prestressed concrete as per IS Code provisions.
3. Design of sections for flexure and shear as per IS Code provisions.
4. Analyze transfer of prestress as per IS Code provisions.
5. Analysis of composite beams and calculation of deflections

UNIT - I

Introduction: Historic development- General principles of prestressing pretension Ing and post tensioning- Advantages and limitations of Prestressed concrete- General principles of PSC- Classification and types of prestressing- Materials- high strength concrete and high tensile steel their characteristics.

UNIT - II

Methods and Systems of prestressing: Pretension Ing and Post tensioning methods and systems of prestressing like Hoyer system, Magnel Blaton system, Freyssinet system and Gifford- Udall System- Lee McCall system. **Losses of Prestress:** Loss of prestress in pretensioned and post-tensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, slip in anchorage, frictional losses IS 1343-2012 code provisions

UNIT - III

Flexure: Analysis of sections for flexure- beams prestressed with straight, concentric, eccentric, bent and parabolic tendons- stress diagrams- Elastic design of PSC slabs and beams of rectangular and I section- Kern line – Cable profile and cable layout.

Shear: General Considerations- Principal tension and compression- Improving shear resistance of concrete by horizontal and vertical prestressing and by using inclined or parabolic cables- Analysis of rectangular and I beam for shear – Design of shear reinforcements- IS Code provisions.

UNIT – IV

Transfer of Prestress in Pretensioned Members: Transmission of prestressing force by bond – Transmission length – Flexural bond stresses – IS code provisions – Anchorage zonestresses in post tensioned members – stress distribution in End block – Analysis by Guyon, Magnel, Zielinski and Rowe's methods – Anchorage zone reinforcement- IS 1343-2012 code Provisions.

UNIT - V

Composite Beams: Different Types- Propped and Unpropped- stress distribution-Differential shrinkage- Analysis of composite beams- General design considerations.

Deflections: Importance of control of deflections- Factors influencing deflections – Short term deflections of uncracked beams- prediction of long-time deflections- IS code requirements.

TEXT BOOKS:

1. Prestressed concrete by Krishna Raju N., 5th Edition, Tata McGraw Hill Company, New Delhi, 2012
2. Prestressed Concrete by Pandit.G.S. and Gupta.S.P., CBS Publishers and DistributersPvt. Ltd, 2012

REFERENCE BOOKS:

1. Prestressed concrete by Krishna Raju, Tata Mc Graw Hill Book – Co. New Delhi.
2. Design of prestress concrete structures by T.Y. Lin and Burn, John Wiley, New York.
3. Prestressed concrete by S. Ramamrutham Dhanpat Rai & Sons, Delhi.
4. Prestressed Concrete by N. Rajagopalan Narosa Publishing House

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. CE -II Sem

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3	0	0	3

(20CE6PE03) FINITE ELEMENT METHODS FOR CIVIL ENGINEERING

(Professional Elective-II)

Course Objectives: The objectives of this course are:

1. To equip the students with the finite element analysis fundamentals.
2. To enable the students to formulate the design problems into FEA.
3. To introduce basic aspects of finite elements technology, including domain discretization, polynomial interpolation, application of boundary conditions, assembly of global arrays, ad solution of the resulting algebraic systems.

Course Outcomes: At the end of the course the student able to:

1. Explain the Finite element method and its terminology.
2. Explain about Finite element analysis of different elements.
3. Finite element analysis of beam elements, stiffness matrix and shape functions.
4. Analysis of 2D problems.
5. Demonstrate various solution techniques.

UNIT - I

Introduction to Finite Element Method – Basic Equations in Elasticity Stress – Strain equation – concept of plane stress – plane strain advantages and disadvantages of FEM. Element shapes – nodes – nodal degree of freedom Displacement function – Natural Coordinates – strain displacement relations.

UNIT - II

Lagrangian Serendipity elements – Hermite polynomials – regular, Irregular 2 D & 3D – Element shape functions up to quadratic formulation. Finite Element Analysis (FEA) of – one dimensional problem – Bar element – Shape functions stiffness matrix – stress – strainrelation.

UNIT - III

FEA Beam elements – stiffness matrix - shape function– Analysis of continuous beams.

UNIT – IV

FEA Two-dimensional problem – CST – LST element – shape function – stress – strain. Isoperimetric formulation – Concepts of, isoperimetric elements for 2D analysis -formulation of CST element.

UNIT - V

Solution Techniques: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

TEXT BOOKS:

1. A first course in Finite Element Method by Daryl L. Logan, 5th Edition, Cengage Learning India Pvt. Ltd.
2. Introduction to finite Elements in Engineering by Tirupathi R. Chandrupatla, and Ashok D. Belegundu, Prentice Hall of India

REFERENCE BOOKS:

1. Finite Element Analysis by P. Seshu, PHI Learning Private Limited
2. Concepts and applications of Finite Element Analysis by Robert D. Cook et al., Wiley India Pvt. Ltd.
3. Applied Finite Element Analysis by G. Ramamurty, I. K. International PublishingHouse Pvt. Ltd.

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III Year B.Tech. CE -II Sem

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3	0	0	3

DISASTER MANAGEMENT
(Open Elective - I)

Course Objectives: The objective of this course is to:

1. Provide basic understanding on different disasters
2. Get familiarized with various tools and methods for disaster management

Course Outcomes: At the end of the course, the student will be able to:

1. Understanding Disasters, man-made Hazards and Vulnerabilities
2. Understanding disaster management mechanism
3. Understanding capacity building concepts and planning of disaster managements

UNIT - I

Understanding Disaster: Concept of Disaster - Different approaches- Concept of Risk - Levels of Disasters - Disaster Phenomena and Events (Global, national and regional) – Different Impacts in terms of Caste, Class, Gender, Age, Location and Disability.

Hazards and Vulnerabilities: Natural and man-made hazards; response time, frequency and forewarning levels of different hazards - Characteristics and damage potential or natural hazards; hazard assessment - Dimensions of vulnerability factors; vulnerability assessment - Vulnerability and disaster risk - Vulnerabilities to flood and earthquake hazards

UNIT - II

Disaster Management Mechanism: Concepts of risk management and crisis managements - Disaster Management Cycle - Response and Recovery - Development, Prevention, Mitigation and Preparedness - Planning for Relief – Early Warning Systems – Advisories from Appropriate Agencies.

UNIT - III

Capacity Building: Capacity Building: Concept - Structural and Nonstructural Measures Capacity Assessment; Strengthening Capacity for Reducing Risk - Counter-Disaster Resources and their utility in Disaster Management - Legislative Support at the state and national levels.

UNIT – IV

Coping with Disaster: Coping Strategies; alternative adjustment processes Changing Concepts of disaster management - Industrial Safety Plan; Safety norms and survival kits Mass media and disaster management.

UNIT - V

Planning for disaster management: Strategies for disaster management planning - Steps for formulating a disaster risk reduction plan - Disaster management Act and Policy in India - Organizational structure for disaster management in India - Preparation of state and district disaster management plans – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery phases of Disaster.

TEXT BOOKS:

1. Manual on Disaster Management, National Disaster Management, Agency Govt of India.
2. Disaster Management by Mrinalini Pandey Wiley 2014.
3. Disaster Science and Management by T. Bhattacharya, McGraw Hill Education (India) Pvt Ltd Wiley 2015

REFERENCE BOOKS:

1. Earth and Atmospheric Disasters Management, N. Pandharinath, CK Rajan, BS Publications 2009.
2. National Disaster Management Plan, Ministry of Home affairs, Government of India (http://www.ndma.gov.in/images/policyplan/dmplan/draftndmp.pdf)

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. CE -II Sem

L	T	P	C
3	0	0	3

ENVIRONMENTAL IMPACT ASSESSMENT
(Open Elective - I)

Course Objectives: The objective of this course is to:

1. Define and Classify Environmental Impacts and the terminology
2. Understand the environmental Impact assessment procedure
3. Explain the EIA methodology
4. List and describe environmental audits

Course Outcomes: At the end of the course, the student will be able to:

1. Identify the environmental attributes to be considered for the EIA study
2. Formulate objectives of the EIA studies
3. Identify the methodology to prepare rapid EIA
4. Prepare EIA reports and environmental management plans

UNIT - I

Introduction: The Need for EIA, Indian Policies Requiring EIA, The EIA Cycle and Procedures, Screening, Scoping, Baseline Data, Impact Prediction, Assessment of Alternatives, Delineation of Mitigation Measure and EIA Report, Public Hearing, Decision Making, Monitoring the Clearance Conditions, Components of EIA, Roles in the EIA Process. Government of India Ministry of Environment and Forest Notification (2000), List of projects requiring Environmental clearance, Application form, Composition of Expert Committee, Ecological sensitive places, international agreements.

UNIT - II

EIA Methodologies: Environmental Attributes-Criteria for the selection of EIA methodology, impact identification, impact measurement, impact interpretation & Evaluation, impact communication, Methods-Adhoc methods, Checklists methods, Matrices methods, Networks methods, Overlays methods. EIA review- Baseline Conditions -Construction Stage Impacts, post project impacts – Cost Benefit Analysis.

UNIT - III

Environmental Management Plan: EMP preparation, Monitoring Environmental Management Plan, Identification of Significant or Unacceptable Impacts Requiring Mitigation, Mitigation Plans and Relief & Rehabilitation, Stipulating the Conditions, Monitoring Methods, Pre- Appraisal and Appraisal.

UNIT – IV

Environmental Legislation and Life cycle Assessment: Environmental laws and protection acts, Constitutional provisions-powers and functions of Central and State government, The Environment (Protection) Act 1986, The Water Act 1974, The Air act 1981, Wild Life act 1972, Guidelines for control of noise, loss of biodiversity, solid and Hazardous waste management rules. Life cycle assessment: Life cycle analysis, Methodology, Management, Flow of materials-cost criteria, case studies.

UNIT - V

Case Studies: Preparation of EIA for developmental projects- Factors to be considered in making assessment decisions, Water Resources Project, Pharmaceutical industry, thermal plant, nuclear fuel complex, Highway project, Sewage treatment plant, Municipal Solid waste processing plant, Air ports.

TEXT BOOKS:

1. Anjaneyulu. Y and Manickam. V., Environmental Impact Assessment Methodologies, B.S. Publications, Hyderabad, 2007
2. Barthwal, R. R., Environmental Impact Assessment, New Age International Publishers, 2002

REFERENCE BOOKS:

1. Jain, R.K., Urban, L.V., Stracy, G.S., Environmental Impact Analysis, Van Nostrand Reinhold Co., New York, 1991.
2. Rau, J.G. and Wooten, D.C., Environmental Impact Assessment, McGraw Hill Pub. Co., New York, 1996.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. CE -II Sem

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(20CS6OE01) JAVA PROGRAMMING
(Open Elective-I)

Course Objectives: The objectives of this course are

1. To introduce the object-oriented programming concepts.
2. To understand object-oriented programming concepts, and apply them in solving problems.
3. To introduce the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes.
4. To introduce the implementation of packages and interfaces.
5. To introduce the concepts of exception handling and multithreading.
6. To introduce the design of Graphical User Interface using applets and swing controls.

Course Outcomes At the end of the course, the student will be able to:

1. Demonstrate the concepts of OOPS using java.
2. Implement complex programs using java standard API library.
3. Build java programs using multithreading and exception handling techniques.
4. Solve the problems using java collection framework.
5. Develop interactive programs using applets and swings for the given problem.

UNIT - I

Object-Oriented Thinking- A way of viewing world – Agents and Communities, messages and methods, Responsibilities, Classes and Instances, Class Hierarchies- Inheritance, Method binding, Overriding and Exceptions, Summary of Object-Oriented concepts. Java buzzwords, An Overview of Java, Data types, Variables and Arrays, operators, expressions, control statements, Introducing classes, Methods and Classes, String handling. Inheritance– Inheritance concept, Inheritance basics, Member access, Constructors, Creating Multilevel hierarchy, super uses, using final with inheritance, Polymorphism-ad hoc polymorphism, pure polymorphism, method overriding, abstract classes, Object class, forms of inheritance: specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance.

UNIT - II

Packages- Defining a Package, CLASSPATH, Access protection, importing packages. Interfaces defining an interface, implementing interfaces, Nested interfaces, applying interfaces, variables in interfaces and extending interfaces. Stream based I/O (java.io) – The Stream Classes-Byte streams and Character streams, reading console Input and Writing Console Output, File class, Reading and writing Files, Random access file operations, The Console class, Serialization, Enumerations, auto boxing, generics.

UNIT - III

Exception handling - Fundamentals of exception handling, Exception types, Termination or resumptive models, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built- in exceptions, creating own exception sub classes. Multithreading-Differences between thread-based multitasking and process-based multitasking, Java thread model, creating threads, thread priorities, synchronizing threads,inter thread communication.

UNIT – IV

The Collections Framework (java. util)- Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque.

Accessing a Collection via an Iterator, Using an Iterator, The For-Each alternative, Map Interfaces and Classes, Comparators, Collection algorithms, Arrays, The Legacy Classes and Interfaces – Dictionary, Hash table, Properties, Stack, Vector More Utility classes, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner.

UNIT - V

GUI Programming with Swing – Introduction, limitations of AWT, MVC architecture,

components, containers. Understanding Layout Managers, Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout. Event Handling- The Delegation event model- Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes. A Simple Swing Application, Applets – Applets and HTML, Security Issues, Applets and Applications, passing parameters to applets. Creating a Swing Applet, Painting in Swing, A Paint example, Exploring Swing Controls- J Label and Image Icon, JText Field, The Swing Buttons Button, JT oggle Button,J Check Box, JRadio Button, JTabbed Pane, JScroll Pane, JList, JCombo Box, Swing Menus, Dialogs.

TEXT BOOKS:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

REFERENCE BOOKS:

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons
2. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
3. Object Oriented Programming through Java, P. Radha Krishna, University Press.
4. Programming in Java, S. Malhotra, S. Chudhary, 2nd edition, Oxford Univ. Press.
5. Java Programming and Object-oriented Application Development, R. A. Johnson, Cengage learning

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III Year B.Tech. CE -II Sem

L	T	P	C
3	0	0	3

(20CS6OE02) OPERATING SYSTEMS
(Open Elective-I)

Course Objectives: The objectives of this course are to

1. Provide an introduction to operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection).
2. Introduce the issues to be considered in the design and development of operatingsystem.
3. Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix.

Course Outcomes At the end of the course, the student will be able to:

1. Demonstrate the fundamental components of a computer operating system.
2. Identify appropriate scheduling algorithm for process management.
3. Solve the situations occurred by deadlock to maintain appropriate process synchronization.
4. Make use of page replacement algorithm for effective memory management.
5. Apply the various system calls to enable the operating system services.

UNIT - I

Operating System - Introduction, Structures - Simple Batch, Multi programmed, Time- shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, Systemcomponents, Operating System services, System Calls.

UNIT - II

Process and CPU Scheduling – Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads, and Interposes Communication, Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling. System call interface for process management-fork, exit, wait, waitpid, and exec.

UNIT - III

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors. Interposes Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT – IV

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Fault, Page Replacement, Page Replacement Algorithms.

UNIT - V

File System Interface and Operations -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usages of open, create, read, write, close, lseek, stat, ioctl system calls, System Protection-Goals.

TEXT BOOKS:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7thEdition, John Wiley
2. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

REFERENCE BOOKS:

1. Operating Systems – Internals and Design Principles Stallings, Fifth Edition–2005,Pearson Education / PHI.
2. Operating System A Design Approach- Crowley, TMH.
3. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI.
4. UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education.
5. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

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III Year B.Tech. CE -II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20CS6OE03) CYBER SECURITY
(Open Elective-I)

Course Objectives: The objectives of this course are to

1. Protect your information from getting intercepted on the way while being transferred to a trusted entity.
2. Protect your information from getting discovered by an eavesdropper.
3. Protect an organization from losing internal data.
4. Protect a software from getting cracked.

Course Outcomes At the end of the course, the student will be able to:

1. Identify various cybercrimes and attacks-global study.
2. Study of various cybercrimes and bottlenecks.
3. Apply critical thinking and problem-solving skills to detect current and future attacks on an organization's computer systems and networks.
4. Study of various tools involved in cybercrime.
5. Apply critical thinking and problem-solving skills to detect current and future attacks on an organization's computer systems and networks.

UNIT - I

Introduction to Cybercrime: Introduction, Cybercrime and Information Security, who are Cybercriminals, Classifications of Cybercrimes, Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes.

UNIT - II

Cyber Offenses: How Criminals Plan Them: Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber Cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.

UNIT - III

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies an Measures in Mobile Computing Era, Laptops.

UNIT – IV

Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow.

UNIT - V

Cyber Security: Organizational Implications, Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associatedchallenges for Organizations.

TEXT BOOKS:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil Belapure, Wiley INDIA.

REFERENCE BOOKS:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRCPress.
2. Introduction to Cyber Security, Chwan-Hwa (John) Wu, J. David Irwin. CRC PressT&F Group

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III Year B.Tech. CE -II Sem	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1**

(20CE6PC05) HIGHWAY ENGINEERING & CONCRETE TECHNOLOGY LAB

Course Objectives: The objectives of this course are to

1. Learn laboratory tests and their procedures cement, fine aggregate, coarse aggregates and bitumen
2. Evaluate fresh concrete properties
3. Understand the test procedures for characterization of Concrete and bituminous mixes

Course Outcomes: After completing this course, the student shall be able to:

1. Categorize the test on materials used Civil Engineering Building & Pavementconstructions
2. Perform the tests on concrete for it characterization.
3. Design Concrete Mix Proportioning by Using Indian Standard Method.
4. Examine the tests performed for Bitumen mixes.
5. Prepare a laboratory report

I **Test on Cement**

1. Normal Consistency and fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity of cement
4. Soundness of cement
5. Compressive strength of cement
6. Workability test on concrete by compaction factor, slump and Vee-bee.

II Test on Aggregates (Coarse and Fine)

1. Specific gravity (Pycnometer and wire basket), water absorption
2. Shape (Flakiness and elongation indices)
3. Impact and abrasion value tests
4. Crushing resistance and durability tests
5. Sieve Analysis and gradation charts (Job mix formula using Rothfuch's charts)
6. Bulking of sand, Bulk and compact densities of fine and coarse aggregates

III Test on Fresh Concrete

1. Slump test
2. CF (compact factor stress)
3. Vee-bee Test
4. Flow Table Test

IV Test on hardened concrete

1. Compression test on cubes & Cylinders
2. Flexure test
3. Split Tension Test
4. Modulus of Elasticity

V Tests on Bitumen and Bituminous concrete

1. Penetration, softening point and spot test
2. Ductility, Elastic recovery and viscosity
3. Flash and fire points and specific gravity
4. Marshall's Stability (sample preparation and testing for stability and flow values)

TEXT BOOKS:

1. Concrete Manual by M.L. Gambhir, Dhanpat Rai & Sons
2. Highway Material Testing manual, Khanna, Justo and Veeraraghavan, Nemchand Brothers

REFERENCE BOOKS:

1. IS 10262 :2009 “Concrete Mix Proportioning – Guidelines”
2. 1S 516:2006 “Methods of Tests on Strength of Concrete”
3. IS 383 :1993 “Specification for Coarse and Fine Aggregates from Natural Sourcesfor Concrete”
4. 1S 1201 -1220 (1978) “Methods for testing tars and bituminous materials”
5. IRC SP 53 -2010 “Guidelines on use of modified bitumen”
6. MS-2 Manual for Marshalls Mix design 2002.

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III Year B.Tech. CE -II Sem	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1**

(20CE6PC06) COMPUTER AIDED STRUCTURAL DESIGN LAB – I

Course Objectives: The objectives of this course are to

1. Learn the usage of any fundamental software for design
2. Create geometries using pre-processor
3. Analyse and interpret the results using post processor
4. Design the structural elements

Course Outcomes: After completing this course, the student shall be able to:

1. Model the geometry of real-world structure Represent the physical model of structural element/structure
2. Perform analysis
3. Interpret from the Post processing results
4. Design the structural elements and a system as per IS Codes
5. Analyse & Design of Roof Trusses
6. Analyse & Design of Roof Trusses

LIST OF EXPERIMENTS

1. Analysis & Design determinate structures using a software
2. Analysis & Design of fixed & continuous beams using a software
3. Analysis & Design of Plane Frames
4. Analysis & Design of space frames subjected to DL & LL
5. Analysis & Design of residential building subjected to all loads (DL, LL, WL, EQL)
6. Analysis & Design of Roof Trusses
7. Design and detailing of built-up steel beam
8. Developing a design program for foundation using EXCEL Spread Sheet
9. Detailing of RCC beam and RCC slab
10. Detailing of Steel built up compression member

Note: Drafting of all the exercises is to be carried out using commercially available designing software.

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III Year B.Tech. CE -II Sem	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1**

(20EN6HS04) ADVANCED COMMUNICATION SKILLS LAB

Course Objectives: This Lab focuses on using multi-media instruction for language development to meet the following targets:

1. To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
2. To communicate their ideas relevantly and coherently in writing.
3. To prepare all the students for their placements.

Course Outcomes: After completing this lab, the students should be able to:

1. Develop LSRW skills and soft skills.
2. Demonstrate the nuances of language through group activities and oral presentations.
3. Build written communication skills to meet the needs of their academic and career endeavors.
4. Take part in interviews with confidence thereby enhancing their employability skills.
5. Choose appropriate language in their social and professional communication.

UNIT - I

Activities on Fundamentals of Inter-personal Communication and Building Vocabulary - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

UNIT - II

General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.

UNIT - III

Activities on Writing Skills – Subject-Verb Agreement, Structure and presentation ofdifferent types of writing – letter writing/Resume writing/ e-correspondence/Technical report writing/ – planning for writing – improving one's writing.

UNIT – IV

Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/ emails/assignments etc.

UNIT - V

Activities on Group Discussion and Interview Skills – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews

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IV Year B.Tech. CE -I Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20CE7PC01) ESTIMATION, COSTING AND PROJECT MANAGEMENT

Course Objectives: The subject provides process of estimations required for various work in construction. To have knowledge of using SOR & SSR for analysis of rates on various works and basics of planning tools for a construction project.

Course Outcomes: On completion of the course, the students will be able to:

1. understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure.
2. quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.
3. understand how competitive bidding works and how to submit a competitive bid proposal.
4. An idea of how to optimize construction projects based on costs
5. An idea how construction projects are administered with respect to contract structures and issues.
6. An ability to put forward ideas and understandings to others with effective communication Processes

UNIT - I

General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating. Detailed Estimates of Buildings

UNIT - II

Reinforcement bar bending and bar requirement schedules Earthwork for roads and canals.

UNIT - III

Rate Analysis – Working out data for various items of work over head and contingent charges.

UNIT – IV

Contracts – Types of contracts – Contract Documents – Conditions of contract, Valuation -Standard specifications for different items of building construction.

UNIT - V

Construction project planning- Stages of project planning: pre-tender planning, pre-construction planning, detailed construction planning, role of client and contractor, level of detail. Process of development of plans and schedules, work break-down structure, activity lists, assessment of work content, concept of productivities, estimating durations, sequence of activities, activity utility data; Techniques of planning- Bar charts, Gantt Charts.

Networks: basic terminology, types of precedence relationships, preparation of CPM networks: activity on link and activity on node representation, computation of float values, critical and semi critical paths, calendaring networks. PERT- Assumptions underlying PERT analysis, determining three-time estimates, analysis, slack computations, calculation of probability of completion

NOTE: NUMBER OF EXERCISES PROPOSED

1. Three in flat Roof & one in Sloped Roof
2. Exercises on Data – three Nos.

TEXT BOOKS:

1. Estimating and costing by B.N. Dutta, UBS publishers, 2000.
2. Estimating and costing by G.S. Birdie
3. Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, Laxmi Publications, 2016
4. Chitkara, K. K. Construction Project Management. Tata McGraw-Hill Education, 2014

REFERENCE BOOKS:

1. Standard Schedule of rates and standard data book by public works department.
2. S. 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. Peurifoy, R.L. Construction Planning, Methods and Equipment, McGraw Hill, 2011
5. Nunnally, S.W. Construction Methods and Management, Prentice Hall, 2006
6. Jha, Kumar Neeraj., Construction Project management, Theory & Practice, Pearson Education India, 2015

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IV Year B.Tech. CE -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20CE7PE01) WASTE MANAGEMENT

Professional Elective – III

Course Objectives: The objectives of the course are to

1. **Define** the terms **and understands** the necessity of solid waste management.
2. **Explain** the strategies for the collection of solid waste.
3. **Describe** the solid waste disposal methods.
4. **Categorize** Hazardous Waste.

Course Outcomes: At the end of the course the student will able to:

1. Identify the physical and chemical composition of solid wastes
2. Analyse the generation, storage, collection and handling techniques.
3. Understand the techniques and methods used in transformation, conservation, and recovery of
4. materials from solid wastes.
5. Understand the landfill techniques.

UNIT - I

Solid Waste: Definitions, Types of solid wastes, sources of solid wastes, Characteristics, and perspectives; properties of solid wastes, Sampling of Solid wastes, Elements of solid waste management - Integrated solid waste management, Solid Waste Management Rules 2016.

UNIT - II

Engineering Systems for Solid Waste Management: Solid waste generation; on-site handling, storage and processing; collection of solid wastes; Stationary container system and Hauled container systems – Route planning - transfer and transport; processing techniques;

UNIT - III

Engineering Systems for Resource and Energy Recovery: Processing techniques; materials recovery systems; recovery of biological conversion products – Composting, pre and post processing, types of composting, Critical parameters, Problems with composing - recovery of thermal conversion products; Pyrolisis, Gasification, RDF - recovery of energy from conversion products; materials and energy recovery systems.

UNIT – IV

Landfills: Evolution of landfills – Types and Construction of landfills – Design considerations – Life of landfills- Landfill Problems – Lining of landfills – Types of liners – Leachate pollution and control – Monitoring landfills – Landfills reclamation.

UNIT - V

Hazardous waste Management: – Sources and characteristics, Effects on environment, Risk assessment – Disposal of hazardous wastes – Secured landfills, incineration - Monitoring – Biomedical waste disposal, E-waste management, Nuclear Wastes, Industrial waste Management

TEXT BOOKS:

1. Tchobanoglous G, Theisen H and Vigil SA ‘Integrated Solid Waste Management, Engineering
2. Principles and Management Issues’ McGraw-Hill, 1993.

REFERENCE BOOKS:

1. Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, ‘Environmental Engineering’, McGraw Hill Inc., New York, 1985.
2. Qian X, Koerner RM and Gray DH, ‘Geotechnical Aspects of Landfill Design and Construction’ Prentice Hall, 2002.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. CE -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20CE7PE02) CONSTRUCTION TECHNOLOGY AND MANAGEMENT

Professional Elective – III

Course Objectives: This subject deals with overall planning, coordination and control of projects. This course gives the students scientific principles involved in construction, an understanding of the behavior of construction materials and fundamentals of structural mechanics.

Course Outcomes: At the end of the course, the student should be able to:

1. Understand the fundamentals of project management.
2. Identify construction facilities and equipment's required.
3. Develop project activity networks.
4. Understand Building Information Modelling integrated approach.
5. Understand about contract management techniques.

UNIT - I

Management -Fundamentals of construction project management: Introduction, Project Initiation and Planning.

UNIT - II

Planning of construction facilities - Earthwork construction - Equipment for construction, Construction Finances – decision making, Cement concrete construction- Construction of Piles - Construction of Cofferdams - Construction of Tunnels.

UNIT - III

Development of project activity networks, Precedence Diagram Method, Critical Path Method (CPM), Program Evaluation and Review Technique (PERT), Line Balance Methods in scheduling, Time Value of Money, Investment Analysis, Cost-Benefit Analysis.

UNIT – IV

Introduction to Building Information Modelling (BIM), Lean construction, and Integrated Project Delivery in construction, Crashing of project, Cost Optimization, Invoicing, Preparation of RA bill, Safety in construction, Estimation.

UNIT - V

Contracts: Contracts in construction, fundamentals of delay analysis and claims; Advances in construction management, tender and tender document - Deposits by the contractor - Arbitration. Negotiation M. Book Muster roll –stores.

REFERENCE BOOKS:

1. Bennett, F. Lawrence., The management of construction: a project life cycle approach. Rutledge, 2003.
2. Oberlender, Garold D., Project management for engineering and construction. Vol. 2. New York: McGraw-Hill, 1993.
3. Peurifoy, Robert Leroy, Cliff J. Schexnayder and Shapira A. Construction planning, equipment, and methods. No. 696 pp. McGraw-Hill, 2010.
4. Chitkara, K. K. Construction Project Management. Tata McGraw-Hill Education, 2014.

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IV Year B.Tech. CE -I Sem	**L**	**T**	**P**	**C**
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(20CE7PE03) AIR POLLUTION AND CONTROL

Professional Elective – III

Course Objectives: The objectives of the course are to

1. Understand the Air pollution Concepts
2. Identify the source of air pollution
3. Know Air pollution Control devices
4. Distinguish the Air quality monitoring devices

Course Outcomes: At the end of the course, the student should be able to:

1. Identify sampling and analysis techniques for air quality assessment.
2. Understands about Atmospheric behavior with air pollution.
3. Understands control mechanism of Air pollutants Apply plume dispersion modelling and assess the concentrations
4. Understand process, working principle and equipment's for control of gaseous pollutants.
5. Understand vehicular pollution, indoor air pollution, their causes and preventive measures.

UNIT - I

Air Pollution: Definition of Air Pollution - Sources & Classification of Air Pollutants - Effects of air pollution - Global effects – Ambient Air Quality and standards – Monitoring air pollution, Sampling and analysis of Pollutants in ambient air - Stack sampling.

UNIT - II

Meteorology and Air Pollution: Factors influencing air pollution, Wind rose, Mixing Depths, Lapse rates and dispersion - Atmospheric stability, Plume behavior, Plume rise and dispersion, Prediction of air quality, Box model - Gaussian model - Dispersion coefficient - Application of tall chimney for Pollutant dispersion.

UNIT - III

Control of Particulate Pollutants: Properties of particulate pollution - Particle size distribution - Control mechanism - Dust removal equipment – Working principles and operation of settling chambers, cyclones, wet dust scrubbers, fabric filters & ESP.

UNIT – IV

Control of Gaseous Pollutants: Process and equipment for the removal by chemical methods Working principles and operation of absorption and adsorption equipment - Combustion and condensation equipment.

UNIT - V

Automobile and Indoor Pollution: Vehicular pollution – Sources and types of emission – Effect of operating conditions-Alternate fuels and emissions-Emission controls and standards, Strategies to control automobile pollution– Causes of indoor air pollution-changes in indoor air quality-control and air cleaning systems-indoor air quality.

TEXT BOOKS:

1. M.N. Rao and HVN Rao, Air Pollution, Tata McGraw Hill Publishers
2. Noel, D. N., Air Pollution Control Engineering, Tata McGraw Hill Publishers, 1999

REFERENCE BOOKS:

1. Air Pollution Control Engineering by Nevers, , McGraw-Hill, Inc., 2000.
2. Fundamentals of Air Pollution by Dr. B.S.N. Raju, Oxford & I.B.H.
3. Air Pollution and Health by T. Holgate, Hillel S. Koren, Jonathan M. Samet, Robert L. Maynard

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IV Year B.Tech. CE -I Sem	**L**	**T**	**P**	**C**
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(20CE7PE04) ELEMENTS OF EARTHQUAKE ENGINEERING

Professional Elective – III

Pre-Requisites: Structural Engineering

Course Objectives: The objectives of the course are to

1. Understand Engineering Seismology
2. Explain and discuss single degree of freedom systems subjected to free and forced vibrations
3. Acquire the knowledge of the conceptual design and principles of earthquake resistant designs as per IS codes
4. understand importance of ductile detailing of RC structures

Course Outcomes: After the completion of the course student should be able to

1. Discuss and explain causes and Theories on earthquake, seismic waves, measurement of earthquakes.
2. Understand conceptual design, ductility and Seismic design requirements.
3. Analyze design principles for Reinforced concrete buildings.
4. Analyze design principles for Masonry Buildings.
5. Evaluate structural and non-structural walls and ductility requirement for earthquake resistant buildings.

UNIT - I

Engineering Seismology: Earthquake phenomenon - cause of earthquakes-Faults- Plate tectonics Seismic waves- Terms associated with earthquakes-Magnitude/Intensity of an earthquake-scales Energy Released-Earthquake measuring instruments seismogram - Seismoscope, Seismograph, strong ground motions-Seismic zones of India.

Theory of Vibrations: Elements of a v vibratory system- Degrees of Freedom-Continuous system Lumped mass idealization-Oscillatory Motion-Simple Harmonic Motion-Free vibration of single degree of freedom (SDOF) system- undamped and damped-critical damping-Logarithmic Decrement-Forced Vibrations-Harmonic Excitation-Dynamic magnification factor-Excitation by rigid based translation for SDOF system-Earthquake ground motion.

UNIT - II

Conceptual design: Introduction-Functional Planning-Continuous load path-Overall form-simplicity and symmetry-elongated shapes-stiffness and strength-Horizontal and Vertical Members-Twisting of buildings-Ductility-definition-ductility relationships-flexible buildings-framing systems-choice of construction materials-unconfined concrete-confined concrete-masonry-reinforcing steel.

Introduction to earthquake resistant design: Seismic design requirements-regular and irregular configurations-basic assumptions-design earthquake loads-basic load combinations-permissible stresses-seismic methods of analysis-factors in seismic analysis-equivalent lateral force method.

UNIT - III

Reinforced Concrete Buildings: Principles of earthquake resistant deign of RC members- Structural models for frame buildings - Seismic methods of analysis- IS code-based methods for seismic design - Vertical irregularities - Plan configuration problems- Lateral load resisting systems- Determination of design lateral forces as per IS 1893 (Part-1):2016- Equivalent lateral force procedure- Lateral distribution of base shear.

UNIT – IV

Masonry Buildings: Introduction- Elastic properties of masonry assemblage- Categories of masonry buildings- Behavior of unreinforced and reinforced masonry walls- Behavior of walls- Box action and bands- Behavior of infill walls- Improving seismic behavior of masonry buildings- Load combinations and permissible stresses- Seismic design requirements- Lateral load analysis of masonry buildings.

UNIT - V

Structural Walls and Non-Structural Elements: Strategies in the location of structural walls- sectional shapes- variations in elevation- cantilever walls without openings – Failure mechanism of nonstructured- Effects of non-structural elements on structural system- Analysis of non-structural elements Prevention of non-structural damage

Ductility Considerations in Earthquake Resistant Design of RC Buildings: Introduction- Impact of Ductility- Requirements for Ductility- Assessment of Ductility- Factors affecting Ductility- Ductile detailing considerations as per IS 13920-2016 - Behavior of beams, columns and joints in RC buildings during earthquakes

TEXT BOOKS:

1. Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press
2. Earthquake Resistant Design of structures – Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd.

REFERENCE BOOKS:

1. Seismic Design of Reinforced Concrete and Masonry Building – T. Paulay and M.J.N. Priestly, John Wiley & Sons.
2. Earthquake Resistant Design of Building structures by Vinod Hosur, Wiley India Pvt. Ltd.
3. Elements of Mechanical Vibration by R.N.Iyengar, I.K.International Publishing House Pvt. Ltd.
4. Masory and Timber structures including earthquake Resistant Design –Anand S.Arya, Nem chand & Bros
5. Earthquake Tips – Learning Earthquake Design and Construction, C.V.R. Murthy

BIS Codes: 1. IS 1893(Part-1):2016. 2. IS 13920:2016. 3. IS 4326. 4. IS 456:2000

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IV Year B.Tech. CE -I Sem

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REMOTE SENSING AND GIS
Open Elective – II

Course Objectives: Know the concepts of Remote Sensing, its interpreting Techniques and concepts of Digital images know the concept of Geographical Information System (GIS), coordinate system GIS Data and its types Understand the students managing the spatial Data Using GIS. Understand Implementation of GIS interface for practical usage.

Course Outcomes: After the completion of the course student should be able to

1. Describe different concepts and terms used in Remote Sensing and its data
2. Understand the Data conversion and Process in different coordinate systems of GIS interface
3. Evaluate the accuracy of Data and implementing a GIS
4. Understand the applicability of RS and GIS for various applications.

UNIT - I

Concepts of Remote Sensing Basics of remote sensing- elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology & units, energy resources, energy interactions with earth surface features & atmosphere, atmospheric effects, satellite orbits, Sensor Resolution, types of sensors. Remote Sensing Platforms and Sensors, IRS satellites.

Remote Sensing Data Interpretation Visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of soil, water and vegetation. Concepts of Digital image processing, image enhancements, qualitative & quantitative analysis and pattern recognition, classification techniques and accuracy estimation.

UNIT - II

Introduction to GIS: Introduction, History of GIS, GIS Components, GIS Applications in Real life, The Nature of geographic data, Maps, Types of maps, Map scale, Types of scale, Map and Globe, Co- ordinate systems, Map projections, Map transformation, Geo-referencing.

UNIT - III

Spatial Database Management System: Introduction: Spatial DBMS, Data storage, Database structure models, database management system, entity-relationship model, normalization Data models and data structures: Introduction, GIS Data model, vector data structure, raster data structure, attribute data, geo-database and metadata.

UNIT – IV

Spatial Data input and Editing: Data input methods – keyboard entry, digitization, scanning, conversion of existing data, remotely sensed data, errors in data input, Data accuracy, Micro and Macro components of accuracy, sources of error in GIS. Spatial Analysis: Introduction, topology, spatial analysis, vector data analysis, Network analysis, raster data analysis, Spatial data interpolation techniques.

UNIT - V

Implementing a GIS and Applications Implementing a GIS: Awareness, developing system requirements, evaluation of alternative systems, decision making using GIS Applications of GIS: GIS based road network planning, Mineral mapping using GIS, Shortest path detection using GIS, Hazard Zonation using remote sensing and GIS, GIS for solving multi criteria problems, GIS for business applications.

TEXT BOOKS:

1. Remote Sensing and GIS by Basudeb Bhatta, Oxford University Press, 2nd Edition, 2011
2. Introduction to Geographic Information systems by Kang-Tsung Chang, McGraw Hill Education (Indian Edition),7th Edition,2015.
3. Fundamentals of Geographic Information systems by Michael N. Demers, 4th Edition, Wiley Publishers, 2012.

REFERENCE BOOKS:

1. Remote Sensing and Image Interpretation by Thomas M. Lillesand and Ralph W. Kiefer, Wiley Publishers,7thEdition,2015.
2. Geographic Information systems An Introduction by Tor Bernhardsen, Wiley India Publication, 3rd Edition, 2010.
3. Advanced Surveying: Total Station, GIS and Remote Sensing by Satheesh Gopi, R. Sathi Kumar, N. Madhu, Pearson Education, 1st Edition, 2007.
4. Textbook of Remote Sensing and Geographical Information systems by M. Anji Reddy.

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IV Year B.Tech. CE -I Sem

L	T	P	C
3	0	0	3

AIR POLLUTION
Open Elective – II

Course Objectives: The objectives of the course are to
1. Understand the Air pollution Concepts
2. Identify the source of air pollution
3. Know Air pollution Control devices
4. Distinguish the Air quality monitoring devices

Course Outcomes: At the end of the course the student will be able to
1. Identify sampling and analysis techniques for air quality assessment
2. Describe the plume behavior for atmospheric stability conditions
3. Apply plume dispersion modelling and assess the concentrations
4. Design air pollution controlling devices

UNIT - I

Air Pollution: Definition of Air Pollution - Sources & Classification of Air Pollutants - Effects of air pollution - Global effects – Ambient Air Quality and standards – Monitoring air pollution, Sampling and analysis of Pollutants in ambient air - Stack sampling.

UNIT - II

Meteorology and Air Pollution: Factors influencing air pollution, Wind rose, Mixing Depths, Lapse rates and dispersion - Atmospheric stability, Plume behavior, Plume rise and dispersion, Prediction of air quality, Box model - Gaussian model - Dispersion coefficient - Application of tall chimney for Pollutant dispersion.

UNIT - III

Control of Particulate Pollutants: Properties of particulate pollution - Particle size distribution - Control mechanism - Dust removal equipment – Working principles and operation of settling chambers, cyclones, wet dust scrubbers, fabric filters & ESP.

UNIT – IV

Control of Gaseous Pollutants: Process and equipment for the removal by chemical methods - Working principles and operation of absorption and adsorption equipment - Combustion and condensation equipment.

UNIT - V

Automobile and Indoor Pollution: Vehicular pollution – Sources and types of emission – Effect of operating conditions-Alternate fuels and emissions-Emission controls and standards, Strategies to control automobile pollution– Causes of indoor air pollution-changes in indoor air quality-control and air cleaning systems-indoor air quality.

TEXT BOOKS:

1. M.N. Rao and HVN Rao, Air Pollution, Tata McGraw Hill Publishers
2. Noel, D. N., Air Pollution Control Engineering, Tata McGraw Hill Publishers, 1999.

REFERENCE BOOKS:

1. Air Pollution Control Engineering by Nevers, , McGraw-Hill, Inc., 2000
2. Fundamentals of Air Pollution by Dr. B.S.N. Raju, Oxford & I.B.H.
3. Air Pollution and Health by T. Holgate, Hillel S. Koren, Jonathan M. Samet, Robert L. Maynard publisher Academic Press

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IV Year B.Tech. CE -I Sem	**L**	**T**	**P**	**C**
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(20CE7HS01) PROFESSIONAL PRACTICE LAW AND ETHICS

Course Objectives: The objectives of the course are to

1. To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession
2. To develop some ideas of the legal and practical aspects of their profession.

Course Outcomes: After the completion of the course student should be able to

1. understand professional Practice and Ethics.
2. understand contract laws.
3. Arbitration, Conciliation and ADR (Alternative Dispute Resolution) system.
4. Labor and employment laws, RERA and NBC rules.
5. Intellectual property rights.

UNIT - I

Professional Practice and Ethics: Definition of Ethics, Professional Ethics - Engineering Ethics, Personal Ethics; Code of Ethics - Profession, Professionalism, Professional Responsibility, Conflict of Interest, Gift Vs Bribery, Environmental breaches, Negligence, Deficiencies in state-of-the-art; Vigil Mechanism, histle blowing, protected disclosures. Introduction to GST- Various Roles of Various Stake holders

UNIT - II

Law of Contract: Nature of Contract and Essential elements of valid contract, Offer and Acceptance, Consideration, Capacity to contract and Free Consent, Legality of Object. Unlawful and illegal agreements, Contingent Contracts, Performance and discharge of Contracts, Remedies for breach of contract. Contracts-II: Indemnity and guarantee, Contract of Agency, Sale of goods Act -1930: General Principles, Conditions & Warranties, Performance of Contract of Sale.

UNIT - III

Arbitration, Conciliation and ADR (Alternative Dispute Resolution) system: Arbitration – meaning, scope and types – distinction between laws of 1940 and 1996; UNCITRAL model law – Arbitration and expert determination; Extent of judicial intervention; International commercial arbitration; Arbitration agreements essential and kinds, validity, reference and interim measures by court; Arbitration tribunal appointment, challenge, jurisdiction of arbitral tribunal, powers, grounds of challenge, procedure and court assistance; Distinction between conciliation, negotiation, mediation and arbitration, confidentiality, resort to judicial proceedings, costs; Dispute Resolution Boards; Lok Adalats.

UNIT – IV

Engagement of Labour and Labour & other construction-related Laws: Role of Labour in Civil engineering; Methods of engaging labour- on rolls, labour sub-contract, piece rate work; Industrial Disputes Act, 1947; Collective bargaining; Industrial Employment (Standing Orders) Act, 1946; Workmen's Compensation Act, 1923; Building & Other - Construction Workers (regulation of employment and conditions of service) Act (1996) and Rules (1998); RERA Act 2017, NBC 2017.

UNIT - V

Law relating to Intellectual property: Introduction – meaning of intellectual property, main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets; Law relating to Copyright in India including Historical evolution of Copy Rights Act, 1957, Meaning of copyright – computer programs, Ownership of copyrights and assignment, Criteria of infringement, Piracy in Internet – Remedies and procedures in India; Law relating to Patents under Patents Act, 1970

TEXT BOOKS:

1. Professional Ethics: R. Subramanian, Oxford University Press, 2015.
2. Ravinder Kaur, Legal Aspects of Business, 4e, Cengage Learning, 2016.

REFERENCE BOOKS:

1. RERA Act, 2017.
2. Wadhera (2004), Intellectual Property Rights, Universal Law Publishing Co.
3. T. Ramappa (2010), Intellectual Property Rights Law in India, Asia Law House.
4. O.P. Malhotra, Law of Industrial Disputes, N.M. Tripathi Publishers.

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IV Year B.Tech. CE -I Sem	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1**

(20CE7PC03) COMPUTER AIDED STRUCTURAL DESIGN LAB - II

Course Objectives: The objectives of the course are to

1. Analyze and design buildings for different load conditions.
2. Detailing of structural elements

Course Outcomes: After the completion of the course student should be able to

1. Analyze and design buildings for different load conditions using design software.
2. Illustrate proper detailing of RCC elements using drafting software.
3. Analyze and design overhead water tank.

LIST OF EXPERIMENTS

1. Analysis & Design of G+5 residential building subjected to DL, LL & WL.
2. Analysis & Design of G+5 residential building subjected to DL, LL & EQL.
3. Detailing of slabs
4. Detailing of beams.
5. Detailing of columns.
6. Detailing of footings.
7. Detailing of stairs.
8. Analysis & Design of overhead water tank

Note: Drafting of all the exercises is to be carried out using commercially available drafting software.

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IV Year B.Tech. CE -II Sem

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(20CE8PE01) TRANSPORTATION ENGINEERING – II

Professional Elective – IV

Course Objectives: The objectives of the course are to

1. To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession
2. To develop some ideas of the legal and practical aspects of their profession.

Course Outcomes: After the completion of the course student should be able to

1. understand about railway engineering. design railway track geometry. understand about Airport engineering.
2. design the runways and taxiways.
3. Understands about ports and harbors.
4. understand about railway engineering. design railway track geometry. understand about Airport engineering.
5. design the runways and taxiways.

UNIT - I

Railway Engineering:

Introduction – permanent way components – cross section of permanent way – functions and requirements of rails, sleepers and ballast – types of gauges – creep of rails – theories related tocreep – coning of wheels – adzing of sleepers – rail fastenings.

UNIT - II

Geometric design of railway track

Gradients – grade compensation – can't and negative super elevation can't deficiency degree of curves safe speed on railway track – points and crossings layout and functioning of left hand turn out and right-hand turn outs – station yards signaling and interlocking.

UNIT - III

Airport Engineering

Airport site selection – factors affecting site selection and surveys- runway orientation – wind rose diagram basic runway length – correction for runway length – terminal area – layout and functions – concepts of terminal building – simple building, linear concept, pier concept and satellite concept – typical layouts

UNIT – IV

Geometric design of runways and taxiways

Aircraft characteristics – influence of characteristics on airport planning and design geometric design elements of runway – standards and specifications as per- functions of taxiways – taxiway geometric design – geometric elements and standard specifications runway and taxiway lighting.

UNIT - V

Ports and Harbors

Requirements of ports and harbors – types of ports – classification of harbors – docks and types of docks – dry docks, wharves and jetties – breakwaters: layouts of different types of harbors and docks – dredging operations – navigation aids.

TEXT BOOKS:

1. A Text Book of Railway Engineering-S.C.Saxena and S.Arora, Dhanpatrai and Sons,New Delhi.
2. Satish Chandra and Agarwal, M.M. (2007) "Railway Engineering" Oxford HigherEducation, University Press New Delhi.
3. Airport Planning and Design- S.K. Khanna and M.G Arora, Nemchand Bros.
4. A Text book of Transportation Engineering – S.P.Chandola – S.Chand & Co. Ltd. –(2001).
5. Railway Track Engineering by J.S.Mundrey

REFERENCE BOOKS:

1. Highway, railway, Airport and Harbour Engineering – K.P. Subramanian, SciTechpublishers.
2. Harbour, Dock and Tunnel Engineering – R. Srinivasan, Charotar Publishing HousePvt. Limited, 2009
3. Dock and Harbour Engineering – Hasmukh P Oza, Gutam H Oza, Chartor Publisherspvt ltd

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IV Year B.Tech. CE -II Sem	**L**	**T**	**P**	**C**
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(20CE8PE02) FOUNDATION ENGINEERING
Professional Elective – IV

Course Objectives: The objectives of the course are to
1. To Plan Soil exploration program for civil Engineering Projects
2. To check the stability of slopes
3. To determine the lateral earth pressures and design retaining walls
4. To determine the Bearing capacity of Soil
5. To design pile group foundation

Course Outcomes: At the end of the course the student will able to
1. will illustrate different soil exploration methods.
2. will analyze slope stability.
3. illustrate earth pressure theories and stability factors of retaining walls.
4. design shallow foundation.
5. understand pile foundations.

UNIT - I
SOIL EXPLORATION: Need – methods of soil exploration – boring and sampling methods penetration tests – plate load test– planning of soil exploration program, Bore logs and preparation of soil investigation report.

UNIT - II
SLOPE STABILITY: Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes stability analysis by Swedish slip circle method, method of slices, Bishop's Simplified method of slices Taylor's Stability Number- stability of slopes of earth dams under different conditions.

UNIT - III
EARTH PRESSURE THEORIES: Active, Passive and at rest soil pressures Rankine's theory of earth pressure – earth pressures in layered soils – Coulomb's earth pressure theory.
RETAINING WALLS: Types of retaining walls – stability of gravity and cantilever retaining walls against overturning, sliding and, bearing capacity, filter material for drainage.

UNIT – IV
SHALLOW FOUNDATIONS - Types - choice of foundation – location and depth - safe bearing capacity shear criteria – Terzaghi's, and IS code methods - settlement criteria – allowable bearing pressure based on SPT N value and plate load test – allowable settlements of structures.

UNIT - V
PILE FOUNDATION: Types of piles – load carrying capacity of piles based on static pile formulae dynamic pile formulae – Pile Capacity through SPT results - pile load tests - load carrying capacity of pile groups in sands and clays – Settlement of pile groups – negative skin friction

TEXT BOOKS:
1. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt. Ltd, New Delhi
2. Principals of Geotechnical Engineering by Braja M. Das, Cengage Learning Publishers.

REFERENCE BOOKS:
1. Soil Mechanics and Foundation Engineering by VNS Murthy, CBS Publishers and Distributors.
2. Geotechnical Engineering Principles and Practices by Cuduto, PHI International.
R18 B.Tech. Civil Engg. Syllabus JNTU HYDERABAD 87
3. Analysis and Design of Substructures – Swami Saran, Oxford and IBH Publishing company Pvt Ltd (1998).
4. Geotechnical Engineering by S. K.Gulhati & Manoj Datta – Tata Mc.Graw Hill Publishing company New Delhi. 2005

5. Bowles, J.E., (1988) Foundation Analysis and Design – 4th Edition, McGraw-Hill Publishing company, Network.

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IV Year B.Tech. CE -II Sem	**L**	**T**	**P**	**C**
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(20CE8PE03) GROUND WATER HYDROLOGY
Professional Elective – IV

Pre-Requisites: Hydraulics & Fluid Mechanics
Course Objectives: The objectives of the course are to

1. To explain the concepts of Groundwater Development and Management.
2. To demonstrate and derive the basic equations used in Groundwater development and management and the corresponding equations
3. To know the investigations, field studies to conduct basic ground water studies.

Course Outcomes: On successful completion of this course, students should be able to:

1. Identify different fundamental equations and concepts as applied in the Groundwater studies.
2. Analysis of steady flow ground water.
3. Analysis of unsteady flow ground water.
4. Illustrate surface and sub-surface investigation.
5. Illustrate control of saline water intrusion.

UNIT - I
Ground Water Occurrence
Ground water hydrologic cycle, origin of ground water, rock properties effecting ground water, Vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as aquifers, types of aquifers, porosity, specific yield and specific retention. Ground Water Movement-Permeability, Darcy's law, storage coefficient, Transmissivity, Differential equation governing ground water flow in three dimensions derivation, ground water flow equation in polar coordinate system, ground water flow contours and their applications.

UNIT - II
Analysis of Pumping Test Data-I
Steady flow ground water flow towards a well in confined and unconfined aquifers-Dupit's and Theism's equations, assumptions, formation constants, yield of an open well interface and well tests.

UNIT - III
Analysis of Pumping Test Data-II
Unsteady flow towards well-non-Equilibrium equations, Thesis solution, Jocob and Chow's simplifications, Leak aquifers.

UNIT – IV
Surface and sub-surface Investigation
surface methods of exploration-Electrical resistivity method and Seismic refraction methods. Subsurface methods geophysical logging and resistivity logging. Concept of artificial recharge of ground water, recharge methods, Applications of GIS and RS in artificial recharge of ground water along with case studies.

UNIT - V
Saline water intrusion in aquifer
Occurrence of saline water intrusion, Ghyben-Herzberg relation, Shape of interface, control of water intrusion. Ground water basin management-case studies

TEXT BOOKS:

1. Ground water Hydrology by David Keith Todd, John Wiley & Son, New York. R18 B.Tech. Civil Engg. Syllabus JNTU HYDERABAD 110
2. Ground water by H.M. Raghunath, Wiley Eastern Ltd. Groundwater System Planning & Management, R. Willes & W.W.G. Yeh, Prentice Hall.

REFERENCE BOOKS:

1. Ground water by Bawvwr, John Wiley & Sons.
2. Applied Hydrogeology by C.W. Fetta, CBS Publishers & Distributors.
3. Ground Water Assessment, Development and Management by K R Karanth, McGraw Hill

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IV Year B.Tech. CE -II Sem	**L**	**T**	**P**	**C**
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(20CE8PE04) DESIGN AND DRAWING OF IRRIGATION STRUCTURE

Professional Elective – IV

Pre-Requisites: Water Resources Engineering

Course Objectives: Learn designing and drawing of hydraulic structure like surplus weir, siphon well drop, trapezoidal notch fall, tank sluice with tower head.

Course Outcomes: At the end of the course, the student will be able to provide design & drawing of irrigation structures Design and drawing of the following hydraulic structures.

1. Surplus weir.
2. Syphon Well Drop
3. Trapezoidal notch fall.
4. Tank sluice with tower head
5. Sloping glacis weir
6. Canal Regulator
7. Type III Syphon aqueduct

Final Examination pattern:

The Question paper is divided into two parts with two questions in each part. The student has to answer ONE question from each part. Part I should cover the designs and drawings for 45 marks and Part II should cover only designs carrying 30 marks.

TEXT BOOKS:

1. Water Resources Engineering – Principles and Practice by Challa Satyanarayana Murthy, New Age International Publishers.
2. Irrigation engineering and Hydraulic structures by S. K. Garg, Standard Book House. by G. L. Asla
3. Irrigation and Water Resource Engineering by G.L. Asawa New Age International Publishers - 2013

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. CE -II Sem

L	T	P	C
3	0	0	3

(20CE8PE05) DISASTER MANAGEMENT

Professional Elective – V

Course Objectives: The subject provides different disasters, tools and methods for disaster management.

Course Outcomes: At the end of the course, the student will be able to:

1. Understands Disasters, man-made Hazards and Vulnerabilities
2. Understands disaster management mechanism
3. Understands capacity building concepts.
4. Understands how to cope with disaster & industrial safety.
5. Understand how to cope with disaster management.

UNIT - I

Understanding Disaster: Concept of Disaster - Different approaches- Concept of Risk - Levels of Disasters - Disaster Phenomena and Events (Global, national and regional) Hazards and Vulnerabilities: Natural and man-made hazards; response time, frequency and forewarning levels of different hazards - Characteristics and damage potential or natural hazards; hazard assessment - Dimensions of vulnerability factors; vulnerability assessment - Vulnerability and disaster risk - Vulnerabilities to flood and earthquake hazards.

UNIT - II

Disaster Management Mechanism: Concepts of risk management and crisis managements - Disaster Management Cycle - Response and Recovery - Development, Prevention, Mitigation and Preparedness - Planning for Relief.

UNIT - III

Capacity Building: Capacity Building: Concept - Structural and Nonstructural Measures Capacity Assessment; Strengthening Capacity for Reducing Risk - Counter-Disaster Resources and their utility in Disaster Management - Legislative Support at the state and national levels.

UNIT – IV

Coping with Disaster: Coping Strategies; alternative adjustment processes - Changing Concepts of disaster management - Industrial Safety Plan; Safety norms and survival kits - Mass media and disaster management.

UNIT - V

Planning for disaster management: Strategies for disaster management planning - Steps for formulating a disaster risk reduction plan - Disaster management Act and Policy in India - Organizational structure for disaster management in India - Preparation of state and district disaster management plans.

TEXT BOOKS:

1. Manual on Disaster Management, National Disaster Management, Agency Govt of India.
2. Disaster Management by Mrinalini Pandey Wiley 2014.
3. Disaster Science and Management by T. Bhattacharya, McGraw Hill Education (India) Pvt Ltd Wiley 2015

REFERENCES:

1. Earth and Atmospheric Disasters Management, N. Pandharinath, CK Rajan, BS Publications 2009.
2. National Disaster Management Plan, Ministry of Home affairs, Government of India (http://www.ndma.gov.in/images/policyplan/dmplan/draftndmp.pdf)

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IV Year B.Tech. CE -II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20CE8PE06) GREEN BUILDING TECHNOLOGY
Professional Elective – V

Course Outcomes: At the end of the course, the student will be able to

1. Understands green building features, benefits, rating system and agencies involved.
2. Understands site selection, planning, water conservation and efficiency.
3. Understands energy efficiency, wind and solar energy.
4. Understands use of local building materials.
5. Understands improvement of indoor environmental quality.

UNIT - I

Green Buildings:

Introduction to Green Buildings: Definition of green buildings and sustainable development, typical features of green buildings, benefits of green buildings towards sustainable development. Green building rating systems – GRIHA, IGBC and LEED, overview of the criteria as per these rating systems.

UNIT - II

Site selection and planning:

Criteria for site selection, preservation of landscape, soil erosion control, minimizing urban heat island effect, maximize comfort by proper orientation of building facades, day
lighting, ventilation, etc.

Water conservation and efficiency: Rainwater harvesting methods for roof & non-roof, reducing landscape water demand by proper irrigation systems, water efficient plumbing systems, water metering, waste water treatment, recycle and reuse systems.

UNIT - III

Energy Efficiency:

Environmental impact of building constructions, Concepts of embodied energy, operational energy and life cycle energy. Methods to reduce operational energy: Energy efficient building envelopes, efficient lighting technologies, energy efficient appliances for heating and air-conditioning
systems in buildings, zero ozone depleting potential (ODP) materials, wind and solar energy harvesting, energy metering and monitoring, concept of net zero buildings.

UNIT – IV

Building materials:

Methods to reduce embodied energy in building materials: (a) Use of local building materials (b) Use of natural and renewable materials like bamboo, timber, rammed earth, stabilized mud blocks, (c) use of materials with recycled content such as blended cements, pozzolana cements, fly ash
bricks, vitrified tiles, materials from agro and industrial waste. (d) reuse of waste and salvaged materials

Waste Management: Handling of construction waste materials, separation of household waste, on-site and off-site organic waste management.

UNIT - V

Indoor Environmental Quality for Occupant Comfort and Wellbeing: Daylighting, air ventilation, exhaust systems, low VOC paints, materials & adhesives, building acoustics. Codes related to green buildings: NBC, ECBC, ASHRAE, UPC etc.

TEXT BOOKS:

1. 'Alternative building materials and technologies' by K.S. Jagadish, B.V. Venkatarama Reddy and K.S. Nanjunda Rao.
2. 'Non-Conventional Energy Resources' by G. D. Rai, Khanna Publishers.

REFERENCES:

1 'Pollution Prevention and Abatement Handbook – Towards Cleaner Production' by World Bank Group (1998),World Bank and UNEP, Washington D.C.
2 'Handbook of Organic Waste Conversion' by Bewik M.W.M.
3 'Energy, The Solar Hydrogen Alternative' by Bokris J.O.
4 'Solar Energy' by Sukhatme S.P.
5 'Waste Energy Utilization Technology' by Kiang Y. H.
6 IGBC Green Homes Rating System, Version 2.0., Abridged reference guide, 2013, Indian Green
7 Building Council Publishers.
8 GRIHA version 2015, GRIHA rating system, Green Rating for Integrated Habitat Assessment.
9 Alternative building materials and technologies by K.S. Jagadish, B.V. Venkatarama Reddy and K.S. Nanjunda Rao.
11 Non-Conventional Energy Resources by G. D. Rai, Khanna Publishers.
12 Sustainable Building Design Manual, Vol.1 and 2, TERI, New Delhi 2004.
13 Mike Montoya, Green Building Fundamentals, Pearson, USA, 2010.
14 Charles J. Kibert, Sustainable Construction – Green Building Design and Delivery, John Wiley & Sons, New York, 2008.
15 Regina Leffers, Sustainable Construction and Design, Pearson / Prentice Hall, USA, 2009.

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IV Year B.Tech. CE -II Sem

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(20CE8PE07) ADVANCED STRUCTURAL DESIGN
Professional Elective – V

Prerequisites: Structural Engineering RCC, STEEL and Structural analysis.
Course Objective: To make the student more conversant with the design principles of critical structures using limit state approach.
Course Outcomes: At the end of the course, the student will be able to

1. Design retaining walls and check its stability.
2. Design flat slabs and check for shear, deflections.
3. Design of RCC Circular water tank.
4. Design of RCC Bridges.
5. Design of steel Gantry Girders.

UNIT - I
Design and detailing of cantilever type of Retaining walls – Stability Check. Principles& Design of Counter fort Retaining walls.

UNIT - II
Flat slabs: Direct design method – Distribution of moments in column strips and middle strip-moment and shear transfer from slabs to columns – Shear in Flat Slabs-Check for one way and two-way shears Ribbed slabs: Analysis of the Slabs for Moment and Shears, Ultimate Moment of Resistance, Design for shear, Deflection, Arrangement of Reinforcements.

UNIT - III
Design of RCC Circular Water Tanks.

UNIT – IV
Introduction - Definition and basic forms – Components of a bridge - Classification of bridges – IRC Loading Standards and specifications - Design of Reinforced Concrete Slab Bridge decks

UNIT - V
Design of Steel Gantry Girders.

TEXT BOOKS:

1. Advanced RCC by Krishnam Raju, CBS Publishers & distributors, New Delhi.
2. Advanced RCC by Varghese, PHI Publications, New Delhi.
3. Structural Design and drawing (RCC and steel) by Krishnam Raju, Univ. Press, New Delhi
4. R.C.C Structures by Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications, New Delhi

REFERENCES:

1 RCC Designs by Sushil Kumar, standard publishing house.
2 Fundamentals of RCC by N.C. Sinha and S.K. Roy, S. Chand Publications, New Delhi.
3 N. Krishna Raju, Design of Bridges, Oxford & IBH Publishing Company Pvt. Ltd, New Delhi.

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IV Year B.Tech. CE -II Sem	**L**	**T**	**P**	**C**
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(20CE8PE08) SAFETY IN CIVIL ENGINEERING PRACTICE
Professional Elective – V

Course Outcomes: At the end of the course, the student will be able to

1. understand about accident causes, regulations and safety training.
2. illustrate various hazards in construction and preventive measures.
3. illustrate working at heights and safety precautions.
4. understand selection, operation, inspection, testing of construction machinery.
5. understand safety in demolition work.

UNIT - I

Accidents Causes And Management Systems : Problems impeding safety in construction industry- causes of fatal accidents, types and causes of accidents related to various construction activities, human factors associated with these accident – construction regulations, contractual clauses – Pre contract activates, preconstruction meeting - design aids for safe construction – permits to work – quality assurance in construction - compensation – Recording of accidents and safety measures – Education and training.

UNIT - II

Hazards Of Construction and Prevention: Excavations, basement and wide excavation, trenches, shafts – scaffolding, types, causes of accidents, scaffold inspection checklist – false work – erection of structural frame work, dismantling – tunneling – blasting, pre blast and post blast inspection – confined spaces – working on contaminated sites – work over water - road works – power plant constructions – construction of high-rise buildings.

UNIT - III

Working At Heights: Fall protection in construction OSHA 3146 – OSHA requirement for working at heights, Safe access and egress – safe use of ladders- Scaffoldings, requirement for safe work platforms, stairways, gangways and ramps – fall prevention and fall protection, safety belts, safety nets, fall arrestors, controlled access zones, safety monitoring systems – working on fragile roofs, work permit systems, height pass – accident case studies.

UNIT – IV

Construction Machinery : Selection, operation, inspection and testing of hoisting cranes, mobile cranes, tower cranes, crane inspection checklist - builder's hoist, winches, chain pulley blocks – use of conveyors - concrete mixers, concrete vibrators – safety in earth moving equipment, excavators, dozers, loaders, dumpers, motor grader, concrete pumps, welding machines, use of portable electrical tools, drills, grinding tools, manual handling scaffolding, hoisting cranes – use of conveyors and mobile cranes – manual handling.

UNIT - V

Safety In Demolition Work: Safety in demolition work, manual, mechanical, using explosive - keys to safe demolition, pre survey inspection, method statement, site supervision, safe clearance zone, health hazards from demolition - Indian standard - trusses, girders and beams – first aid – fire hazards and preventing methods – interesting experiences at the construction site against the fire accidents.

TEXT BOOKS:

1. Safety in the Build Environment' by Jnathea D.Sime, London, 1988.
2. 'Reliability Maintenance and Safety Engineering, by Gupta A K, Laxmi Publications, New Delhi.
3. 'Safety Management' by John V. Grimoldi, AITBS Publishers and Distributors, New Delhi.

REFERENCES:

1 'Construction hazard and Safety Hand book' by Hudson, R., Butter Worth's, 1985.
2 'Construction Safety Hand Book'by V.J.Davies and K.Thomasin, Thomas Telford Ltd., London, 1990.
3 'Handbook of OSHA Construction Safety and Health'by Charles D. Reese & James V. Edison.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. CE -II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

GREEN BUILDING TECHNOLOGY
Open Elective – III

Course Outcomes: At the end of the course, the student will be able to:

1. Understands green building features, benefits, rating system and agencies involved.
2. Understands site selection, planning, water conservation and efficiency
3. Understands energy efficiency, wind and solar energy.
4. Understands use of local building materials.
5. Understands improvement of indoor environmental quality.

UNIT – I

Green Buildings:

Introduction to Green Buildings: Definition of green buildings and sustainable development, typical features of green buildings, benefits of green buildings towards sustainable development. Green building rating systems – GRIHA, IGBC and LEED, overview of the criteria as per these rating systems.

UNIT – II

Site selection and planning:

Criteria for site selection, preservation of landscape, soil erosion control, minimizing urban heat island effect, maximize comfort by proper orientation of building facades, day lighting, ventilation, etc.
Water conservation and efficiency: Rainwater harvesting methods for roof & non-roof, reducing landscape water demand by proper irrigation systems, water efficient plumbing systems, water metering, waste water treatment, recycle and reuse systems.

UNIT - III

Energy Efficiency:

Environmental impact of building constructions, Concepts of embodied energy, operational energy and life cycle energy. Methods to reduce operational energy: Energy efficient building envelopes, efficient lighting technologies, energy efficient appliances for heating and air-conditioning systems in buildings, zero ozone depleting potential (ODP) materials, wind and solar energy harvesting, energy metering and monitoring, concept of net zero buildings.

UNIT – IV

Building materials:

Methods to reduce embodied energy in building materials: (a) Use of local building materials (b) Use of natural and renewable materials like bamboo, timber, rammed earth, stabilized mud blocks, (c) use of materials with recycled content such as blended cements, pozzolana cements, fly ash bricks, vitrified tiles, materials from agro and industrial waste. (d) reuse of waste and salvaged materials Waste Management: Handling of construction waste materials, separation of household waste, on-site and off-site organic waste management.

UNIT - V

Indoor Environmental Quality for Occupant Comfort and Wellbeing:

Daylighting, air ventilation, exhaust systems, low VOC paints, materials & adhesives, building acoustics. Codes related to green buildings: NBC, ECBC, ASHRAE, UPC etc.

TEXT BOOKS:

1. Alternative building materials and technologies' by K.S. Jagadish, B.V. Venkatarama Reddy and K.S. Nanjunda Rao.
2. 'Non-Conventional Energy Resources' by G. D. Rai, Khanna Publishers.

REFERENCES:

1 'Pollution Prevention and Abatement Handbook – Towards Cleaner Production' by World Bank Group (1998), World Bank and UNEP, Washington D.C.
2 'Handbook of Organic Waste Conversion' by Bewik M.W.M.
3 'Energy, The Solar Hydrogen Alternative' by Bokris J.O.
4 'Solar Energy' by Sukhatme S.P.
5 'Waste Energy Utilization Technology' by Kiang Y. H.
6 IGBC Green Homes Rating System, Version 2.0., Abridged reference guide, 2013, Indian Green
7 Building Council Publishers.
8 GRIHA version 2015, GRIHA rating system, Green Rating for Integrated Habitat Assessment.
9 Alternative building materials and technologies by K.S. Jagadish, B.V. Venkatarama Reddy and K.S. Nanjunda Rao.
10 Non-Conventional Energy Resources by G. D. Rai, Khanna Publishers.
11 Sustainable Building Design Manual, Vol.1 and 2, TERI, New Delhi 2004.
12 Mike Montoya, Green Building Fundamentals, Pearson, USA, 2010.
13 Charles J. Kibert, Sustainable Construction – Green Building Design and Delivery, John Wiley & Sons, New York, 2008.
14 Regina Leffers, Sustainable Construction and Design, Pearson / Prentice Hall, USA, 2009.

Program Educational Objectives (PEO's):

PPEO 1: To prepare students to have good knowledge in the field of English, basic sciences and all basic Civil Engineering subjects.

PEO 1.1.To prepare students to have good knowledge in the field of English and basic sciences.

PEO 1.2.To prepare students to have good knowledge in the field of all basic civil Engineering Subjects.

PEO 2: The students will be trained in practical skills, communication skills and ethical values by providing industrial internship and workshops.

PEO 2.1.The students will be trained in practical skills, communication skills and ethical values.

PEO 2.2. To fulfill above the students will be provided with industrial internship and workshops.

PEO 3: The students will be motivated to innovate and for continuous learning process by encouraging them to attend seminars, becoming members of professional bodies and preparing them for pursuing higher studies

PEO 3.1 The students will be motivated to innovate.

PEO 3.2 The students will be motivated for continuous learning process.

PEO 3.3 To fulfill above the students will be motivated to attend seminars, becoming members of professional bodies and preparing them for pursuing higher studies..

Programme Outcomes (PO's) :

PO1.Engineering knowledge: Ability to obtain and apply the knowledge of science and engineering essentials in problem solving.

PO2.Problem Analysis: Ability to undertake problem recognition ,formulation and providing ideal solution.

PO3.Design/ development of solutions: An ability to design, implement a computer based system, with desire program to meet the needs of social and environmental considerations.

PO4.Conduct investigations of complex problems: An ability to apply mathematical formulas, algorithmic principles and computational theory to develop a model and design of computer based system.

PO5. Modern tool usage: An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

PO6.Engineer and society: An ability to analyze the impact of computing in different organizations, society including the varying policy issues that are taken care off.

PO7.Environment and sustainability: understanding of impact of engineering solutions on the environment and this attains sustainability with responsibility.

PO8.Ethics: An ability to lead a strong professionalism and the ethical values.

PO9.Individual and team work: An ability to function effectively on multidisciplinary environments leads to leadership and member of team work.

PO10. Communication: An ability to communicate effectively in both verbal and written form which enables to prepare well documentation for report writing and a project.

PO11.Project management and finance: Apply project management practices to the launch of new programs, initiatives, products, services, and events relative to the stakeholder needs including – finance.

PO12.Life-long learning: RRecognition of the need for higher studies and inspires to update the latest technologies by the way of life long learning process from time to time.

Program Specific Outcomes: (PSO's):

PSO 1: Ability to plan, analyzes, designs, and executes projects in civil engineering.

PSO 2: Provide sustainable solutions to the civil engineering problems.

Institutes Under

TKR EDUCATIONAL SOCIETY

Teegala Krishna Reddy Engineering College(TKEM)

TKR College of Engineering and Technology(TKRC)

TKR Institute of Management and Science(TKRB)

TKR College of Pharmacy(TKRP)