ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABUS

Effective from the Academic Year 2017-18 onwards

Department of Civil Engineering (CE)

For

B. Tech. Four Year Degree Programme
(MR17 Regulations)

MALLA REDDY ENGINEERING COLLEGE
(Autonomous)

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

MR17 – ACADEMIC REGULATIONS (CBCS)
for B.Tech. (REGULAR) DEGREE PROGRAMME

Applicable for the students of B.Tech. (Regular) programme admitted from the Academic Year *2017-18* onwards

The B.Tech. Degree of Jawaharlal Nehru Technological University Hyderabad, Hyderabad shall be conferred on candidates who are admitted to the programme and who fulfill all the requirements for the award of the Degree.

VISION

To establish a reputable professional education centre, to impart high quality trend setting technologies in an ambience of humanity, wisdom, intellect and innovation to nurture the students to become competent and committed professionals with disciplined ethical values.

MISSION

Commitment to progress in mining new knowledge by adopting cutting-edge technologies to promote academic growth by offering state-of-the-art undergraduate and postgraduateprogrammes based on well-versed perceptions of global areas of specialization to serve the nation with advanced technical knowledge.

DEPARTMENT VISION

Striving to be the centre of excellence in civil engineering education. To provide students the latest learning techniques and complete knowledge base for sustainable development of society.

DEPARTMENT MISSION

Provide value based technical education and empower the students to become competent professionals

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: To provide students with a solid foundation in Mathematical, Scientific, software skills and Engineering fundamentals required to solve engineering problems and also to pursue higher studies.

PEO2: To train students with good scientific and engineering breadth so as to comprehend, analyze, design and create novel products and solutions for the real life problems.

PEO3: To inculcate in students professional and ethical attitude, effective communication skills, teamwork skills, multidisciplinary approach and ability to relate engineering issues to broader social context.

PROGRAMME OUTCOMES (POs)

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

The graduates in Civil Engineering will be able to

1. Analyze Design, Construct, Maintain and Operate infrastructural projects.

2. Assess the environmental impact of various projects and take required measures to curb environmental deterioration.

3. Able to use latest softwares pertaining to various streams of Civil Engineering.

1. **Under-Graduate Degree Programme in Engineering & Technology (UGP in E&T): Malla Reddy Engineering College (Autonomous)** offers 4 Year (8 Semesters) **Bachelor of Technology** (**B.Tech**.) Under Graduate Programmes, with effect from the Academic Year 2017-18 onwards, in the following Branches of Engineering.

S. No.	Branch Code	Branch	Intake
1	01	Civil Engineering (CE)	180
2	02	Electrical and Electronics Engineering (EEE)	60
3	03	Mechanical Engineering (ME)	240
4	04	Electronics And Communication Engineering (ECE)	180
5	05	Computer Science and Engineering (CSE)	240
6	06	Information Technology (IT)	60
7	25	Mining Engineering (Mi.E)	60

2. Eligibility for Admission

2.1 Admission to the UGP shall be made either on the basis of the merit rank obtained by the qualifying candidate in entrance test conducted by the Telangana State Government (TSEAMCET), or the University, or on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the Government of Telangana from time to time.

2.2 The medium of instructions for the entire UGP in E&T will be ENGLISH only.

3. B.Tech. Programme (UGP) Structure & Duration of Study.

3.1 A student after securing admission shall pursue the Under Graduate Programme in B.Tech. in a minimum period of **four** academic years (8 semesters) and a maximum period of **eight** academic years (16 semesters) starting from the date of commencement of first year first semester. Further 2 years of extension is allowed for appearing examinations, failing which student shall forfeit seat in B.Tech. Course.

Each semester is structured to provide 24 credits, totaling to 192 credits for the entire B.Tech. programme.

Each student shall secure 192 credits (with CGPA ≥ 5) required for the completion of the Under Graduate Programme and award of the B.Tech. degree.

3.2 UGC/ AICTE specified Definitions/ Descriptions are adopted appropriately for various terms and abbreviations used in these Academic Regulations / Norms, which are as listed below.

3.2.1 Semester Scheme:

Each UGP is of 4 academic years (8 Semesters), with the academic year being divided into two semesters of 22 weeks (≥ 90 teaching days, out of which number of contact days for teaching / practical ≥ 75 and conducting examinations and preparation days = 15) each, each semester having **'Continuous Internal Evaluation (CIE)'** and **'Semester End Examination (SEE)'**. Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC and Curriculum / Course Structure as suggested by AICTE are followed.

3.2.2 Credit Courses:

All Subjects / Courses are to be registered by a student in a semester to earn credits. Credits shall be assigned to each Subject / Course in a L: T: P: C (Lecture Periods: Tutorial Periods: Practical Periods: Credits) Structure, based on the following general pattern.

- One Credit - for one hour / Week / Semester for Theory / Lecture (L) Courses; and
- One Credit - for two hours / Week / Semester for Laboratory / Practical (P) Courses or Tutorials (T).

Courses like Computational Mathematics Lab, Environmental Science, Professional Ethics, Gender Sensitization lab, Law for Engineers, Fine Arts / Foreign languages and other student activities like Internship, Sports / Yoga and NSS are identified as Mandatory / Audit courses. These courses will not carry any credits.

3.2.3 Subject / Course Classification:

All subjects / courses offered for the under graduate programme in E&T (B.Tech. degree programmes) are broadly classified as follows. The Institute has followed almost all the guidelines issued by AICTE / UGC/Affliating University.

- **(a) Foundation Courses (FC)**
- **(b) Core Courses (CC)**
- **(c) Elective Courses (EC)**
- **(d) Mandatory Courses (MC)**
- **(e) Audit Courses (AC)**
- **(f) Minor Courses (MiC)**

- **Foundation Courses (FC)** are further categorized as:
    - (i) Humanities and Social Sciences (HS)
    - (ii) Basic Sciences (BS)
    - (iii) Engineering Sciences (ES).
- **Core Courses (CC) and Elective Courses (EC)** are categorized as Professional Subjects (PS), which are further subdivided as –
    - (i) Professional / Departmental Core (PC) Subjects
    - (ii) Professional / Departmental Electives (PE)
    - (iii) Open Electives (OE)
    - (iv) Project Related (PR)
- **Mandatory Courses** (**MC** - Non-credit with evaluation).
- **Audit Courses** (**AC** – Non - credit without evaluation).
- **Minor Courses** (**MiC** – One or two credit courses)

3.2.4 Course Nomenclature:

The curriculum nomenclature or course - structure grouping for each of the UGP in E & T (B.Tech. Degree Programmes), is as listed below (along with AICTE specified % range of total credits).

Sl. No.	Classification		Course Work – Subject Area	Distribution of credits	as per AICTE
	AICTE	**UGC**			
1	HS	Foundation Courses	Humanities and Social sciences including English, Environmental Sciences and Management subjects.	5.20 %	5- 10 %
2	BS		Basic Sciences (BS) including Mathematics, Physics and Chemistry.	15.10 %	15- 20%
3	ES		Engineering sciences (ES) including Engineering Workshop, Engineering Graphics, Basics of Electrical and Electronics / Mechanical / Computer Engineering.	17.70 %	15 – 20%

4	PC	Core Courses	Professional core subjects are relevant to the chosen specialization / branch; [May be split into Hard (no choice) and Soft (with choice)], if required.	36.45 %	30 – 40%
5	PR	Project Related	Minor and major projects, Technical Seminar and Comprehensive viva-voce.	9.89 %	10 – 15%
6	PE	Professional Electives	Professional electives are relevant to the chosen specialization / branch.	10.41 %	10– 15 %
7	OE	Open Electives	Open electives are the courses from other technical and / or emerging subject areas.	5.2 %	5 – 10 %
8	MC	Mandatory Courses	These courses are non - credit courses with evaluation.	-	-
9	AC	Audit Courses	These courses are non - credit courses without evaluation.	-	-
10	MiC	Minor Courses	These are one or two credit courses intended to improve the skills of the student in placements and entrepreneurship.	-	-
Total credits for UGP (B.Tech.)					**192 (100%)**

4.0 Course Registration

4.1 A 'Faculty Advisor or Counselor' shall be assigned to each student, who will advise him on the Under Graduate Programme (UGP), its Course Structure and Curriculum, Choice / Option for Subjects / Courses, based on his competence, progress, pre-requisites and interest.

4.2 Academic section of the College invites 'Registration Forms' from students within 15 days from the commencement of class work for the first semester through 'ON-LINE SUBMISSIONS', ensuring 'DATE and TIME Stamping'. The ON-LINE registration requests for any 'SUBSEQUENT SEMESTER' shall be completed BEFORE the commencement of SEEs (Semester End Examinations) of the 'CURRENT SEMESTER'.

4.3 A Student can apply for ON-LINE Registration, ONLY AFTER obtaining the 'WRITTEN APPROVAL' from the Faculty Advisor / Counselor, which should be submitted to the College Academic Section through the Head of Department (a copy of it being retained with Head of Department, Faculty Advisor / Counselor and the Student).

4.4 A Student may be permitted to register for the Subjects / Course of CHOICE with a typical deviation of ± 4 credits of the semester with minimum credits of 20 and maximum credits of 28, based on his PROGRESS and SGPA / CGPA and completion of the 'PRE-REQUISITES' as indicated for various Subjects / Courses in the department course structure and syllabus contents. It needs specific approval and signature of the Faculty Advisor / Counselor and Head of the Department, 'within a period of 15 days' from the beginning of the current semester.

4.5 If the student submits ambiguous choices or multiple options or erroneous entries during ON-LINE registration for the Subject(s) / Course(s) under a given specified Course / Group / Category as listed in the course structure, only the first mentioned Subject / Course in that category will be taken into consideration.

4.6 Subject / Course options exercised through ON-LINE registration are final and CANNOT be changed, nor can they be inter-changed; further, alternate choices will also not be considered. However, if the Subject / Course that has already been listed for registration (by the Head of Department) in a semester could not be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to have alternate choice - either for a new Subject (subject to offering of such a Subject), or for another existing subject (subject to availability of seats), which may be considered. Such alternate arrangements will be made by the Head of the Department, with due notification and time - framed schedule, within the FIRST WEEK from the commencement of Class - work for that semester. Such changes are to be intimated to Chief Controller of Examinations/Principal immediately.

4.7 Open Electives: A student has to complete 3 Open Electives during the period of UGP. The students have to choose only one open elective in a semester from III year I semester onwards from the given list. However, the student cannot opt for an open elective subject offered by their own (parent) department, if it is already listed under any category of the subjects offered by parent department in any semester.

4.8 Professional Electives: A student has to complete 6 Professional Electives during the period of UGP. Students have to choose professional electives from III year I semester onwards from the list of professional electives offered by their departments.

4.9 For Audit Courses like Sports / Yoga and NSS, Computational Mathematics Lab, MOOC/NPTEL online courses etc, a '**Satisfactory Participation Certificate**' from the authorities concerned for the relevant semester is essential. No Marks or Credits shall be awarded for these activities.

4.10 For Mandatory Courses, a '**Satisfactory / Not Satisfactory' grade** is awarded based on the performance in both CIE and SEE.

5.0 Subjects / Courses to be offered

5.1 A typical Section (or Class) strength for each semester shall be 60.

5.2 A Subject/ Course may be offered to the students, ONLY IF a minimum of 40 students opt for the same. The maximum strength of a section is limited to 70.

5.3 More than ONE TEACHER may offer the SAME SUBJECT (Lab / Practical may be included with the corresponding theory subject in the same semester) in any semester. However, selection choice for students will be based on 'FIRST COME FIRST SERVE' basis and 'CGPA Criterion' (ie., the first focus shall be on early ON - LINE ENTRY from the student for registration in that semester and the second focus, if needed, will be on CGPA of the student).

5.4 If more entries for registration of a subject come into picture, then the concerned Head of the Department shall take necessary actions, whether to offer such a Subject / Course for TWO (or multiple) SECTIONS or NOT .

6.0 Attendance Requirements:

6.1 A student shall be eligible to appear for the Semester End Examinations, if he / she acquire a minimum of 75 % of attendance in aggregate of all the Subjects / Courses (including Non - Credit Courses) for that semester.

6.2 Condoning of shortage of attendance in aggregate up to 10 % (>= 65 % and < 75 %) in each semester may be granted by the College Academic Committee (CAC) on genuine and **valid grounds** based on the student's representation with supporting evidence.

6.3 A stipulated fee prescribed by the CAC, shall be payable towards condoning of shortage of attendance.

6.4 Shortage of attendance below 65% in aggregate shall in NO case be condoned.

6.5 Students, whose shortage of attendance is not condoned in any semester, are not eligible to register their Semester End Examinations, they get detained and their registration for that semester shall stand cancelled. They will not be promoted to the next semester. They may seek re-registration for all those Subjects registered in that Semester in which he got detained, by seeking re - admission for that semester as and when offered; in case if there are any Professional Electives and / or Open Electives, the same may also be **re-registered** if offered, however, if those electives are not offered in later semesters, then alternate electives may be chosen from the **same** set of elective subjects offered under that category.

6.6 If any student fulfills the attendance requirement in the present semester shall not be eligible for readmission into the same class.

7.0 Academic Requirements:

The following Academic Requirements have to be satisfied, in addition to the attendance requirements mentioned in item No.**7.**

7.1 A student shall be deemed to have satisfied the Academic Requirements and earned the credits allotted to each Subject / Course, if he / she secures not less than 40 % marks (24 out of 60 marks) in the Semester End Examination and a minimum of 40 % of the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) marks taken together (i.e. 40 marks); in terms of Letter Grades, this implies securing 'P' Grade or above in that Subject / Course.

7.2 A student shall be deemed to have satisfied the Academic Requirements and earned the credits allotted to Minor Project / Technical Seminar / Major Project, if he / she secure not less than 40 % of the total marks to be awarded for each. The student would be treated as failed, if he (i) does not submit a report on his / her Minor Project / Technical Seminar / Major Project or does not make a presentation of the same before the Evaluation Committee as per schedule or (ii) secures less than 40 % of marks in industry oriented Mini Project / Technical Seminar / Main Project evaluations.

He / She may reappear once for each of the above evaluations, when they are scheduled again; if he / she fails in such **'one-reappearance'** evaluation also, he / she has to reappear for the same in the next subsequent semester, as and when it is scheduled.

7.3 Promotion Rules: Every student has to fulfil the Attendance and Academic requirements by securing the required credits against registered credits as shown below:

Sl. No.	Promotion	Conditions to be fulfilled
1.	First year first semester (I Semester) to first year second semester (II Semester)	• Regular course of study of first year first semester. (I Semester)
2.	First year second semester (II Semester) to second year first semester (III Smester)	• Regular course of study of first year second semester (II Semester). • Must have secured at least 50 % credits up to first year second semester (II Semester) from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3.	Second year first semester (III Semester) to second year second semester (IV Semester)	• Regular course of study of second year first semester (III Semester)

4.	Second year second semester (IV Semester) to third year firstsemester (V Semester)	• Regular course of study of second year second semester (IV Semester). • Must have secured at least 60% credits up to second year second semester (IV Semester) from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5.	Third year first semester (V Semester) to third year second semester (VI Semester)	• Regular course of study of third year first semester (V Semester).
6.	Third year second semester (VI Semester) to fourth year first semester (VII Semester)	• Regular course of study of third year secondsemester (VI Semester). • Must have secured at least 60 % credits up to third year second semester (VI Semester) from all the relevant regular and supplementary examinations, whether the student takes those examinations ornot.
7.	Fourth year first semester (VII Semester) to fourth year second semester (VIII Semester)	• Regular course of study of fourth year first semester (VII Semester).

7.4 A Student shall register for all subjects covering 192 credits as specified and listed (with the relevant Course / Subject Classifications as mentioned) in the Course Structure, fulfills all the Attendance and Academic requirements for 192 credits securing a minimum of 'P' Grade (Pass Grade) or above in each subject and earn all 192 credits securing SGPA $\geq$ 5.0 (in each semester) and CGPA (at the end of each successive semester) $\geq$ 5.0, to successfully complete the UGP.

7.5 After securing the necessary 192 credits as specified for the successful completion of the entire under graduate programme, the student can avail exemption of two subjects up to 6 credits, that is, one open elective and one professional elective subject or two professional elective subjects for optional drop out from these 192 credits earned; resulting in 186 credits for under graduate programme performance evaluation, i.e., the performance of the student in these 186 credits shall alone be taken into account for the calculation of the final CGPA (at the end of under graduate programme, which takes the SGPA of the IV year II semester into account) and shall be indicated in the grade card of IV year II semester. However, the performance of student in the earlier individual semesters, with the corresponding SGPA and CGPA for which grade cards have already been given will not be altered.

7.6 If a student registers for some more **'Extra Subjects'** (in the parent Department or other Departments / Branches of Engineering) other than those listed subjects totaling to 192 credits as specified in the Course Structure of his / her department, the performances in those 'extra Subjects' (although evaluated and graded using the same procedure as that of the required 192 credits) will not be taken into account while calculating the SGPA and CGPA. For such extra subjects registered, Letter Grade alone will be indicated in the Grade Card, as a performance measure, subject to completion of the Attendance and Academic Requirements as stated in items No.7 and 8.1 to 8.5.

7.7 When a student is detained due to shortage of attendance in any semester, he / she 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 student has been readmitted shall be

applicable. However, no Grade Allotments or SGPA / CGPA calculations will be done for that entire semester in which he / she got detained.

7.8 When a student is detained due to lack of credits in any year, shall be promoted to the next academic year only after acquiring the required academic credits. The academic regulations under which student has been readmitted shall be applicable to him.

7.9 A student eligible to appear in the Semester End Examination in any Subject / Course, but absent from it or failed (there by failing to secure 'P' Grade or above) may reappear for that Subject / Course at the supplementary examination as and when conducted. In such cases, his / her Internal Marks (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 his / her performance in that subject.

8.0 Evaluation, Distribution and Weightage of Marks

The performance of a student in each semester shall be evaluated subject - wise (irrespective of credits assigned) for 100 marks for Theory, Practicals, Seminar, Drawing / Design, Minor Project, Major Project and Minor Courses etc.,. For all Subjects / Courses, the distribution shall be 40 marks for CIE (Continuous Internal Evaluation) and 60 marks for the SEE (Semester End Examination) and a Letter Grade corresponding to the % of marks obtained shall be given.

8.1 Theory Courses:
8.1.1   Continuous Internal Evaluation (CIE):

During the semester, there shall be **2 mid - term examinations** for 40 marks each. Each mid - term examination consists of online **objective test** for 10 marks with duration of **20 minutes** and **subjective paper** for 25 marks with duration of **90 minutes**. Further, there will be an allocation of 5 marks for **Assignment.**

Part	Type of Questions	No. of questions	Marks per question	Total
**Mid – Term Examination -UG**
Part A	Multiple-choice questions	20	0.5	10
Part B	Compulsory questions	5	2	10
Part C	Choice questions [3 out of 5]	3	5	15
\multicolumn{4}{c}{**Mid-Term Exam Total**}	35
\multicolumn{4}{c}{Assignment}	05
\multicolumn{4}{c}{**Grand Total**}	40

The first mid - term examination shall be conducted for the first 50% of the syllabus and the second mid-term examination shall be conducted for the remaining 50% of the syllabus. First assignment should be submitted before the conduct of the first mid - term examinations and the second assignment should be submitted before the conduct of the second mid – term examinations. The assignments shall be as specified by the concerned subject teacher. The first mid - term examination marks, first assignment marks shall make one set of CIE marks and the second mid - term examination marks, second assignment marks shall make second set of CIE marks; and 70% of the best performed plus 30% of the other shall be taken as the final marks secured by the student towards Continuous Internal Evaluation in that theory subjects.

8.1.2 Semester End Examination (SEE):

The distribution of marks is as given below:

Semester End Examination				
Part	Type of Questions	No. of questions to be answered	Marks per question	Total
Part A	Compulsory Questions (One from each Module)	5	2	10
Part B	Choice Questions: For each question there will be an 'either or choice', which means that there will be two questions from each module and the student should answer either of the two questions.	5	10	50
Grand Total				60

8.2 Practical Courses:

8.2.1 Continuous Internal Evaluation (CIE):

There will be CIE for 40 marks, shall be awarded with a distribution of 20 marks for day - to - day performance and timely submission of lab records, 5 marks for viva - voce,15 marks for internal lab exam (best out of two exams).

8.2.2 Semester End Examination (SEE):

There will be SEE for 60 marks, shall be awarded with a distribution of 15 marks for design/procedure/schematic diagram of the given experiment, 20 marks for conduction of experiment, 15 marks for results and 10 marks for viva - voce. For conducting SEE, one internal examiner and one external examiner will be appointed by the Chief Controller of Examinations of the college. The external examiner should be selected from outside the college among the autonomous / reputed institutions from a panel of three examiners submitted by the concerned Head of the Department.

8.3 Engineering Drawing:

The distribution of marks is as given below

CIE for Engineering Drawing				
Part	Type of Questions	No. of questions	Marks per question	Total
Part A	Day-to-Day Work			20
Mid – Term Examination				
Part B	Choice Questions [4 out of 6]	4	5	20
Total				40

SEE for Engineering Drawing			
Type of Questions	No. of questions	Marks per question	Total
Either or Choice from each module	5	12	60

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8.4 Projects:

8.4.1 Mini Project:

There shall be a mini - project, in collaboration with an industry of their specialization. Students will register for this immediately after III year II semester (VI Semester) end examinations and pursue it during summer vacation. CIE of 40 marks are awarded based on the report submitted and presentation before the department committee consists of project coordinator, supervisor of the mini - project and a senior faculty member of the department in IV year I semester (VII Semester). SEE of 60 marks will be evaluated by the committee consists of an external examiner, Head of the Department, supervisor of the mini - project and a project coordinator of the department.

8.4.2 Major Project:

Major Project has to be carried out during the VIII semester, as per the instructions of the project supervisor assigned by the Head of the Department. Out of total 100 marks allotted for the major project, 40 marks shall be for **CIE** (Continuous Internal Evaluation) and 60 marks for the **SEE** (Semester End Viva-voce Examination). CIE marks shall be awarded by a Departmental Committee consisting of project coordinator, Supervisor of Major Project and a senior Faculty member, from two reviews (average). Review - I will be conducted within a month from the commencement of class work (problem definition, objective, literature survey and brief discription - each 10 marks) and Review - II will be conducted before second mid examination (progress of work, results, discussion and presentation - each 10 marks). The Major Project Viva-voce (SEE) shall be conducted by a committee comprising of an External Examiner, Head of the Department and Project Supervisor. In SEE of 60 marks, 15 marks for working model / simulation / data collection, 15 marks for report preparation and 30 marks for presentation and viva - voce. The external examiner should be selected by Chief Controller of Examinations from outside the college among the autonomous / reputed institutions from a panel of three examiners submitted by the concerned Head of the Department / Board of Studies (BOS) Chaiman.

8.5 Technical Seminar:

For Technical Seminar presentation, the student shall collect the information on a specialized topic, prepare a Technical Report and submit to the department at the time of seminar presentation. The seminar presentation (along with the technical report) shall be evaluated by a committee consisting of Seminar coordinator and two senior faculty members for 100 marks. There shall be no semester end examination for the seminar.

8.6 Comprehensive Viva - Voce:

The Comprehensive Viva - Voce shall be conducted in VIII semester for 100 marks. This Viva - Voce is intended to assess the students' understanding of various subjects studied during the B.Tech. programme and will be evaluated by a committee, consisting of the Head of the Department and two senior faculty members. There shall be no external evaluation.

8.7 Non-Credit Courses:

8.7.1 Mandatory Courses:

Mandatory Non - Credit Courses offered in any semester, a 'Satisfactory / Not Satisfactory' shall be awarded to the student based on the performance in both CIE and SEE.

8.7.2 Audit Courses:

Audit Courses offered in any Semester, a '**Satisfactory Participation Certificate**' shall be issued to the student from the concerned authorities, only after securing ≥ 65 % attendance in such a course. No marks or Letter Grade shall be allotted for these activities.

9.0 Grading Procedure

9.1 Marks will be awarded to indicate the performance of each student in each theory subject, or Lab / Practical or Seminar or Project or Minor - Project or Minor Course etc., based on the % marks obtained in CIE + SEE (Continuous Internal Evaluation+ Semester End Examination, both taken together) as specified in Item No. 9 and a corresponding Letter Grade shall be given.

9.2 As a measure of the student's performance, a 10 - point Absolute Grading System using the following Letter Grades (UGC Guidelines) and corresponding percentage of marks shall be followed.

% of Marks	Grade Points	Letter Grade
≥ 90	10	O (Out Standing)
≥ 80 to < 90	9	A$^+$ (Excellent)
≥ 70 to < 80	8	A (Very Good)
≥ 60 to < 70	7	B$^+$ (Good)
≥ 50 to <60	6	B (Average)
≥ 40 to < 50	5	C (Pass)
< 40	0	F (Fail)
Absent	0	Ab

9.3 A student obtaining 'F' Grade in any subject shall be considered 'Failed' and will be required to reappear as 'Supplementary Candidate' in the Semester End Examination (SEE) as and when conducted. In such cases, his / her Internal Marks (CIE Marks) in those subject(s) will remain same as those he / she obtained earlier.

9.4 A Letter Grade does not imply any specific % of marks.

9.5 In general, a student shall not be permitted to repeat any Subject / Course (s) only for the sake of 'Grade Improvement' or 'SGPA / CGPA Improvement'. However, he / she has to repeat all the Subjects / Courses pertaining to that semester, when he / she is detained (as listed in Items Nos.7.7 & 7.8).

9.6 A student earns Grade Point (GP) in each Subject / Course, on the basis of the Letter Grade obtained by him in that Subject / Course (excluding Mandatory non-credit Courses).Then the corresponding 'Credit Points' (CP) are computed by multiplying the Grade Point with credits for that particular Subject / Course.

Credit Points (CP) = Grade Point (GP) x Credits …For a Course

9.7 The Student passes the Subject / Course only when he / she gets GP ≥ 5 ('C' Grade or above).

9.8 The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points (ΣCP) secured from ALL Subjects / Courses registered in a semester by the Total Number of Credits registered during that semester. SGPA is rounded off to TWO Decimal Places. SGPA is thus computed as

$$\text{SGPA} = \left\{ \sum_{i=1}^{N} C_i G_i \right\} / \left\{ \sum_{i=1}^{N} C_i \right\} \dots \text{ for each semester}$$

where 'i' is the subject indicator index (takes into account all subjects in a semester), 'N' is the number of Subjects 'REGISTERED' for the semester (as specifically requiredand listed under the Course Structure of the parent Department) is the number of credits allotted to the ith subject and represents the Grade Points (GP) corresponding to the Letter Grade awarded for that ith subject.

9.9 The Cumulative Grade Point Average (CGPA) is a measure of the over all cumulative performance of a student over 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 off to TWO decimal places. CGPA is thus computed from the II semester onwards, at the end of each semester, as per the formula.

$$CGPA = \left\{ \sum_{j=1}^{M} C_j G_j \right\} / \left\{ \sum_{j=1}^{M} C_j \right\} \dots \text{ for all 'S' semesters registered}$$

(i.e., upto and inclusive of 'S' semesters, $S \geq 2$)

where 'M' is the TOTAL number of subjects (as specifically required and listed under the course structure of the parent department) the student has 'REGISTERED' from the 1st Semester onwards upto and inclusive of the semester 'S' (obviously $M > N$), 'j' is the subject indicator index (takes into account all subjects from '1' to 'S' semesters) is the number of credits allotted to the jth subject, and represents the Grade Points (GP) corresponding to the Letter Grade awarded for that j^{th} subject. After registration and completion of I Year I Semester however, the SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.

ILLUSTRATION OF CALCULATION OF SGPA

Course/Subject	Credits	Letter Grade	Grade Points	Credit Points
Course 1	4	A	8	4 x 8 = 32
Course 2	4	O	10	4 x 10 = 40
Course 3	4	C	5	4 x 5 = 20
Course 4	3	B	6	3 x 6 = 18
Course 5	3	A+	9	3 x 9 = 27
Course 6	2	B	6	2 x 6 = 12
Course 7	2	A+	9	2 x 9 = 18
Course 8	2	A	8	2 x 8 = 16
	Total Credits 24			Total Credit Points 183

SGPA = 183/24 = 7.62

ILLUSTRATION OF CALCULATION OF CGPA:

Course / Subject	Credits	Letter Grade	Grade Points	Credit Points
I Year I Semester				
Course 1	4	A	8	4 x 8 = 32
Course 2	4	A+	9	4 x 9 = 36
Course 3	4	B	6	4 x 6 = 24
Course 4	3	O	10	3 x 10 = 30
Course 5	3	B+	7	3 x 7 = 21
Course 6	2	B	6	2 x 6 = 12
Course 7	2	A+	9	2 x 9 = 18
Course 8	2	A	8	2 x 8 = 16
I Year II Semester				
Course 9	4	B+	7	4 x 7 = 28
Course 10	4	O	10	4 x 10 = 40
Course 11	4	A	8	4 x 8 = 32
Course 12	3	B	6	3 x 6 = 18
Course 13	3	C	5	3 x 5 = 15

Course 14	2	A+	9	2 x 9 = 18	
Course 15	2	O	10	2 x 10 = 20	
Course 16	2	A	8	2 x 8 = 16	
	Total Credits = 48			Total Credit Points = 376	

CGPA = 376 / 48 = 7.83

9.10 For merit ranking or comparison purposes or any otherlisting, ONLY the 'ROUNDED OFF' values of the CGPAs will be used.

9.11 For calculations listed in Item Nos.9.6 to9.10, performance infailed Subjects / Courses (securing 'F' Grade) will also be taken into account and the credits of such Subjects / Courses will also be included in the multiplications and summations. However, Mandatory Courses will not be taken into consideration.

9.12 Passing Standards:

9.12.1 A student shall be declared successful or 'passed' in a semester, only when he / she gets a SGPA $\geq$ 5.00 (at the end of that particular semester); and a student shall be declared successful or 'passed' in the entire UGP, only when he / she gets a CGPA $\geq$ 5.00; subject to the condition that he / she secures a GP $\geq$ 5 ('C' Grade or above) in every registered Subject / Course in each semester (during the entire UGP) for the degree award, as required.

9.12.2 Inspite of securing 'P' Grade or above in some (or all) Subjects / Courses in any semester, if a student receives a SGPA < 5.00 and / or CGPA < 5.00 at the end of such a semester, then he / she 'may be allowed' (on the 'specific recommendations' of the Head of the Department and subsequent approval from the Principal) (i) to go into the next subsequent semester (subject to fulfilling all other attendance and academic requirements as listed under Items Nos. 7 & 8); (ii) to 'improve his / her SGPA of such a semester (and hence CGPA) to 5.00 or above', by reappearing for ONE or MORE (as per student's choice) of the same course(s) in which he / she has secured 'P' Grade(s) in that semester, at the Supplementary Examinations to be held in the next subsequent semester(s). In such cases, his / her Internal Marks (CIE Marks) in those subject(s) will remain same as those he / she obtained earlier. In these considerations, the newly secured Letter Grades will be recorded and taken into account for calculation of SGPA and CGPA, only if there is an improvement.

9.12.3 A student shall be declared successful in any Non-Credit Course, if he / she secures a 'Satisfactory Participation Certificate' for that Audit Course and "Satisfactory Certificate' for Mandatory Course.

9.13 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.

10.0 Declaration of Results

10.1 Computation of SGPA and CGPA are done using the procedure listed in items 9.6 to 9.10.

10.2 For final % of marks equivalent to the computed final CGPA, the following formula may be used …

% of Marks = (final CGPA – 0.5) x 10

11.0 Award of Degree

11.1 A student who register for all the specified courses as listed in the Course Structure, satisfies all the course requirements, passes all the examinations prescribed in the entire UG Programme (UGP) within the specified period (refer 4.1) and secures the required number of 192 Credits

(with CGPA $\geq$ 5.0) 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.

11.2 A student who qualifies for the award of the degree aslisted in Item 12.1, shall be placed in the following classes:

Class Awarded	CGPA
First Class with Distinction	≥ 8.00
First Class	≥ 6.50 and < 8.00
Second Class	≥ 5.50 and < 6.50
Pass Class	≥ 5.00 and < 5.50

11.3 A student with final CGPA (at the end of the UGP) < 5.00 will not be eligible for the award of the degree.

12.0 With holding of Results

If the student has not paid fees to college at any stage or has pending dues against his / her name due to any reason whatsoever or if any case of indiscipline is pending against him, the result of the student may be with held and he / she will not be allowed to go into the next higher semester. The award or issue of the degree may also be with held in such cases.

13.0 Transitory Regulations

A. **For students detained due to shortage of attendance**:

1. A student who has been detained in I year of MR13 / MR14 / MR15 regulations due to lack of attendance, shall be permitted to join I year I Semester of MR17 regulations and he / she is required to complete the study of B.Tech.programme within the stipulated period of eight academic years from the date of first admission in I Year.

2. A student who has been detained in any semester of II, III and IV years of MR13 / MR14 / MR15 regulations for want of attendance shall be permitted to join the corresponding semester of MR17 regulations and is required to complete the study of B.Tech. with in the stipulated period of eight academic years from the date of first admission in I Year. The MR17 academic regulations under which a student has been readmitted shall be applicable to that student from that semester. See rule (C) for further transitory regulations.

B. **For students detained due to shortage of credits**:

3 A student of MR13 / MR14 / MR15 regulations, who has been detained due to lack of credits, shall be promoted to the next semester of MR17 regulations only after acquiring the required credits as per the corresponding regulations of his / her first admission. The student is required to complete the study of B.Tech. with in the stipulated period of eight academic years from the year of first admission. The MR17 academic regulations are applicable to a student from the year of readmission onwards. See rule (C) for further Transitory Regulations.

C. **For readmitted students in MR17 regulations**:

4 A student who has failed in any subject under any regulation has to pass those subjects in the same regulations.

5 The maximum credits that a student acquires for the award of degree, shall be the sum of the total number of credits secured in all the regulations of his / her study including MR17 regulations. The performance evaluation of the student will be done after the exemption of two subjects if total credits acquired are $\leq$ 206, three subjects if total credits acquired are $>$ 206 (see MR17 regulations for exemption details).

6 If a student readmitted to MR17 regulations, has any subject with 80 % of syllabus common with his / her previous regulations, that particular subject in MR17 regulations will be substituted by another subject to be suggested by the College Academic Committee (CAC).
   Note: If a student readmitted to MR17 regulations, has not studied any subjects / topics in his / her earlier regulations of study which is prerequisite for further subjects in MR17 regulations, the departments concerned shall conduct remedial classes to cover those subjects/topics for the benefit of the students.

14.0 Student Transfers

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

14.2 The students seeking transfer to MALLA REDDY ENGINEERING COLLEGE (Autonomous) - MREC(A) from various other Universities / Institutions have to pass the failed subjects which are equivalent to the subjects of MREC(A) and also pass the subjects of MREC(A) which the students have not studied at the earlier institution. Further, though the students have passed some of the subjects at the earlier institutions, if the same subjects are prescribed in different semesters of MREC(A), the students have to study those subjects in MREC(A) inspite of the fact that those subjects are repeated.

14.3 The transfer students from other Universities / Institutions to MREC(A) who are on rolls will be provided one chance to write internal examinations in the failed subjects and / or subjects not studied as per the clearance letter issued by the JNTUH.

15.0 Scope

(i) Where the words "he", "him", "his", occur in the write - up of regulations, they include "she", "her", "hers".

(ii) Where the words "Subject" or "Subjects", occur in these regulations, they also imply "Course" or "Courses".

(iii) The academic regulations should be read as a whole, for the purpose of any interpretation.

(iv) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the College Academic Committee headed by the Principal is final.

Academic Regulations for B.Tech. (Lateral Entry Scheme)
w.e.f the A Y 2018-19

1. **Eligibility for award of 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.

2. The student shall register for 144 credits and secure 144 credits with CGPA ≥ 5 from II year to IV year B.Tech. programme (LES) for the award of B.Tech. degree. **Out of the 144 credits secured, the student can avail exemption up to 6 credits**, that is, one open elective subject and one professional elective subject or two professional elective subjects resulting in 138 credits for B.Tech. programme performance evaluation**.**

3. 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.

4. The attendance requirements of B. Tech. (Regular) shall   be applicable to B.Tech.(LES).

5. **Promotion Rule:**

Sl.No.	Promotion	Conditions to be fulfilled
1	Second year first semester (III Semester) to second year second semester (IV Semester)	Regular course of study of second year first semester (III Semester).
2	Second year second semester (IV Semester) to third year first semester (V Semester).	**(i)** Regular course of study of second year second semester (IV Semester) **(ii)** Must have secured at least 29 credits out of 48 credits i.e., 60 % credits up to second year second semester (IV Semester) from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Third year first semester (V Semester) to third year second semester (VI Semester)	Regular course of study of third year first semester (V Semester).
4	Third year second semester (VI Semester) to fourth year first semester (VII Semester)	**(i)** Regular course of study of third year second semester (VI Semester) **(ii)** Must have secured at least 58 credits out of 96 credits i.e., 60 % credits up to third year second semester (VI Semester) from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Fourth year first semester (VII Semester) to fourth year second semester (VIII Semester)	Regular course of study of fourth year first semester (VII Semester)

6. All the other regulations as applicable to B. Tech. 4 - year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).

MALPRACTICES RULES

DISCIPLINARY ACTION FOR IMPROPER CONDUCT IN EXAMINATIONS

Sl.No.	Nature of Malpractices/Improper conduct	Punishment
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which student is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the course of the examination)	Expulsion from the examination hall and cancellation of the performance in that course only.
(b)	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the students involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to that course of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the student has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that semester. The hall ticket of the candidate shall be cancelled.
3	Impersonates any other candidate in connection with the examination.	The student who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original student who has been impersonated, shall be cancelled in all the courses of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester. The candidate is also debarred for two consecutive semesters from class work and

		all SEE. The continuation of the programme by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4	Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The student is also debarred for two consecutive semesters from class work and all SEE. The continuation of the programme by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course.
6	Refuses to obey the orders of the Chief Controller of Examinations (CCE) / Controller of Examinations (CE) / Assistant Controller of Examinations (ACE) / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-incharge, 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	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that semester. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police cases registered against them.

	means or misconduct or has the tendency to disrupt the orderly conduct of the examination	
7	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred for two consecutive semesters from class work and all SEE. The continuation of the programme by the student is subject to the academic regulations in connection with forfeiture of seat.
8	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred and forfeits the seat.
9	If student of the college, who is not a studentfor the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester.

| 11 | Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny. | Cancellation of the performance in that course and all other courses the student has appeared including practical examinations and project work of that SEE. |
| 12 | If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the CCE for further action toward suitable punishment. | |

Note: *The student(s) found indulging in malpractices during the CIE also will be punished based on the recommendations of the College Academic Committee.*

Malpractices identified by squad or special invigilators

1. Punishments to the students as per the above guidelines.

MALLA REDDY ENGINEERING COLLEGE (Autonomous)
COURSE STRUCTURE – B.Tech. CIVIL ENGINEERING
(Choice Based Credit System)
(MR17 Regulations - Effective from Academic Year 2017-18 onwards)

I SEMESTER

S.No	Category	Course Code	Name of the course	L	T	P	Credits	Internal (CIE)	External (SEE)	Total Marks
1	BS	70B01	Engineering Mathematics	3	2	-	4	40	60	100
2	BS	70B06	Engineering Physics	4	-	-	4	40	60	100
3	BS	70B10	Applied Chemistry	4	-	-	4	40	60	100
4	ES	70501	Computer Programming	2	2	-	3	40	60	100
5	ES	70201	Basic Electrical and Electronics Engineering	3	-	-	3	40	60	100
6	BS	70B11	Applied Chemistry Lab	-	-	4	2	40	60	100
7	ES	70502	Computer Programming Lab	-	-	4	2	40	60	100
8	ES	70303	Engineering Workshop	-	-	4	2	40	60	100
9	AC	70A01	NSS & Sports/Yoga	-	-	2	-	-	-	-
			Total	**16**	**4**	**14**	**24**	**Contact Periods: 34**		

II SEMESTER

S.No	Category	Course Code	Name of the course	L	T	P	Credits	Internal (CIE)	External (SEE)	Total Marks
1	HS	70H01	English	3	-	-	3	40	60	100
2	BS	70B02	Computational Mathematics	3	2	-	4	40	60	100
3	BS	70B09	Physics of Materials	3	-	-	3	40	60	100
4	ES	70301	Engineering Graphics	4	-	-	4	40	60	100
5	ES	70302	Engineering Mechanics	4	-	-	4	40	60	100
6	HS	70H02	English Language Lab	-	-	4	2	40	60	100
7	BS	70B07	Engineering Physics Lab	-	-	4	2	40	60	100
8	ES	70304	Engineering Mechanics and Auto CAD Lab	-	-	4	2	40	60	100
9	MC	70M01	Computational Mathematics Lab	-	-	3	-	40	60	100
			Total	**17**	**2**	**15**	**24**	**Contact Periods: 34**		

III SEMESTER

S.No	Category	Course Code	Name of the course	Contact hours/week L	T	P	Credits	Scheme of Valuation Internal (CIE)	External (SEE)	Total Marks
1	BS	70B03	Advanced Calculus	2	2	-	3	40	60	100
2	ES	70101	Strength of Materials	2	2	-	3	40	60	100
3	ES	70102	Fluid Mechanics	2	2	-	3	40	60	100
4	PC	70103	Surveying	3	-	-	3	40	60	100
5	PC	70104	Building Materials Construction and Planning	3	-	-	3	40	60	100
6	PC	70105	Engineering geology	3	-	-	3	40	60	100
7	ES	70106	Strength of Materials Lab	-	-	4	2	40	60	100
8	PC	70107	Surveying Lab	-	-	4	2	40	60	100
9	PC	70108	Engineering geology Lab	-	-	4	2	40	60	100
10	MC	70M03	Environmental Science	-	2	-	-	40	60	100
11	AC	70A03	Internship-I	-	-	-	-	-	-	-
			Total	**15**	**8**	**12**	**24**	**Contact Periods: 35**		

IV SEMESTER

S.No	Category	Course Code	Name of the course	Contact hours/week L	T	P	Credits	Scheme of Valuation Internal (CIE)	External (SEE)	Total Marks
1	BS	70B04	Probability and Statistics	2	2	-	3	40	60	100
2	ES	70109	Hydraulics and Hydraulic Machinery	3	2	-	4	40	60	100
3	PC	70110	Advanced Surveying	3	-	-	3	40	60	100
4	PC	70111	Advanced Solid Mechanics	2	2	-	3	40	60	100
5	PC	70112	Concrete Technology	3	-	-	3	40	60	100
6	PC	70113	Environmental Engineering	4	-	-	4	40	60	100
7	ES	70114	Mechanics of Fluids and Hydraulic Machinary Lab	-	-	4	2	40	60	100
8	PC	70115	Concrete Technology Lab	-	-	4	2	40	60	100
9	MC	70M02	Gender Sensitization	-	-	3	-	40	60	100
10	AC	70A02	Law for Engineers	-	2	-	-	-	-	-
			Total	**17**	**8**	**11**	**24**	**Contact Periods:36**		

V SEMESTER

| S.No | Category | Course Code | Name of the course | Contact hours/week | | | Credits | Scheme of Valuation | | Total Marks |
				L	T	P		Internal (CIE)	External (SEE)	
1	HS	70H04	Engineering Economics and Accountancy	2	-	-	2	40	60	100
2	PC	70116	Design of Reinforced Concrete Structures	2	2	-	3	40	60	100
3	PC	70117	Geotechnical Engineering	2	2	-	3	40	60	100
4	PC	70118	Structural Analysis	2	2	-	3	40	60	100
5	PE-1	70132	Air Pollution and Control	3	2	-	4	40	60	100
		70133	Disaster Management							
		70134	Solid Waste Management							
6	OE		Open Elective-1	3	2	-	4	40	60	100
7	HS	70H03	English Communication and Presentation Skills Lab	-	-	2	1	40	60	100
8	PC	70119	Environmental Engineering Lab	-	-	4	2	40	60	100
9	PC	70120	Geotechnical Engineering Lab	-	-	4	2	40	60	100
10	AC	70A04	MOOC/ NPTEL Certification Course	-	2	-	-	-	-	-
11	AC	70A05	Internship-II	-	-	-	-	-	-	-
			Total	**14**	**12**	**10**	**24**	**Contact Periods:36**		

VI SEMESTER

| S.No | Category | Course Code | Name of the course | Contact hours/week | | | Credits | Scheme of Valuation | | Total Marks |
				L	T	P		Internal (CIE)	External (SEE)	
1	HS	70H06	Industrial Management	2	-	-	2	40	60	100
2	PC	70121	Design of steel Structures	2	2	-	3	40	60	100
3	PC	70122	Water Resources Engineering	3	-	-	3	40	60	100
4	PC	70123	Transportation Engineering	3	-	-	3	40	60	100
5	PC	70124	Advanced Structural Analysis	2	2	-	3	40	60	100
6	PE-II	70135	Plastic Analysis and Design	4	-	-	4	40	60	100
		70136	Rehabilitation and Retrofitting of Structures							
		70137	Construction Engineering and Management							
7	PC	70125	Transportation Engineering Lab	-	-	4	2	40	60	100
8	PC	70126	CADD Lab	-	-	4	2	40	60	100
9	MC	70M04	Professional Ethics	-	2	-	-	40	60	100
10	PR	70P01	Technical Seminar	-	-	4	2	100	-	100
			Total	**16**	**6**	**12**	**24**	**Contact Periods: 34**		

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VII SEMESTER

S.No	Category	Course Code	Name of the course	L	T	P	Credits	Internal (CIE)	External (SEE)	Total Marks
				Contact hours/week			Credits	Scheme of Valuation		Total Marks
1	PC	70127	Estimating and Costing	2	2	-	3	40	60	100
2	PC	70128	Remote Sensing and GIS	3	-	-	3	40	60	100
3	PC	70129	Foundation Engineering	2	2	-	3	40	60	100
4	PE-III	70138	Principles of Bridge Engineering	2	2	-	3	40	60	100
		70139	Finite Element Methods							
		70140	Prestressed Concrete Structures							
5	PE-IV	70141	Water Resources Systems Analysis	2	2	-	3	40	60	100
		70142	Irrigation structures and water power Engineering							
		70143	River Engineering							
6	OE		Open Elective-2	2	2	-	3	40	60	100
7	PC	70130	Remote Sensing and GIS Lab	-	-	4	2	40	60	100
8	PC	70131	Structural Analysis Lab	-	-	4	2	40	60	100
9	PR	70P02	Mini Project	-	-	4	2	40	60	100
			Total	**13**	**10**	**12**	**24**	**Contact Periods:35**		

VIII SEMESTER

S.No	Category	Course Code	Name of the course	L	T	P	Credits	Internal (CIE)	External (SEE)	Total Marks
				Contact hours/week			Credits	Scheme of Valuation		Total Marks
1	PE-V	70144	Traffic Engineering	3	-	-	3	40	60	100
		70145	Pavement Design							
		70146	Public Transportation							
2	PE-VI	70147	Environmental Impact Assessment and Management	3	-	-	3	40	60	100
		70148	Ground Improvement Techniques							
		70149	Advanced Foundation Engineering							
3	OE		Open Elective-3	2	2	-	3	40	60	100
4	PR	70P03	Entrepreneurship	-	2	-	1	40	60	100
5	PR	70P04	Comprehensive Viva Voce	-	-	4	2	100	-	100
6	PR	70P05	Major Project	-	-	18	12	40	60	100
7	AC	70A06	Fine Arts/Foreign Language	-	2	-	-	-	-	-
			Total	**8**	**6**	**22**	**24**	**Contact Periods: 36**		

LIST OF OPEN ELECTIVES

Sl. No.	Branch	Course Code	Name of the Course	No. of Credits
1.	CIVIL	70132	Air Pollution and Control	4
2.	EEE	70241	Electrical Safety and Energy Management	4
3.	MECH	70355	Industrial Safety	4
4.	ECE	70446	Principles of Communication Engineering	4
5.	CSE	70537	Software Quality Assurance and Testing	4
6.	IT	70619	Information Retrieval Systems	4
7.	MINING	72501	Introduction to Mining Engineering	4
8.	MBA	7B159	Training and Organisational Development	4
9.	ENGLISH	70H07	English Language Skills	4
10.	MATHEMATICS	70B15	Transform Techniques	4
11.	PHYSICS	70B17	Advanced Physics for Engineers	4
12.	CHEMISTRY	70B20	Chemistry of Engineering Materials	4
13.	CIVIL	70103	Surveying	3
14.		70150	Green Buildings	3
15.	EEE	70227	Energy Audit and Conservation	3
16.		70240	Energy Storage Systems	3
17.	MECH	70347	Renewable Energy Sources	3
18.		70351	Total Quality Management	3
19.	ECE	70430	Digital Design using Verilog HDL	3
20.		70438	Satellite Communications	3
21.	CSE	70539	Android Application Development	3
22.		70544	Software Project Management	3
23.	IT	70605	Advanced Java Programming	3
24.		70621	Management Information System	3
25.	MINING	72504	Drilling and Blasting	3
26.		72543	Tunnelling Engineering	3
27.	MBA	7B108	Creativity and Innovations Management	3
28.		7B136	Digital Marketing	3
29.	ENGLISH	70H08	Interpretation Skills and Analytical Writing	3
30.		70H09	World Literature	3
31.	MATHEMATICS	70B14	Applied Statistics	3
32.		70B16	Optimization Techniques	3
33.	PHYSICS	70B18	Nano Materials	3
34.		70B19	NDT and Vacuum Technology	3
35.	CHEMISTRY	70B21	Nano Chemistry	3
36.		70B22	Photochemistry and Spectroscopy	3

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: 70B01	**ENGINEERING MATHEMATICS** (Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	**L**	**T**	**P**
Credits: 4		3	2	-

Prerequisite: NIL

Course Objective: The objective of this course is to familiarize the students with linear algebra and elements of mathematics. Differential equations play a major role in understanding many processes and systems that are of interest to the engineers in a generic sense. An in-depth understanding of the ordinary and higher order differential equation are an absolutely essential part of the tool-kit of a well trained engineer. This course fills into this perceived need. The treatment should be informed by the fact that not only conceptual but also and in some cases, more importantly numerical or computational methods are of essence. This is specially designed for students to help them bring to speed with other students who have already had some training in mathematics at the 12th standard level.

MODULE I: Matrices and Linear Systems of Equations [12 Periods]
Rank of the matrix - Elementary transformations –Echelon form – Normal form – PAQ Form - Inverse of a Matrix by applying Elementary transformations.
Solution of Linear Systems – Consistency of linear system of equations – Gauss elimination method – LU-Decomposition method –Solution of Tri-diagonal Systems (Thomas Algorithm).

MODULE II: Eigen Values & Eigen Vectors [13 Periods]
Linear transformation - Eigen values - Eigen vectors – properties – Linearly independent and dependent vectors - Cayley-Hamilton Theorem (without Proof) - Inverse and powers of a matrix by Cayley-Hamilton theorem.
Diagonolization of matrix-Calculation of powers of matrix,– Modal and spectral matrices. Real matrices – Symmetric - skew – symmetric -Orthogonal Matrix. Similarity Transformation - Orthogonal Transformation. Quadratic forms

MODULE III: Differential Equations of First Order and First Degree [13 Periods]
A: Formation of Differential Equations - Solutions of First order Differential Equations: Homogeneous - Non-homogeneous – Exact - Non-exact.
B: Leibnitz's Linear Equation - Bernoulli's Differential Equation. Applications of First Order Differential Equations: Orthogonal trajectories - Newton's Law of cooling - Law of natural growth and decay.

MODULE IV: Differential Equations of Second & Higher Order [13 Periods]
Rules for finding Complementary function-Particular integral (Non-homogeneous term of the type e^{ax} , $Sin\ bx\ /\ Cos\ bx$, x^n, $e^{ax}V(x)$, $x^nV(x) only$)
Method of variation of parameters. Equations reducible to constant coefficients - Cauchy - Euler and Legendre's differential equations.

MODULE V: Laplace Transforms [13 Periods]
Definition of Laplace transform, Condition for existence, Laplace transform of standard functions, Properties of Laplace transform, Laplace transform of function when they are multiplied or divided by 't' , Evaluation of Integrals by using Laplace transforms.

Inverse Laplace transforms: Finding inverse Laplace transforms using partial fractions, first shifting theorem, Inverse Laplace transforms of derivatives, Convolution theorem, Dirac's delta function, Unit step function. Application of Laplace transforms to ordinary differential equations.

TEXT BOOKS
1. Kreyszig, **"Advanced Engineering Mathematics"**, John Wiley & Sons Publishers, 10th Edition, Reprint 2010.
2. B.S. Grewal, Khanna, **"Higher Engineering Mathematics",** Publishers, 43rd Edition, Reprint 2011.

REFERENCES
1. Richard Bellman,**"Introduction to Matrix Analysis"**, Dover Publications, 2nd Edition, 1970.
2. R.K. Jain & S.R.K. Iyengar, **"Advanced Engineering Mathematics"** 3rd edition, Narosa Pub. House, Delhi.
3. Kanti B.Datta, **"Mathematical Methods of Science and Engineering"**, Cengage Learning
4. Alan Jeffrey, **"Mathematics for Engineers and Scientists"**, 6ht Edi, 2013, Chapman & Hall/ CRC.

E -RESOURCES
1. http://home.scarlet.be/math/stelsels.htm (Systems of linear equations, matrices)
2. https://www.math.ust.hk/~machas/differential-equations.pdf (Differential equations)
3. HTTP://WWW.MATH.PSU.EDU/SHEN_W/250/NOTESLAPLACE.PDF (LAPLACE TRANSFORM)
4. HTTPS://GLOBALJOURNALS.ORG/GJCST_VOLUME15/4-SYSTEM-OF-LINEAR-EQUATIONS.PDF(MATRICES)
5. HTTP://IEEEXPLORE.IEEE.ORG/STAMP/STAMP.JSP?ARNUMBER=6541959 (DIFFERENTIAL EQUATIONS OF FIRST ORDER AND FIRST DEGREE)
6. HTTPS://WWW.IJSR.NET/ARCHIVE/V2I1/IJSRON2013331.PDF (LAPLACE TRANSFORMS
7. HTTP://NPTEL.AC.IN/COURSES/122107036/32 (MATRICES BY PROF SUNITA GAKKHAR)
8. HTTP://NPTEL.AC.IN/COURSES/122107037/20 (DIFFERENTIAL EQUATIONS OF FIRST ORDER AND FIRST DEGREE)
9. HTTP://NPTEL.AC.IN/COURSES/122107037/14 (DIFFERENTIAL EQUATIONS OF SECOND & HIGHER ORDER)
10. HTTPS://WWW.YOUTUBE.COM/WATCH?V=DPG5T-YBQJU (LAPLACE TRANSFORMS)

Course Outcomes
At the end of the course, students will be able to
1. Apply the operations on Matrices like Row, Column operations, Rank of the Matrix and Able to check the Consistency and Inconsistency of the system of equations.
2. Find the Eigen values and Eigen vectors of the given Matrix to analyze the associated Spectral matrix. Application of Cayley –Hamilton theorem.
3. Solve the first order first degree Differential equations and its applications
4. Understand higher order ordinary differential equations and apply them in Bending of Beams and circuit problems.
5. Understand Laplace Transforms and perform its applications to linear differential equations and real time applications.

Prerequisites: NIL

Course Objective: The main objective of this course is to provide an adequate exposure and develop insight about the basic principles of physics along with the possible applications.

MODULE I: Optics [12 Periods]

Principle of superposition, Coherence–Spatial and Temporal; Introduction to Interference, Young's double slit experiment - Optical path difference and Fringe width; Interference in thin films (Reflected light) Cosine law; Newton's rings experiment - Determination of wavelength of light. Concept of diffraction, Diffraction grating – resolving power.

MODULE II: Waves and Oscillations [13 Periods]

Introduction, Differential equation for SHM and its solution; expression for energy of the oscillator; superposition of two linear SHMs (with same frequencies) - Lissajous figures; Damped vibrations - differential equation and its solution, Critical damping, under damping and over damping; Qualitative treatment of Forced vibrations, sharpness of resonance, analogy between mechanical and electrical oscillators.

MODULE III: Crystal Structures and X-ray Diffraction [13 Periods]

A: Crystal Structures: Space lattice**,** crystallographic axes, Unit cell, Lattice parameters; Crystal systems, Bravais lattices, Miller indices, Crystal planes and directions, Inter-planar spacing of orthogonal crystal systems, Atomic radius, Coordination number and atomic packing fraction of SC, BCC and FCC lattices, Diamond, ZnS and NaCl structures.
B: X-ray Diffraction: Introduction, Bragg's law, Laue and Powder methods, Application of XRD to analyze Cubic structure.

MODULE IV: Principles of Quantum Mechanics [13 Periods]

Postulates of Quantum mechanics, Louis de Broglie's concept of matter waves, Davisson and Germer's experiment, Heisenberg's Uncertainty Principle, Schrödinger's Time dependent and Independent Wave Equation; Physical Significance and properties of the Wave Function; Energy of a particle in One Dimensional infinite Potential well.

MODULE V: Nano Materials [13Periods]

Introduction - Nano scale, Surface to volume ratio and Quantum confinement; Optical properties, Electrical properties; brief description of different methods of synthesis of nano materials - physical (LASER ablation, Ball milling), chemical (Vapor deposition, Sol - gel); Carbon nano-tubes - properties and applications**,** Applications of nano materials - automobiles, electronics, medical, cosmetics, textile.

TEXT BOOKS

1. K Vijaya Kumar, S Chandralingam, "**Modern Engineering Physics**'' Volume I & II, S. Chand, 1st Edition, 2017.
2. M N Avadhanulu, P G Kshirsagar, " **A Textbook of Engineering Physics"**, Revised Edition 2014

REFERENCES

1. P K Palanisamy, **"Engineering Physics"**, SciTech Publication, 4th Edition, 2014.
2. B K Pandey and S. Chaturvedi, "**Engineering Physics**" Cengage Learning India Revised Edition, 2014.
3. R K Gaur and SL Gupta, "**Engineering Physics**" DhanpatRai Publications, Eighth Revised Edition, 2006.
4. D K Bhattacharya, Poonam Tandon, "**Engineering Physics**", Oxford University Press, 1st Edition, 2015.

E - RESOURCES

1. https://www.researchgate.net/publication/259574083_Lecture_Notes_on_Engineering_Physics
2. https://www.researchgate.net/publication/292607115_Applied_Physics
3. http://www.springer.com/physics/theoretical%2C+mathematical+%26+computational+physics/journal/40094
4. http://www.springer.com/physics/journal/340
5. https://www.youtube.com/watch?v=jnjjWI1s9_s&list=PLzJaFd3A7DZse2tQ2qUFChSiCj7jBidO0
6. https://www.youtube.com/watch?v=4a0FbQdH3dY

Course Outcomes

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

1. Be aware of the concepts of Interference, diffraction and its applications.
2. Distinguish free, damped and forced vibrations, develop basic knowledge on the distribution functions and simple applications
3. Apply the basic principles of crystals and analysis of crystal structures using X-ray diffraction.
4. Acquire the theoretical information about matter in terms of quantum physics
5. Analyze and apply various synthesis methods of nano materials and different applications.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: 70B10	**APPLIED CHEMISTRY** (Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	**L**	**T**	**P**
Credits: 4		**4**	**-**	**-**

Prerequisite: NIL

Course Objective: The purpose of this course is to emphasize the relevance of fundamentals and applications of chemical sciences in the field of engineering and to provide basic knowledge on electrochemistry, batteries, corrosion, applications of conducting polymers in various fields, fuels in day to day life and the concepts of composites, Nano materials and green chemistry.

MODULE I: Water   [12 Periods]

Hardness of Water: causes of hardness, expression of hardness – units – types of hardness, Alkalinity of water specifications for drinking water (BIS and WHO standards); Estimation of temporary & permanent hardness of water by EDTA method - numerical problems. Boiler troubles – Scale &sludge, Priming and foaming, caustic embrittlement and boiler corrosion; Treatment of boiler feed water – Internal treatment (Phosphate, carbonate and calgon conditioning).External treatment – Lime Soda process and ion exchange process, Numerical Problems. Disinfection of water by chlorination and ozonisation. Desalination by reverse osmosis.

MODULE II: Electrochemistry and Corrosion   [13 Periods]

Electrochemistry: Introduction-Conductance-Specific and Equivalent conductance. Electrochemical cells- EMF, Galvanic Cells, Electrode potential, Calomel Electrode, glass electrode; Nernst equation its applications and numerical problems - Batteries: Primary cells (dry cells) and secondary cells (lead-Acid cell, Ni-Cd cell). Applications of batteries. Fuel cells – Hydrogen – Oxygen fuel cell and its applications.

Corrosion: Causes and effects of corrosion: Theories of corrosion – Chemical & Electrochemical corrosion; Factors affecting rate of corrosion – Nature of metal and Nature of Environment – Corrosion control methods – Cathodic protection (Sacrificial anodic). Surface coatings: Metallic coatings & methods of application of metallic coatings - hot dipping (Galvanization), Cementation, Electroplating (Copper plating), Electroless plating of Nickel.

MODULE III: Polymers   [13 Periods]

A: Types of Polymerization-Chain (Free radical Mechanism) & Step growth. Plastics: Thermoplastic & Thermosetting plastics, Compounding& fabrication of plastics (Compression and injection moulding). Preparation, properties, engineering applications of PVC, Teflon, Nylon – 6,6 and Bakelite.
B: Conducting polymers: Polyacetylene, Polyaniline, Mechanism of Conduction, doping; applications of Conducting polymers. Bio degradable polymers: poly lactic acid and poly vinyl acetate. Elastomers: Natural Rubber-vulcanization. Synthetic Rubber- preparatrion, properties and applications of BuNa-S, Butyl rubber. Fibre-reinforced polymers-properties and applications.

MODULE IV: Fuels and Combustion   [13 Periods]

Fuels: Classification – solid fuels: coal – analysis of coal - proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining. Cracking- fixed bed catalytic cracking, synthesis of petrol by Fisher- Tropsch method. Knocking – octane and cetane rating. Gaseous fuels -

constituents, characteristics and applications of natural gas, LPG and CNG.

Combustion: Combustion-Definition, Calorific value of fuel – HCV, LCV; Determination of calorific value by Junkers gas calorimeter – Numerical problems on combustion. Renewable energy sources-solar, wind, hydro power and biomass energy advantages, disadvantages and Applications

MODULE V: Composites, Nano Chemistry and Green Chemistry   [13 Periods]

Composites: Basics of composites, composition and characteristics-types of composites –particle and fiber reinforced composites and their applications. Concept of Bio-fuels (Biodiesel, Bioethanol and Biogas), Biosensors, Biosurfactants.

Nano Chemistry: Introduction and classification of Nanomaterials (Fullerence, Carbon nano tubes and nanowires only) - Application of nanomaterials. Brief introduction to nanocomposites

Green Chemistry: Introduction, principles of green chemistry, introduction to ultrasonic and microwave assisted reactions, solvent free reactions. Concept of R4M4 (Reduce, Reuse, Recycle, Redesign; Multipurpose, Multidimensional, Multitasking and Multi-tracking) model with special reference of Econoburette, Survismeter.

TEXT BOOKS
1. P. C. Jain and Monica Jain, "**A text Book of Engineering Chemistry"**, Dhanpat Rai Publications, New Delhi, 12th Edition 2006.
2. M. Thirumala Chary and E. Laxminarayana, **"Engineering Chemistry"** by SciTech publications(INDIA) PVT Ltd, Third Edition,2016 .

REFERENCES
1. B. Rama Devi, Ch. VenkataRamana Reddy and Prasantha Rath**, "Text Book of Engineering chemistry"** by Cengage Learning India Pvt.Ltd,2016.
2. F.W. Billmeyer, "**Text Book of Polymer Science"**, John Wiley & Sons, 4th Edition, 1996.
3. M.G. Fontana, N. D. Greene, "**Corrosion Engineering"**, McGraw Hill Publications, New York, 3rd Edition, 1996.
4. B. R. Puri, L. R. Sharma & M. S. Pathania, "**Principles of Physical Chemistry",** S. Nagin Chand &Co., New Delhi, 23rd Edition, 1993.
5. G. A. Ozin and A.C. Arsenault, "**Nanochemistry: A Chemical Approach to Nanomaterials**", RSC Publishing, 3rdEdition, 2005.

E -RESOURCES
1. https://books.google.co.in/books?isbn=0070669325 (Engineering chemisty by Sivasankar)
2. https://www.youtube.com/watch?v=yQUD2vzfgh8 (Hot dipping Galvanization)
3. Journal of Industrial & Engineering chemistry (Elsevier)
4. Journal of fuel chemistry & Technology (Elsevier)
5. nptel.ac.in/courses/113108051/ (corrosion &electrochemistry web course)
6. http://nptel.ac.in/course.php (Material chemistry video& web courses)

Course Outcomes
At the end of the course, students will be able to
1. Acquire knowledge on Water treatment, specifically hardness of water.
2. Acquire knowledge on Electrochemical cell, fuel cells, batteries and its applications.
3. Know the properties and uses of polymeric materials.
4. Analyze the combustion mechanism of various types of fuels (solid, liquid, gas)
5. Acquire basic knowledge on the concepts of Composites, Nano and Green Chemistry.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. I Semester	
Code: 70501	**COMPUTER PROGRAMMING** (Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	L	T	P
Credits: 3		2	2	-

Prerequisites: NIL

Course Objectives: This course provides the fundamental concepts of computers and introduce to the students to the field of programming using C language, apply the control structures, iterations statements, arrays, functions, strings, pointers, structures, unions and files. This course also explains the concepts of searching and sorting techniques in C language.

MODULE I: Fundamentals and Introduction to 'C' Language **[11 Periods]**
Fundamentals: Hardware, Software, Programming languages, Number Systems, Translators, Introduction to Operating System, Program Development steps - Algorithm, Flow charts.
Introduction to 'C' Language: History, Simple C Program, Identifiers, Preprocessor Directives-Include and define, Basic data types, User-defined data types, Variables, Constants, Type qualifiers, Managing Input / Output, Operators, Precedence and Associativity, Expression Evaluation, Type conversions, Simple 'C' Programming examples.

MODULE II: Control Statements & Arrays **[9 Periods]**
Control Statements: Conditional statements- if and switch statements, ternary operator ?: , Loop Control Statements – while, for, do-while, break, continue and goto statements.
Arrays: Basic concepts, One-dimensional arrays, Two–dimensional arrays, Multi-dimensional arrays.

MODULE III: Strings & Pointers **[9 Periods]**
A: Basic concepts, String Input / Output functions, Arrays of strings, String handling functions.
B: Basic concepts, Pointer arithmetic, Pointers and strings, Pointers and arrays, Dynamic Memory Allocation**.**
.
MODULE IV: Functions & Derived Types **[9 Periods]**
Functions: Basics, User defined functions, Inter function communication, Library functions, Storage Classes-auto, register, static, extern, Scope rules, Array and string manipulations using functions, Recursive functions, Pointers and functions.
Derived types: Structures – Basic concepts, Nested structures, Arrays of structures, Structure manipulations using functions, Pointers to structures, Self-referential structures, Unions, bit fields

MODULE V: File I/O, Sorting and Searching **[10 Periods]**
File I/O: Basic concepts, Text files and Binary files, File input / output operations, File status functions (error handling), Command-Line Arguments, C programming examples.
Sorting and Searching: Sorting - selection sort, bubble sort, insertion sort, Searching - linear and binary searching methods**.**

TEXT BOOKS
1. PradipDey, Manas Ghosh, **"Programmingin C"**, Oxford University Press, 2nd Edition, 2011.
2. E. Balagurusamy, "**Computer Programming in C"**, Tata McGraw Hill, 1st Edition, 2013.

REFERENCES

1. Brian W. Kernighan, Dennis M. Ritchie, "**The C Programming Language"**, PHI, 2nd Edition, 1990.
2. Greg Perry and Dean Miller, "**C Programming Absolute beginner's guide**", QUE Publishers, 3rd Edition, 2013.
3. Paul Deitel and Harvey Deitel, "**C How to Program"**, PHI, 7th Edition, 2012.
4. Behrouz A. Forouzan, E.V.Prasad, Richard F. Gilberg, "**C programming: A Problem- Solving Approach**", Cengage Learning Press, 1st Edition, 2011.

E -RESOURCES

1. http://oxford university press.ac.in/eBooks/ Programming in C.
2. https://www.journals.elsevier.com/science-of-computer-programming
3. http://www.ejournalofsciences.org
4. http://onlinecourses.nptel.ac.in/iiitk_cs-101
5. http://onlinevideolecture.com/ebooks/?subject=C-Programming

Course Outcomes

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

1. Understand the basic terminology, write, compile and debug programs in computer programming.
2. Apply different types of control structures and arrays in a computer programming.
3. Develop programs that make use of concepts such as strings and pointers in C language.
4. Compare parameter passing techniques, structures and unions in computer programming.
5. Analyze file operations, searching and sorting methods.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. I Semester	
Code: 70201	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING** (Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisites: NIL

Course Objectives: To introduce the concept of electrical circuits and its components. To introduce the characteristics of various electronic devices. To impart the knowledge of various configurations, characteristics and applications of electrical & electronic components.

MODULE I: **Introduction to Electrical Circuits** **[10 Periods]**

Circuit Concept – R-L-C parameters – Voltage and Current sources – Independent and dependent sources - Source transformation – Voltage and Current relationship for passive elements – Series, parallel, series-parallel, star-to-delta and delta-to-star transformation. Kirchhoff's laws – KCL and KVL, Loop and Nodal analysis of Networks with independent voltage and current sources.

MODULE II: **Magnetic Circuits** **[9 Periods]**

Magnetic Circuits – Faraday's laws of electromagnetic induction – concept of self ad mutual inductance – dot convention – coefficient of coupling – composite magnetic circuit - Analysis of series and parallel magnetic circuits. Hysteresis and Eddy currents.

MODULE III: **Single Phase A.C. Circuits** **[10 Periods]**

A: R.M.S and Average values and form factor for sinusoidal wave forms, Steady state analysis of pure R, L and C with sinusoidal excitation.

B: Steady state analysis of series RL, RC, RLC - Concept of Reactance, Impedance, Susceptance and Admittance – Phase and Phase difference – Power factor, Real and Reactive powers.

MODULE IV: **Semiconductor Diode Characteristics** **[10 Periods]**

Qualitative theory of the p-n junction, the p-n junction as a diode, band structure of an open circuited p-n junction, the current components in a p-n diode, quantitative theory of the p-n diode currents, the volt ampere characteristics, the temperature dependence of V-I characteristics, diode resistance, ideal versus practical diodes, diode equivalent circuits, space charge or transition capacitance CT, diffusion capacitance, breakdown mechanism in diode, Zener diode, V-I characteristics of Zener diode.

MODULE V: **Diode Applications & Special Semiconductor Devices** **[9 Periods]**

Diode Applications: Introduction, load line analysis, series diode configurations, parallel and series-parallel configuration, half-wave rectification, full-wave rectification, general filter considerations, Inductive, Capacitive, LC and CLC filters, Zener diode as voltage regulator.

Special Semiconductor Devices: Principle of operation, Characteristics and applications of Tunnel diode, Varactor diode, Photo Diode, LED, LCD.

TEXT BOOKS

1. M. Surya Kalavathi, Ramana Pilla, Ch. Srinivasa Rao, Gulinindala Suresh, **" Basic Electrical and Electronics Engineering"**, S. Chand and Company Limited, New Delhi, 1st Edition, 2017.
2. R. L. Boylestad and Louis Nashlesky, **"Electronic Devices & Circuit Theory"**, Pearson Education, 2007.

REFERENCES

1. V. K. Mehtha and Rohit Mehta, **"Principles of Electrical Engineering and Electronics"**, S. Chand & Co., 2009.
2. Jacob Milliman, Christos C.Halkias, Satyabrata Jit (2011), **"Electronic Devices and Circuits"**, 3 rd edition, Tata McGraw Hill, New Delhi.
3. Thomas L. Floyd and R. P. Jain, "**Digital Fundamentals"**, Pearson Education, 2009.
4. David A. Bell, **"Electronic Devices and Circuits"**, Oxford University Press, 2008.
5. Nagrath I.J. and D. P. Kothari, "**Basic Electrical Engineering"**, Tata McGraw Hill, 2001.
6. Mittle N., **"Basic Electrical Engineering"**, Tata McGraw Hill Education, New Delhi, 2nd Edition, 2005.

E - RESOURCES

1. https://www.electrical4u.com/ohms-law-equation-formula-and-limitation-of-ohms-law/
2. https://www.eeweb.com/passives
3. http://nptel.ac.in/courses/108108076/
4. http://nptel.ac.in/downloads/108105053/

Course Outcomes

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

1. Apply basic laws in electrical circuit.
2. Apply the faraday's laws of electromagnetism to real world.
3. Analyze the response of AC network.
4. Know the practical importance of Diode and its characteristics.
5. Recognize the operation of Diode and its applications.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: 70B11	APPLIED CHEMISTRY LAB (Common for CE, ME and Min.E)	L	T	P
Credits: 2		-	-	4

Course objectives:
To provide the students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence.

List of Experiments: (Any ten experiments)

1. Calibration of Volumetric apparatus.

2. Estimation of Hardness of water by EDTA Method.

3. Estimation of pH of an acid (Three methods).

4. Estimation of alkalinity of water.

5. Estimation of strength of an acid by Conductometry.

6. Estimation of strength of an acid by Potentiometry.

7. Determination of ferrous ion in cement by colorimeter.

8. Determination of viscosity of given liquids.

9. Preparation of Nylon 6,6.

10. Preparation of Thiokol Rubber.

11. Determination of surface tension of given sample using stalagnometer.

12. To Study the inversion of cane sugar by polarimeter.

13. Estimation of Mn^{+2} ion in $KMnO_4$ by Colorimeter.

Course Outcomes
At the end of the course, students will be able to
1. Estimate the impurities present in water samples.
2. Select lubricants for various purposes.
3. Prepare advanced polymer materials.
4. Know the strength of an acid present in batteries.
5. Find the Fe^{+2} present in unknown substances/ores using titrimetric and instrumental methods.

Software Requirement: Turbo 'C'

List of Programs:

1. a) Practice various Internal and External DOS Commands.
   b) Implement various programs logics using algorithms and flowcharts.
   c) Write sample examples of C programs to implement basic operations.
2. a) Write a C program to find smallest and largest of given three numbers.
   b) Write a C program to find the roots of a quadratic equation.
3. a) Write a C program to find the sum of individual digits of a positive integer.
   b) 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.
4. a) Write a C program to find whether the given number is palindrome, perfect, Armstrong or strong.
   b) Write a C program to generate all the prime numbers between n1 and n2, where n1 and n2 are values supplied by the user.
5. Write C programs that use both recursive and non-recursive functions
   a) To find the factorial of a given integer.
   b) To find the GCD (greatest common divisor) of two given integers.
6. a) Write a C program to find both the largest and smallest number in a list of integers.
   b) Write a C program that uses functions to perform the following:
      i) Addition of Two Matrices
      ii) Multiplication of Two Matrices
7. a) Write a C program that uses functions to perform the following operations:
      i) To insert a sub-string into given main string from a given position.
      ii) To delete n characters from a given position in a given string.
   b) Write a C program to determine if the given string is a palindrome or not
   c) Write a C program to find substring in a given string.
   d) Write a C program to count the lines, words and characters in a given text.
8. a) Write a C program to implement functions arguments with different returns values.
   b) Write a C program to implement call by value and call by reference using functions.
9. a) Write a C program to find grades of a student's using structures and unions.
   b) Write a C program to implement nested structures.
10. a) Write a C program which copies one file to another.
    b) Write a C program to command line arguments.
11. 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.
    b) Write a C program that uses recursive and non -function to search for a Key value in a given sorted list of integers using Binary search.
12. a) Write a C program that implements the Selection sort method to sort a given array of integers in ascending order.

b) Write a C program that implements the Bubble sort method to sort a given list of names in ascending order.

TEXT BOOKS
1. PradipDey, ManasGhosh, **"Programmingin C"**, Oxford University Press, 2nd Edition, 2011.
2. E.Balagurusamy, "**Computer Programming in C"**, Tata McGraw Hill, 1st Edition, 2013.

REFERENCES
1. Brian W. Kernighan, Dennis M. Ritchie, "**The C Programming Language"**, PHI, 2nd Edition, 1990.
2. Greg Perry and Dean Miller, "**C ProgrammingAbsolute beginner's guide**", QUE Publishers, 3rd Edition, 2013.
3. Paul Deitel and Harvey Deitel, "**C How to Program"**, PHI, 7th Edition, 2012.
4. Behrouz A. Forouzan, E.V.Prasad, Richard F.Gilberg, "**C programming: A Problem- Solving Approach**", Cengage Learning Press, 1st Edition, 2011.

Course Outcomes
At the end of the course, students will be able to
1. Analyze concepts in problem solving do programming in C language and write diversified solutions using C language.
2. Identify situations where computational methods and computers would be useful.
3. Understand the programming tasks using techniques learned and write pseudo-code.
4. Compare the program on a computer, edit, compile, debug, correct, recompile and run it.
5. Identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: 70303	**ENGINEERING WORKSHOP**	**L**	**T**	**P**
Credits: 2	(Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	**-**	**-**	**4**

Course Objectives: To understand the usage of hand tools, acquire the skills in model / pattern making and familiarize with various work materials and tools.

I. Trades for Exercises:
At least two exercises from each trade:
1. Carpentry
2. Fitting
3. Tin-Smithy
4. House-wiring
5. Foundry
6. Arc welding
7. IT workshop – Hardware identification and connectivity, assembling, disassembling and OS Installation

II. Trades for Demonstration& Exposure

1. Machine shop
2. Plumbing
3. Wood working lathe
4. Identification of Electronic Components
5. Blacksmithy

Course Outcomes

At the end of the course, students will be able to
1. Knowledge of carpentry process and methods used in the design and fabrication, installation, maintenance and repair of structures and fixtures (e.g., furniture, cabinets) to accomplish work assignments.
2. Assembling together of part and removing metals to secure the necessary joint by using fitting and welding.
3. Understand the hardware components of house wiring.
4. Understand the manufacturing process using machine shop.
5. Analyze the different types of computer hardware and software installation.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code:70H01	ENGLISH	L	T	P
Credits: 3	(Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	3	-	-

Prerequisite: NIL

Course Objective: The objective of this course is to improve the English Language competency of the students, which emphasizes on all language components namely grammar, vocabulary, prose, short stories. Further, it also helps in developing the skills of Reading and Writing. As a result students are equipped to study the academic subjects more effectively using the theoretical and practical components of the English syllabus.

MODULE I: Minimalism- Live a Meaningful Life   [10 Periods]
Poem   : **Road Not Taken** by **Robert Frost**
Vocabulary   : Formation of words, prefixes, suffixes and root words
Grammar   : Articles and Prepositions
Reading   : Skimming and Scanning
Writing   : Introduction to writing skills, characteristics of effective writing

MODULE II: Knowledge Society   [10 Periods]
Poem   : **Life** by Sarojini Naidu
Vocabulary   : Homonyms, homophones, homographs
Grammar   : Sentence Structures, Voice – exercises
Reading   : Intensive Reading and Extensive Reading
Writing   : Paragraph writing- use of cohesive devices; arranging jumbled sentences into Paragraph

MODULE III: Half a Rupee Worth   [10 Periods]
Poem   : **If** by **Rudyard Kipling**
Grammar   : Tense, aspect and concord
Vocabulary   : Idiomatic Expressions; Phrasal Verbs
Reading   : Reading for theme and gist.
Writing   : Essay Writing

MODULE IV: Jesse Owens   [9 Periods]
Poem   : **I too Sing America** by **Langston Hughes**
Grammar   : Question Tags; Degrees of Comparison
Vocabulary   : One word substitutions; synonyms and antonyms
Reading   : Reading for interpretation
Writing   : Letter writing- both formal and informal

MODULE V: Pecuniary Independence   [9 Periods]
Poem   : **Human Family** by **Maya Angelou**
Grammar   : Direct and Indirect Speech
Vocabulary   : Gender sensitive language, integrated exercises in vocabulary
Reading   : Reading for specific purposes
Writing   : Summarizing

* Exercises from the texts not prescribed shall also be used for classroom tasks.

TEXT BOOKS
1. T.V.Surnedranath Reddy, B.Vijay Kumar and K.James. *"***Effective English"***,* First Edition*, Maruthi Publications, 2017.

REFERENCES
1. Azar, Betty and Stacy A, Hagen**,** Understanding and Using English Grammar, Foundation Books, 4th Edition, 2009.
2. Chaudhuri, SantanuSinha, Learn English: A Fun Book of Functional Language**,** Grammar and Vocabulary,New Delhi: Tata McGraw Hill Education, , Paper Back Edition. 2013.
3. Eastwod, John: Oxford Guide to English Grammar, Oxford University Press, 4th Edition, 1994.
4. Field, Marion**,** Improve Your Written English, Kindle books, 5th Edition, 2009.
5. G. Leech and J. Svartvik ,A Communicative Grammar of English, London: Longman, 3rd Edition, 2002.

E - RESOURCES
1. http://www.slideshare.net/aszardini/word-formationroot-words-prefixes-and-suffixes
2. http://www.scribd.com/doc/37085980/Circulars-Circular-Letters-Notices-Memo#scribd.
3. http://www.zsme.tarnow.pl/jezykiobce/wp-content/uploads/2013/11/writing-letters1.pdf.

Course Outcomes
At the end of the course, students will be able to
1. Use English considerably well in written and spoken.

2. Enrich language accurately and fluently.

3. Employ extensive and intensive reading skills

4. Gain confidence in using English language and skills for writing in real life situations.

5. Use standard grammar, punctuation, and spelling in documents.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: 70B02	**COMPUTATIONAL MATHEMATICS** (Common for CE,EEE,ME,ECE,CSE,IT and Min.E)	**L**	**T**	**P**
Credits: 4		3	2	-

Prerequisite: Engineering Mathematics

Course Objective: The objective of this course is to introduce various numerical techniques which are indispensable tools to solve many algebraic and transcendental equations. Various methods are used to reduce the global error involved in approximations. This course fills into this perceived need. The treatment should be informed by the fact that not only conceptual but also (and in some cases) more importantly numerical or computational methods are of essence.

MODULE I: Algebraic and Transcendental Equations [13 periods]

Solution of Algebraic and Transcendental Equations: Introduction - Bisection Method - Method of False Position - Iteration Method – Newton-Raphson Method - Ramanujan's Method.
Gauss Jacobi – Gauss Seidel Methods

MODULE II: Interpolation [13 periods]

Introduction, Errors in Polynomial Interpolation, Finite differences, Forward Differences-Backward differences, Symbolic relations and separation of symbols, Differences of a polynomial-Newton's formulae for interpolation
Central difference interpolation Formulae, Gauss Central Difference Formulae, Interpolation with unevenly spaced points: Lagrange's Interpolation formula.

MODULE III: Curve Fitting, Numerical Differentiation & Integration [12 periods]

A: Curve fitting: Fitting a first degree (linear) and second degree (parabola), exponential, power curves for a data by the Method of least squares.
B: Numerical Differentiation: Evaluation of derivatives, Evaluation of maximum & minimum for a given data. Numerical Integration: Trapezoidal Rule, Simpson's 1/3rd, 3/8 Rule.

MODULE IV: Numerical Solution of Ordinary Differential Equations [13 periods]

Solution by Taylor's series method - Picard's Method of successive Approximations - Euler's Method-Modified Euler's Method – Runge-Kutta Methods. Predictor-Corrector Methods: Milne's method - Adams- Bashforth Method.

MODULE V: Numerical Solution of Partial Differential Equations [13 periods]

Classification of second order equations – Finite difference approximations to derivatives - standard 5 point formula – diagonal 5 point formula – solution of Laplace equation.
Solution of poission's equation.Solution of one dimensional heat, wave equations (by Crank-Nicolson explicit/implicit formula only).

TEXT BOOKS

1. S.S. Sastry, **"Introductory Methods of Numerical Analysis"**, Prentice-Hall of India Private Limited, 4th edition.
2. B.S. Grewal, **"Higher Engineering Mathematics",** Khanna Publishers, 43rd Edition, Reprint 2011.

REFERENCES

1. R.K. Jain & S.R.K. Iyengar **"Advanced Engineering Mathematics"**, Narosa Publications Delhi, 3rd edition.
2. Kanti B. Datta **"Mathematical Methods of Science and Engineering",** Cengage Learning Publications.
3. Alan Jeffrey **"Mathematics for Engineers and Scientists"**, Chapman & Hall/ CRC, 6th Edition 2013
4. Michael Greenberg **"Advanced Engineering Mathematics"**, Pearson Education Second Edition.

E –RESOURCES

1. http://www.simumath.com/library/book.html?code=Alg_Equations_Examples (Algebraic and transcendental equation text book by YURG BERENGARD)
2. http://jupiter.math.nctu.edu.tw/~smchang/9602/NA_lecture_note.pdf (Interpolation)
3. http://www.essie.ufl.edu/~kgurl/Classes/Lect3421/Fall_01/NM5_curve_f01.pdf (Curve fitting)
4. http://nptel.ac.in/courses/104101002/downloads/lecturenotes/module1/chapter6.pdf (Numerical Differentiation and Integration)
5. http://www.sam.math.ethz.ch/~hiptmair/tmp/NPDE10.pdf (Numerical Solution of Partial Differential Equations)
6. https://www.jstor.org/stable/27953736?seq=1#page_scan_tab_contents (Algebraic and transcendental equation by William L. Schaaf)
7. http://www.ijcsi.org/papers/IJCSI-9-6-2-413-419.pdf (Algebraic and transcendental equation by Md. Golam Moazzam)
8. http://www.iosrjournals.org/iosr-jm/papers/Vol6-issue6/J0665862.pdf (Interpolation)
9. http://www.wseas.org/multimedia/journals/mathematics/2014/a045706-398.pdf (Curve fitting)

Course Outcomes

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

1. Apply numerical methods to solve some algebraic and transcendental equations to the desired level of accuracy.
2. Application of interpolation concept to evaluate missed data in data analysis.
3. Application of least squares method to solve data analysis problems and able to find the differentiation and integration by using numerical techniques.
4. Apply differential equations in engineering oriented problems and to observe patterns by using numerical techniques.
5. Find the Numerical solution of partial differential equations.

Prerequisite: Engineering Physics

Course Objective: The main objective of this course is to provide the basic physics principles, would help engineers to understand the tools and techniques used in the industry and provide the necessary foundations for inculcating innovative approaches. This would create awareness about the vital role played by science and engineering in the development of new technologies.

MODULE I: Magnetic Properties of Materials & Superconductivity   [9 Periods]

Magnetic Properties of Materials: Introduction, origin of magnetic moment - Bohr magneton; classification of dia, para and ferro magnetic materials, hysteresis curve, soft and hard ferromagnetic materials, properties of anti-ferro and ferri magnetic materials.

Superconductivity: Concept of Perfect Diamagnetism; Meissner effect ; Type I and II Superconductors; BCS theory (qualitative); High T_C super conductors; Applications of Superconductors - Smart magnets, SQUIDs, transmission lines, Mag-Lev Train.

MODULE II: Dielectric Properties of Materials   [9 Periods]

Electric dipole, Dipole moment, Dielectric constant, Polarizability, Electric Susceptibility, Displacement Vector, Electronic, Ionic and Orientation Polarizations and Calculation of Polarizabilities - Electronic and ionic; Qualitative treatment of Internal Fields in solids, Clausius - Mossotti Equation, Piezo-electricity, Ferro- electricity, Barium titanate, Applications of Ferroelectric materials.

MODULE III: LASER & Fiber Optic Materials   [13 Periods]

A: Laser : Characteristics of LASER; Absorption, Spontaneous and Stimulated transitions; Einstein's Coefficients and Relations between them; Population Inversion; Pumping - Optical and Electrical; Meta-stable State; Three and Four level pumping schemes; Ruby LASER; Helium-Neon LASER; Nd:YAG LASER; Semiconductor Diode LASER; Applications of LASER - drilling, welding, data storage, optical signal processing and nuclear fusion.

B: Fiber Optic Materials: Principle of Optical Fiber; Acceptance angle and Acceptance cone, Numerical Aperture; Step and Graded index Optical Fibers and their Refractive Index profiles; Attenuation in Optical Fibers, Fiber materials, Application of Optical Fibers - Medical, Level sensor and Communication system.

MODULE IV: Acoustics & Ultrasonics   [9 Periods]

Acoustics: Reverberation & Reverberation time, basic requirements of acoustically good hall; absorption Coefficient, Determination of absorption coefficient based on the standard times of reverberation, Sabine's formula (Qualitative treatment); Factors affecting the architectural acoustics and their remedies.

Ultrasonics: Introduction, Concept of Magnetostriciton, Piezo and inverse Piezo electric effects; Production of Ultrasonic waves - Magnetostriction method; Piezo electric crystal method; Properties of Ultrasonic waves; Detection of Ultrasonics - Piezo electric detector, Kundt's tube, Sensitive flame method, Thermal detector; Applications - Communication, Industrial, Biological and Medical;

MODULE V: Non Destructive Testing (NDT)   **[8 Periods]**

Introduction, Types of Defects, Methods of NDT, visual Inspection, Liquid/dye penetrate testing, magnetic particle testing, Eddy current testing, Ultrasonic inspection method, Advantages, X-ray radiography, X-ray fluoroscopy, comparison of conventional and real time radiography

TEXT BOOKS
1. K Vijaya Kumar, S Chandralingam, "**Modern Engineering Physics**'' Volume I & II, S. Chand, 1st Edition, 2017.
2. M N Avadhanulu, P G Kshirsagar, "A **Textbook of Engineering Physics"**, Revised Edition 2014.

REFERENCES
1. P K Palanisamy, "**Engineering Physics"**, 4th Edition, SciTech Publications, 2014.
2. D K Bhattacharya, PoonamTandon, "**Engineering Physics**", Oxford University Press, 1st Edition, 2015.
3. G Prasad and Bhimashankaram, "**Engineering Physics"**, B S Publications, 3rd Edition, 2008.
4. R K Gaur and SL Gupta, "**Engineering Physics**" DhanpatRai Publications, Eighth Revised Edition, 2006.

E-RESOURCES
1. http://www.aep.cornell.edu/academics/upload/PhD-Handbook-11-12-2.pdf
2. https://archive.org/details/essentialsofappl029186mbp
3. https://www.youtube.com/watch?v=etjZmdmrjSU
4. https://www.youtube.com/watch?v=ooLJ_bGKmH8
5. https://www.youtube.com/watch?v=QQZ6EGf0Ju8
6. https://www.youtube.com/watch?v=6QUFuZpCgGw
7. https://www.youtube.com/watch?v=qUEbxTkPIWI
8. http://www.springer.com/physics/journal/340
9. http://www.niscair.res.in/sciencecommunication/researchjournals/rejour/ijpap/ijpap0.asp

Course Outcomes

At the end of the course, students will be able to
1. Distinguish ferro, ferri and anti-ferro magnetic materials and understands different types of superconductors.
2. Recognizes the dielectric properties of matter.
3. Aware of the concepts and applications of LASER and Optical fibers.
4. Analyzes the minimum requirements of Acoustics and also various production and detection methods of Ultrasonics.
5. Know relevant applications of NDT.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. II - Semester	
Code: 70301	ENGINEERING GRAPHICS (Common to CE, EEE, ECE, CSE, ME, IT and Min.E)	L	T	P
Credits: 4		4	-	-

Prerequisite: NIL

Course Objective: The students will be able to understand the manual drawings and getting fundamental knowledge on drafting software.

MODULE I: Introduction to Engineering Drawing   [15 Periods]

Principles of Engineering Graphics and their Significance. Lettering and dimensioning. Geometrical Constructions: Regular polygons only. Curves: Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid, Hypocycloid and Involute. Scales: Construction of different types of scales - Plain, Diagonal and Vernier scale.

MODULE II: Projection of Points, Lines and Planes   [15 Periods]

Principles of Orthographic Projections – Conventions – First Angle projections. Points & Lines: Projection of Points, Projection of Lines- inclined to both the planes. Planes: Projection of Planes – inclined to one plane only.

MODULE III: Projection of Solids & Section of Solids   [15 Periods]

A: Projection of Solids: Projections of regular solids like cube, prism, pyramid, tetrahedron, cylinder and cone by rotating object method. Axis inclined to both the reference planes.
B: Section of Solids: Sectioning of above solids in simple vertical position with the cutting plane is inclined to the one plane and perpendicular to the other –true shape of section.

MODULE IV: Development of Surfaces & Isometric Projections   [15 Periods]

Development of Surfaces: Development of lateral surfaces of simple and sectioned solids – prisms, pyramids cylinders and cones. Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions –Plane Figures, Simple and Compound Solids.

MODULE V: Transformation of Projections & Introduction Auto CAD   [15 Periods]

Transformation of Projections: Conversion of Isometric Views to Orthographic Views. Conversion of orthographic views to isometric views – simple objects. Introduction to Auto CAD: Introduction, Salient features of AutoCAD software**,** Basic commands, construction, editing and dimensioning, two dimensional drawings.

TEXT BOOKS
1. N.D. Bhat, "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2014.
2. BasantAgrawal, "Engineering Drawing" , Tata McGraw Hill, 2nd Edition, 2013.

REFERENCES
1. K.L.Narayana, P. Kannaiah, "Engineering Drawing", SciTech Publishers. 2nd Edition, 2013
2. K. Venugopal, "Engineering Drawing", New Age International Publishers, 3rd Edition, 2014.
3. K. V. Natarajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2015.

4. M.S. Kumar, "Engineering Graphics", D.D. Publications, 2011.
5. Trymbaka Murthy, "Computer Aided Engineering Drawing", I.K. international Publishing House, 3rd Edition, 2011.

E - RESOURCES
1. https://www.slideshare.net/search/slideshow?searchfrom=header&q=engineering+drawing
2. https://www.wiziq.com/tutorials/engineering-drawing
3. http://freevideolectures.com/Course/3420/Engineering-Drawing
4. http://www.worldcat.org/title/journal-of-engineering-graphics/oclc/1781711
5. http://road.issn.org/issn/2344-4681-journal-of-industrial-design-and-engineering-graphics
6. http://nptel.ac.in/courses/112103019/

Course Outcomes

At the end of the course, students will be able to
1. Understand the basics of drawings and importance of curves.
2. Draw the projection of points, lines and planes.
3. Draw the projection of solids and section of solids.
4. Produce development of surface and isometric projections.
5. Convert orthographic views to isometric views and vice-versa and know the basics of Auto CAD.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. II Semester	
Code: 70302	**ENGINEERING MECHANICS** (Common for CE, ME and Min.E)	**L**	**T**	**P**
Credits: 4		**4**	**-**	**-**

Prerequisite: Engineering Physics

Course Objective: The objective of this subject is to provide the basic concepts and effect of system forces on rigid bodies, Geometrical Properties of Planes and Solids, problem solving in kinematics and kinetics using different methods and to analyse the types of friction for moving bodies and problems related to friction.

MODULE I: Introduction to Mechanics & System of Forces   [13 Periods]
Introduction: Basic Concepts, Laws of Motion, Force - types, characteristics - Principle of transmissibility - Types of Forces - Concurrent and non-concurrent Forces - Composition of force – Resultant - Triangle, Polygon and Parallelogram Law of Forces - Moment of Force and its Application - Varignon's theorem, Couples - Free Body Diagrams, Types of Supports and their reactions, Internal and External Forces - Types of Equilibrium, Equations of Equilibrium, Conditions of Equilibrium - Lami's Theorem.

MODULE II: Friction, Centroid and Center of Gravity   [13 Periods]

Friction: Types of friction, Limiting friction, Laws of friction, static and dynamic frictions, application of laws of friction. Motion of bodies - wedge, screw, screw jack.
Centroid and Center of Gravity: Introduction, Centroids of Lines and Areas - simple figures - Centroid of composite figures. Pappus theorem - Centre of gravity of simple solids, composite solids - Centroids of volumes.

MODULE III: Projection of Solids & Section of Solids   [13 Periods]
A: Area Moment of Inertia: Definition - Moment of Inertia of plane areas, Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures.
B: Mass Moment of Inertia: Introduction-moment of inertia of masses - Radius of gyration-Transfer formula for mass moment of inertia- by integration - Moment of Inertia of composite bodies.

MODULE IV: Kinematics & Kinetics   [13 Periods]
Kinematics: Rectilinear motion - Motion of Rigid Body under uniform and variable accelerations - motion under gravity- curvilinear motion – Projectiles - rotary motion.
Kinetics: Analysis as a Particle and Analysis as a Rigid Body in Translation - D'Alemberts Principle - Connected bodies- Kinetics of rotating bodies.

MODULE V: Work, Power, Energy & Mechanical Vibrations   [12 Periods]
Work, Power and Energy: Introduction, work-energy equation - motion of connected bodies - work done by a spring - general plane motion.
Mechanical Vibrations: Definitions, concepts - simple harmonic motion - free vibrations - Simple and compound pendulums.

TEXT BOOKS

1. S. TIMOSHENKO, D.H. YOUNG, J.V. RAO AND SUKUMAR PATI, "ENGINEERING MECHANICS", TATA MCGRAW-HILL EDUCATION, 5TH EDITION, 2013.
2. K.Vijaya Kumar Reddy, J. Suresh Kumar**, "Engineering Mechanics"**, B S Publications, 3rd Edition, 2013.

REFERENCES

1. Beer, F.P and Johnston Jr. E.R. "**Vector Mechanics for Engineers**", Tata McGraw-Hill Education 10th Edition (India) Pvt Ltd.. 2013.
2. Fedinand. L. Singer, **"Engineering Mechanics"**, Harper & Row Publishers, 3rd Edition, 1975.
3. R.S. Khurmi, "**A Text Book of Engineering Mechanics"**, S.Chand Publications, 21st Edition, 2007.
4. K L Kumar, "**Engineering Mechanics"**, Tata McGraw Hill Education, 4th Edition, 2011.
5. D.S.Kumar Patil, "**Engineering Mechanics''**, SK Kataria & Sons Publishers, 2nd Edition, 2009.

E - RESOURCES

1. http://www.mathalino.com/reviewer/engineering-mechanics/equilibrium-force-system
2. http://nptel.ac.in/courses/112103109/
3. http://ascelibrary.org/journal/jenmdt
4. https://tll.mit.edu/sites/default/files/SUTDVideoThumb/freebodydiagrams.pdf
5. http://nptel.ac.in/courses/112106180/
6. http://nptel.ac.in/courses/115104094/

Course Outcomes

At the end of the course students will be able to

1. Determine the resultant of a system of forces and draw free body diagrams and can frame appropriate equilibrium equations from the free body diagram
2. Understand and solve the fundamental static problems and able to find centroid and centre of gravity
3. Determine area and mass moment of inertia for various sections.
4. Apply fundamental concepts of kinetics and kinematics of particles to the analysis of simple practical problems.
5. Understand and solve fundamental work, power and energy related problems and know the concepts of mechanical vibrations.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: 70H02	**ENGLISH LANGUAGE LAB**	L	T	P
Credits: 2	(Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	-	-	4

Prerequisite: NIL

Course Objective: To sensitize the students to the intelligibility in their pronunciation of English, speech sounds, word accent, intonation and rhythm. It also helps to improve the fluency in spoken English and make them aware of nuances of major skills, *viz*listening and speaking skills. Hence it helps to train the students to understand nuances of both verbal and non verbal communication during all activities. The purpose of this course is to develop confidence levels of the students and to face the audience and participate in public speaking.

Listening Skills:
Objectives:
1. To enable students to develop their listening skill so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions
Students should be given practice in listening to the sounds of the language to be able to recognize them, awareness regarding stress and recognize and use the right intonation in sentences.
• Listening for general content
• Listening to fill up information
• Intensive listening
• Listening for specific information

Speaking Skills:

Objectives:
1. To make students aware of the role of speaking in English and its contribution to their success.
2. To enable students to express themselves fluently and appropriately in social and professional contexts.
• Oral practice
• Describing objects/situations/people
• Just A Minute (JAM) Sessions.

Syllabus: English Language Communication Skills Lab shall have two parts:
a. Computer Assisted Language Learning (CALL) Lab
b. Interactive Communication Skills (ICS) Lab
The following course content is prescribed for the English Language Communication Skills Lab

MODULE I:

CALL Lab: Introduction to Phonetics – Speech Sounds – Vowels and Consonants

ICS Lab: Ice-Breaking activity and JAM session

Listening: listening for sounds in context, for ideas.

Speaking: ideation and translation of ideas into sentences.

MODULE II:

CALL Lab: Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms -Consonant Clusters.

ICS Lab: Situational Dialogues – Role-Play- Expressions in Various Situations – Self-introduction and Introducing others – Greetings – Apologies – Requests – Social and Professional Etiquette - Telephone Etiquette.

Listening: listening for specific purposes, for details.

Speaking: speaking in the above situations with clarity, connectivity, maintaining voice characters.

MODULE III:

CALL Lab: Word accent and Listening Comprehension-reading (aloud) meaningfully.

ICS Lab: Descriptions- Narrations- Giving Directions and guidelines.

Listening: listening for intelligible English

Speaking: formal and informal conversations, register.

MODULE IV:

CALL Lab: Intonation and Common errors in Pronunciation- reading aloud (evaluating through recording).

ICS Lab: Extempore- Public Speaking, Oral Presentation Skills

Listening: note taking and listening for speaker's tone/attitude

Speaking: organizing, connecting ideas and sentences, short forms in spoken English, errors in spoken English

MODULE V:

CALL Lab: Neutralization of Mother Tongue Influence and Conversation Practice

ICS Lab: Information Transfer, Debate

Minimum Requirement of infra structural facilities for EL Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer aided Language Lab for 40 students with 40 systems, one master console, LAN facility and English language software for self- study by learners.

System Requirement (Hardware component):

Computer network with Lan with minimum 60 multimedia systems with the following specifications:

a) P – IV Processor   b) Speed – 2.8 GHZ,   c) RAM – 512 MB Minimum

d) Hard Disk – 80 GB,   e) Headphones of High quality

2. Interactive Communication Skills (ICS) Lab : The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.

TEXT BOOKS

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

Prescribed Lab Manual: Rani Sudha, "*English Language Communication Skills laboratory*"
Manual Published by **Pearson Publication**, 5 edition, New Delhi 2014

REFERENCES

1. Gairns ,Ruth and Redman , Stuart: Oxford Word Skills, Learn and Practice English Vocabulary, 2nd Edition, 2008.
2. Hughes , John and Mallett , Andrew: Successful Presentations: DVD and Student's Book Pack: A Video Series Teaching Business Communication Skillsfor Adult Professionals
3. Hamcock, English pronunciation in use (Intermediate),Cambridge university Press,2009
4. Karia ,Akash: Public Speaking Mastery, Speak Like a Winner , Kindle Edition, 2013.
5. Lucas, Stephen: The Art of Public Speaking**"** : Tata McGraw Hill, 11th Edition, 2011.

E - RESOURCES

1. http://www.mindtools.com/CommSkll/ActiveListening.htm
2. http://www.slideshare.net/alisonkis/dialogue-and-roleplay-activity
3. http://www.hse.ru/pubs/lib/data/access/ram/ticket/2/14309868938d576a532b71360b7354268 380727a22/An%20article%20for%20Monika%20(2010).pdf

Course Outcomes

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

1. Understand the nuances of language through audio- visual experience and group activities
2. Neutralize the accent for intelligibility
3. Realize the importance of listening skills and speaking skills and their application in real life situations.
4. Recognize significance of non-verbal communication and develop confidence to face audience and shed inhibitions.
5. Speak with clarity and confidence there by enhance employability skills of the students.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: 70B07	**ENGINEERING PHYSICS LAB**	**L**	**T**	**P**
Credits: 2	(Common to CE, EEE, ME, ECE, CSE, IT and Min.E)	-	-	4

Course Objective: The main objective of this course is to provide the necessary exposure to the practical aspects, which is an essential component for learning science.

List of Experiments : (Any ten experiments)

1. Magnetic field along the axis of current carrying circular coil- Stewart and Gee's experiment
2. LASER- Diffraction due to single slit.
3. Newton's Rings.
4. Michelson interferometer (Demonstration only).
5. Melde's Experiment – Longitudinal and Transverse modes.
6. Sonometer- Frequency of A.C supply.
7. The RLC series circuit – Determination of resonant frequency, bandwidth and quality factor.
8. Evaluation of Numerical aperture of the given fiber.
9. Energy band –gap of a material of a P-N junction diode.
10. Torsional Pendulum- Determination of Rigidity modulus of the given wire.
11. LED characteristics.
12. Solar cell characteristics.
13. LASER diode characteristics.

Course Outcomes

At the end of the course, students will be able to
1. Develop skills to impart practical knowledge in real time solution.
2. Understand principle, concept, working, application and comparison of results with theoretical calculations.
3. Design new instruments with practical knowledge.
4. Understand measurement technology, usage of new instruments and real time applications in engineering studies.
5. Apply the knowledge of experimental physics in understanding the advanced engineering subjects.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: 70304	ENGINEERING MECHANICS AND AUTOCAD LAB (Common to CE, EEE, ME, ECE, CSE, IT and Min.E)	L	T	P
Credits: 2		-	-	4

Course Objectives: The objective of this subject is to provide the basic concept of force, moment of inertia, reaction and moments by practically and development of part drawings for various components drafting software.

Any **six** experiments from Module – A

MODULE A: Engineering Mechanics Lab

1. Verification of triangle law and polygon law of forces.

2. Equilibrium of coplanar concurrent force system-forces in the jib crane.

3. To determine the support reaction for a beam.

4. To determine the moment of inertia of a flywheel.

5. Verifying the law of moments by disc apparatus.

6. To determine the coefficient of friction.

7. To study equilibrium of Non Concurrent forces.

8. To verify the equilibrium of forces using force table.

MODULE B: AutoCAD Lab
Drafting: Development of part drawings for various components in the form of orthographic and isometric using AutoCAD software. Representation of dimensioning and tolerances scanning and plotting (2D Drawing).

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

1. Use scalar and vector analytical techniques for analyzing forces in statically determinate structures.
2. Apply basic knowledge of math's and physics to solve real-world problems.
3. Execute the basic commands using AutoCAD package
4. Use basic drawing, editing and viewing tools.

5. Prepare a layout.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. II Semester	
Code: 70M01	**COMPUTATIONAL MATHEMATICS LAB**	**L**	**T**	**P**
Credits: Nil	(Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	**-**	**-**	**3**

Following Programming is to be done in 'C' Language:

Course Objectives: The objective of this course is to introduce various numerical techniques which are indispensible tools to solve many algebraic and transcendental equations. Various methods are used to reduce the global error involved in approximation root values in 'C' Language.

MODULE I:
1. Find the roots of Non-linear equation using Bisection method.
2. Find the roots of Non-linear equation using Regula - falsi method.
3. Find the roots of Non-linear equation using Newton-Raphson method.
4. Find the roots of Non-linear equation using Iteration method.

MODULE II:
5. Find the smallest root of non-linear equation using Ramanujan's method
6. Solve the system of non-homogeneous linear equations using Gauss-Jacobi method
7. Solve the system of non-homogeneous linear equations using Gauss-siedal method
8. Lagrange's interpolation for unevenly spaced points

MODULE III:
9. Numerical solution of first order O.D.E. using Euler's method.
10. Numerical solution of first order O.D.E. using 4th order Runge-Kutta method.
11. Numerical Integration using Trapezoidal Rule
12. Numerical Integration using Simpson's Rule

Manual: Numerical Methods in Engineering & Science (with Programs in C, C++ & MATLAB) by B.S. Grewal, Khanna Publisher. 2014

REFERENCES
1. S.S. Sastry **"Introductory Methods of Numerical Analysis"**, Prentice-Hall of India Private Limited, 4th edition.
2. Sankara Rao K. "**Numerical Methods for Scientists and Engineers**", Prentice-Hall. 7th Edition, 2008.

E-RESOURCES
1. www.codewithc.com › Numerical Methods › Numerical Methods & C/C++(Source code for Newton Raphson Method in C)
2. vle.du.ac.in/mod/resource/view.php?inpopup=true&id=13354 (Solutions of Algebraic and Transcendental Equations –Part I)
3. www.dailyfreecode.com › Articles › C Programming › Numerical Methods (Code for program of BISECTION METHOD in C Programming)

4. www.ijcsi.org/papers/IJCSI-9-6-2-413-419.pdf (A Robust method for solving Transcendental Equations by Md.GolamMoazzam)
5. http://paulbourke.net/miscellaneous/interpolation/ (interpolation)
6. http://www.tutorialspoint.com/cprogramming/c_functions.htm (interpolation)
7. https://www.class-central.com/mooc/2486/nptel-introduction-to-programming-in-c (Solutions of Algebraic and Transcendental Equations –Part I)
8. http://freevideolectures.com/Course/2663/Numerical-Methods-and-Programing (Interpolation)
9. http://www.nptel.ac.in/courses/111107063/3 (Numerical solution of first order ordinary differential equation)

Course Outcomes
At the end of the course, students will be able to
1. Find the root of an Algebraic and Transcendental equations by using various methods in 'C' language.
2. Find the root of non-homogeneous linear equations by using various methods in 'C' language.
3. Find the root of first order O.D equations by using various methods in 'C' language.
4. Find numerical integrations by using various methods in 'C' language.
5. Interpolate the values for unequally spaced points by using various methods in 'C' language.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: 70B03	**Advanced Calculus** (Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	**L**	**T**	**P**
Credits: 3		**2**	**2**	**-**

Prerequisite: Basic Calculus

Course Objective: The objective of this course is to familiarize the prospective engineers with techniques in multivariate analysis. It deals with acquainting the students with standard concepts to advanced level that will serve them well towards tackling applications that they would find useful in their profession.

MODULE I: Differential Calculus [12 Periods]
Rolle's Theorem, Lagrange's Mean Value Theorem, Cauchy's mean value Theorem, Taylor's expansion and Maclaurin's expansion of functions (Without Proofs).
Differentiability of multivariable functions: Jacobian, Functional dependence, Taylor's theorem of two variables (Without Proof) Maxima and Minima of functions of two variables, Lagrange's method of multipliers.

MODULE II: Multiple Integrals: [12 Periods]
Multiple integrals- double integrals, Change of order of integration, change of variables- polar and Cartesian coordinates. Triple integrals, change of variables- spherical, cylindrical coordinates.

MODULE III: Vector Differentiation: [12 Periods]
A: Scalar and Vector Point functions - Gradient - Directional derivative – Divergence – Curl and Their Physical Interpretation.
B: Irrotational fields and Scalar potentials - angle between two surfaces. Vector Identities

MODULE IV: Vector Integration: [12 Periods]
Line integrals – Work done by a force – Circulation - Potential function, Surface integrals - volume integrals.
Vector integral theorems: Verification of Gauss's Divergence Theorem, Green's and stoke's Theorems (without proof).

MODULE V: Partial Differential Equations [12 Periods]
Introduction to Partial differential equations – Formation –Elimination of arbitrary constants – Elimination of arbitrary functions. Linear Partial differential equations - Lagrangian subsidiary Equations. Non-Linear Partial Differential equations of first order (standard forms). Charpit's method.

TEXT BOOKS:
1. Kreyszig "**Advanced engineering Mathematics**" John Wiley &Sons, 10th Edition, 2010.
2. B.S. Grewal "**Higher Engineering Mathematics**" Khanna Publishers, 43rd Edition, 2014.

REFFERENCE BOOKS:
1) R.K. Jain & S.R.K. Iyengar **"Advanced Engineering Mathematics"** Narosa Publications, 4th edition 2014.
2) Kanti B.Datta "**Mathematical Methods of Science and Engineering"** Cengage Learning, First Edition, 2011.
3) Tom M.Apostol **"Calculus"** volume-II, John Wiley, Second Edition.

E RESOURCES:
1. https://www.math.cmu.edu/~wn0g/2ch6a.pdf (Differential Calculus)
2. http://www.staff.ttu.ee/~lpallas/multipleintegrals.pdf (Multiple Integrals)
3. http://www.mecmath.net/calc3book.pdf (Vector Calculus)
4. http://www.aidic.it/cet/16/51/055.pdf (Differential Calculus)
5. https://www.youtube.com/watch?v=lxF2rqry2LM (Differential Calculus)
6. http://nptel.ac.in/courses/122104017/28 (Multiple Integrals)
7. http://nptel.ac.in/courses/111103021/ (Partial Differential Equations)

Course Outcomes:
At the end of the course, students will be able to
1. Learn the concept of slope of a curve which can be mapped to functions to evaluate mean values and applications of functions of several variables.
2. Understanding the concepts of double and triple integrals in engineering problems.
3. Apply the concept of Gradient, Divergence and Curl of a vector valued functions and scalar valued functions.
4. Verifying the Vector Integral theorems in engineering and physical problems.
5. Understand Partial Differential equations and perform its applications to real time applications.

Prerequisite: Engineering Mechanics

Course Objective: To provide basic knowledge by understanding the fundamental concepts of mechanics of deformable solids; including simple stresses and strains, principal stresses and strains, strain energy, shear force, bending moments and geometry of deformation.

MODULE I: Simple Stresses and Strains, Strain Energy [10 Periods]
Simple Stresses and Strains: Types of stresses and strains – Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Poisson's ratio and volumetric strain – relationship between Elastic constants – Bars of varying section – composite bars – Temperature stresses – Self weight.
Strain Energy: Resilience – Gradual, sudden and impact loadings – simple applications

MODULE II: Shear Force and Bending Moment (Determinant Beams) [10 Periods]
Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, U.D.L., uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading.

MODULE III: Theory of Simple Bending and Shear Stresses [10 Periods]
A Theory of Simple Bending: Assumptions – Derivation - Neutral axis – Determination of bending stresses and section modulus of rectangular, circular sections (Solid and Hollow), I,T, Angle and Channel sections.
B Shear Stresses: Derivation– Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections

MODULE IV: Deflection of Beams (Determinant Beams) [09 Periods]
Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam: Double Integration method, Macaulay's method, Area Moment method, Conjugate beam method.

MODULE V: Principal Stresses and Strains, Theories of failures [09 Periods]
Principal Stresses and Strains: Introduction–Stresses on an inclined section of a uni- axial loading–compound stresses–Normal and tangential stresses on an inclined plane for biaxial stresses Two perpendicular normal stresses accompanied by a state of simple shear–Mohr's circle of stresses–Principal stresses and strains–Analytical and graphical solutions.

Theories of Failures: Introduction-Various Theories of failures like Maximum Principal stress theory–Maximum Principal strain theory–Maximum shear stress theory – Maximum strain energy theory –Maximum shear strain energy theory (Von Mises Theory).

TEXT BOOKS:
1. R.K.Bansal, **"Introduction to Strength of materials"** Laxmi publications Pvt. Ltd., 6th Edition-2015, New Delhi.
2. R. Subramanian **"Strength of materials",** Oxford university press, 2nd Edition 2010 New Delhi

REFERENCES:
1. S. Ramakrishna and R.Narayan, **"Strength of Materials"**, Dhanpat Rai publications 1st Edition - 2007.
2. R.K.Rajput, **"Strength of materials"** by, S.Chand & Co, 6th Edition 2017 New Delhi.
3. **"Strength of materials"** by W A Nash, 4th Edition, 2007, Tata McGraw-Hill Education.
4. **"Mechanics of materials"** by Dr. B.C.Punmia, 2002, Lakxmi Publications.

E RESOURCES:
1. http://www.aboutcivil.org/solid-mechanics.html
2. https://link.springer.com/journal/11223
3. https://www.journals.elsevier.com/mechanics-of-materials
4. http://nptel.ac.in/courses/105105108/
5. http://nptel.ac.in/downloads/112106141/

Course Outcomes:
At the end of the course, students will be able to
1. Understand the concepts of simple stresses and strains and estimation of stresses for Bars of varying sections, composite bars and Temperature stresses.
2. Examine the variation of bending moment and shear force at any section and identify the position and the magnitude of maximum and minimum values for all practical loading cases.
3. Examine the variation of flexural/shear stresses across the section and identify the position and magnitude of maximum and minimum values in various sections.
4. Compute the deflections and rotations by various methods.
5. Analyze the principal stresses and strains by recognize the orientation of principal planes and develops an understanding of various theories of failures.

Pre Requisites: NIL

Course Objective: To give fundamental knowledge of fluid, its properties and behavior under various conditions. To develop and understanding of fluid kinematics and classification of flows. To apply the working concepts of various devices used to measure the velocity and discharge of fluid. To apply interrelationship of various properties of fluid in practical problems and how these are used in Civil engineering.

MODULE I: Introduction and Hydrostatic Forces [10 Periods]
Introduction: Dimensions and units – Physical properties of fluids specific gravity, viscosity, surface tension, vapour pressure and their influences on fluid motion, Pressure at a point, Pascal's law, Hydrostatic law - atmospheric, gauge and vacuum pressure- measurement of pressure, Pressure gauges, Manometers: differential and Micro Manometers.
Hydrostatic Forces: Hydrostatic forces on submerged plane, Horizontal, Vertical, Inclined and Curved surfaces – Center of pressure, Derivations and problems.

MODULE II: Fluid Kinematics and Classification of Flows [10 Periods]
Fluid Kinematics: Description of fluid flow, Stream line, path line and streak lines and stream tube.
Classification of Flows: Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one, two, three dimensional flows – stream and velocity potential functions, flownet analysis.

MODULE III: Fluid Dynamics and Applications of Momentum Principle [10 Periods]
A: Fluid Dynamics Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line for 3-D flow.
B: Applications of Momentum Principle Navier – Stokes equations (Explanationary), Momentum equation and its application – forces on pipe bend.

MODULE IV: Boundary Layer Theory and Laminar and Turbulent Flow [09 Periods]
Boundary Layer Theory: Approximate Solutions of Navier Stoke's Equations – Boundary layer – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarmen momentum integral equation, laminar and turbulent Boundary layers, BL in transition, separation of BL, control of BL, flow around submerged objects-Drag and Lift- Magnus effect.
Laminar and Turbulent Flow: Reynold's experiment – Characteristics of Laminar & Turbulent flows, Flow between parallel plates, Flow through long tubes, Flow through inclined tubes.

MODULE V: Closed Conduit Flow and Measurement of Flow   **[09 Periods]**

Closed Conduit Flow: Laws of Fluid friction – Darcy's equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line, Pipe network problems, variation of friction factor with Reynold's number – Moody's Chart.

Measurement of Flow: Pitot tube, Venturi meter and orifice meter – classification of orifices, flow over rectangular, triangular, trapezoidal and Stepped notches –Broad crested weirs.

TEXT BOOKS:
1. Modi and Seth "**Fluid Mechanics**", Standard book house.20th Edition, 2015.
2. S.K.Som & G.Biswas "**Introduction to Fluid Machines**" (Tata Mc.Grawhill publishers Pvt. Ltd.) 3rd Edition, 2011.
3. Edward J. Shaughnessy, Jr, Ira M. Katz and James P. Schaffer "**Introduction to Fluid Machines**", Oxford University Press, New Delhi, 1st Edition, 2004.

REFERENCES:
1. J.F.Douglas, J.M. Gaserek and J.A.Swaffirld, "**Fluid Mechanics**" Prentice Hall 4th Edition, 2000.
2. A.K. Mohanty, "**Fluid Mechanics**", Prentice Hall of India Pvt. Ltd., New Delhi, 2nd Edition 2004.
3. Subramanya "**Fluid Mechanics**", Tata McGraw-Hill Education, 2nd Edition, 2011
4. R.K.Rajput "**Fluid Mechanics**" S. Chand, 2nd Edition, 2008.

E RESOURCES:
1. http://nptel.ac.in/courses.php?disciplineId=105.
2. http://www.learnerstv.com/Free-Engineering-Video-lectures-ltv078-Page1.htm.
3. http://nptel.ac.in/courses/105101082/.

Outcomes:
At the end of the course, students will be able to
1. Gain knowledge about the physical properties of the fluid and their influence on fluid motion and measurement of pressure by various manometers and the hydrostatic forces acting on the submerged bodies.
2. Recognize fluid kinematics through stream line, path line and streak line and understand the classification of flows and continuity equation for one, two & three dimensional flows.
3. Understand fluid dynamics using Euler's and Bernoulli's equation for three dimensional flows and application of Momentum equation.
4. Gain the knowledge of boundary layer theory by Navier stoke's equation and Vonkarmen momentum integral equation and gain the knowledge in Laminar & Turbulent flows using Reynold's experiment.
5. Understand various frictional losses in pipes and measurement of flow using notches & weirs.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. III Semester	
Code: 70103	**SURVEYING**	L	T	P
Credits: 3		3	0	-

Pre Requisites: NIL

Course Objectives: Student will be able to learn and understand the various basic concept and principles used in surveying like Chain Surveying, Compass Surveying, Plane Table Surveying, the field applications and concepts of leveling survey.

MODULE I: Introduction to Basic Concepts   **[10 Periods]**
Introduction, Objectives, classifications and Principles of surveying, Scales, Shrinkage of maps, conventional symbols and code of signals, Surveying Accessories, phases of surveying.

MODULE II: Plane Table Survey   **[10 Periods]**
Instruments employed in plane table survey. Use and adjustment of these instruments including simple alidade. Setting up of the table, Various methods of plane table survey: Radiation method of plane tabling, Intersection or triangulation method of plane tabling, Traversing method of plane tabling, Resection method of plane tabling. Three point and two point problems, errors in plane table survey. Advantages and disadvantages of plane tabling.

MODULE-III: Measurement of Distances and Directions: **[10 Periods]**
A: Linear Distances: Approximate methods, direct methods-chains – tapes, ranging- tape corrections, indirect methods- optical methods –E.D.M methods.
B: Prismatic Compass: Bearings Included Angles, Local Attraction, Magnetic Declination and Dip.

MODULE IV: Leveling and Contouring   **[09 Periods]**
Leveling: Basic definitions, types of levels and leveling staves, Temporary and permanent adjustments- method of leveling. Booking and determination of levels-HI method – Rise and fall method, effect of curvature if earth and refraction.
Contouring: Characteristics and Uses of contours, Direct and indirect methods of contour surveying, interpolation and sketching of Contours.

MODULE V: Computation of Areas and Volumes   **[09 Periods]**
Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries, Planimeter.
Volumes: Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

TEXT BOOKS:
1. B.C.Punmia Ashok Kumar Jain and Arun Kumar Jain "**Surveying**" (Vol – 1, 2 & 3), Laxmi Publications (P) ltd., 14th Edition, 2014.
2. Duggal S K, "**Surveying**" (Vol – 1 & 2), Tata Mc.Graw Hill Publishing Co. Ltd. 4th Edition, 2004.

REFERENCES:
1. Arora K R "**Surveying Vol 1, 2 & 3**", Standard Book House, Delhi, 15th Edition, 2015.
2. Chandra A M, "**Plane Surveying**", New age International Pvt. Ltd., Publishers, New Delhi, 3rd Edition 2015.
3. Chandra A M, "**Higher Surveying**", New age International Pvt. Ltd., Publishers, New Delhi, 3rd Edition 2015.

E RESOURCES:
1. HYCOS/Surface Waters/Levelling_and_surveying.pdf
2. http://v5.books.elsevier.com/bookscat/samples/9780750669498/9780750669498.PDF
3. http://www.whycos.org/fck_editor/upload/File/Pacific
4. http://nptel.ac.in/courses/105107122/
5. https://www.youtube.com/watch?v=chhuq_t40rY

Course Outcomes:
At the end of the course, students will be able to
1. Apply basic geometry to detect difference in plane and arc distance over "spherical" earth surface for typical length survey projects.
2. Identify the importance of the compass survey and its practical applications.
3. Apply basic methods and applications of plane Table survey.
4. Identify the field applications and concepts of leveling survey.
5. Identify the different methods of calculation of area, contouring and measurement of volumes.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. III Semester	
Code:70104	**BUILDING MATERIALS CONSTRUCTION AND PLANNING**	L	T	P
Credits: 3		3	-	-

Prerequisite: NIL

Course Objectives: To provide basic knowledge in engineering materials which includes role of materials in civil engineering based on Physical, chemical and Mechanical properties which will be useful for all engineering works and enable the students to develop knowledge of material science and behavior of various building materials used in construction and to identify the construction materials required for the assigned work and to provide procedural Knowledge of the simple testing methods of cement, Lime, concrete etc. and Introduction to techniques of construction planning and green buildings.

MODULE I: Building Stones, Bricks and Tiles　　　　　　　**[10 Periods]**
Stone- Building stones, classification of building stones, quarrying procedures, dressing, and tools for dressing of stones. Bricks-Composition of brick earth, manufacturing of brick & Tests on brick. Tiles - Types of tiles, manufacturing of tiles.

MODULE II: Cement & Admixtures　　　　　　　　　　　**[10 Periods]**
Ingredients of cement – manufacture – field & lab tests, Admixtures – mineral & chemical admixtures – uses.

MODULE III: Building Components and Building Services　　　**[10 Periods]**
A. Building Components: Lintels, Arches, walls, vaults – stair cases – types of floors, types of roofs – flat, curved, trussed ;foundations – types ; Damp Proof Course; Joinery – doors – windows – materials – types.
B. Building Services: Plumbing services, water distribution, sanitary lines and fittings, ventilators, functional requirements, systems of ventilators, air conditioning essentials and types, acoustics, Fire protection & fire hazards.

MODULE IV: Masonry and Finishing Form Work　　　　　**[09 Periods]**
Masonry and Finishing: Brick masonry – types – bonds; Stone masonry – types; Composite masonry – Brick-stone composite; Concrete, Reinforced brick. Finishers: Plastering, Pointing, Painting.
Form Work: Requirements, Standards, Scaffolding, Shoring, Underpinning.

MODULE V: Green Building and Building Planning:　　　　　**[09 Periods]**
Introduction to green buildings, Green materials, Green Globes- Building Planning, Principles of Building Planning, Classification of buildings and Building by- laws

TEXT BOOKS:
1. SK Duggal, **"Building Materials"**, New Age Publications 4th Edition, April, 2014.
2. BC Punmia, Ashok Kumar Jain and Arun Kumar Jain, **"Building Construction"**, Laxmi Publications (P) Ltd., New Delhi, 10th Edition, 2013.

REFERENCES:
1. Roy Chudley **"Construction Technology"** Vol. – 1 & 2, 2nd Edition, Longman, UK, 1987.
2. PC Varghese, **"Building Construction"**, Prentice Hall of India Private Ltd., New Delhi, 2nd Edition, 2007.

E RESOURCES:
1. http://www.dewa.gov.ae/images/greenbuilding_eng.pdf
2. http://Building materials and construction planning.pdf
3. http://www.wikipedia.org/wiki/Construction

Course Outcomes
At the end of the course, students will be able to
1. To identify various building materials and select suitable type of building material for given situation and to be aware of various traditional building materials and also the emerging materials in the field of Civil Engineering construction.
2. List the grades of cement, the types of cement and the types of different admixtures.
3. To select suitable type of foundation and gain complete knowledge on plumbing works.
4. Visualization of different types of masonry construction and design suitable type of formwork.
5. Create awareness about green building practice and apply the principles of planning and by-laws used for building planning.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. III Semester	
Code:70105	ENGINEERING GEOLOGY	L	T	P
Credits: 3		3	-	-

Pre Requisites: NIL

Course Objective: Ability to analyze representations of key concepts from geology (earth science), policy and values as they appear in geophysics, geochemistry and other natural sciences & technological sciences. To make clear key points of a complex article or research work in concrete technology, material sciences in building construction and management & conservation of natural building materials. Also, to understand the naturally occurring potable (surface and subsurface) water its origin, accumulation, migration and management of water resources.

MODULE I: Introduction   [10 Periods]

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.

MODULE II: Mineralogy and Petrology   [10 Periods]

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: Feldsper, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Kyanite, Garnet, Talc, Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chromite, 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 & metamorphic rocks and their distinguishing features, Megascopic and microscopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate. Rock excavation, stone aggregates.

MODULE III: Structural Geology and Geophysical Studies   [10 Periods]

A: Structural Geology: Indian stratigraphy and Geological Time Scale**.** Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities and joints their important types.

B: Geophysical Studies: Importance of Geophysical studies. Principles of Geophysical study by Gravity methods, Magnetic methods, Electrical methods, Seismic methods, Radiometric 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.

MODULE IV: Geology of Dams and Reservoirs and Tunnels [09 Periods]
Geology of Dams and Reservoirs: 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 tightness and life of reservoirs, Geo-hazards, ground subsidence.
Tunnels: Purposes of tunneling, Effects of Tunneling on the ground. Role of Geological Considerations (Lithological, structural and ground water) in tunneling, over break and lining in tunnels, Tunnels in rock, subsidence over old mines, mining subsidence.

MODULE V: Ground Water [09 Periods]
Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration. Earthquakes: their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Landslides: landslides hazards, water in landslides, their causes and effects, measures to be taken to prevent their occurrence. Importance of study of ground water, earthquake and landslides.

TEXT BOOKS:
1. N.Chennakesavulu ―**A Text book ofEngineering Geology**, Mac-Millan Publishers India Ltd. 2ⁿᵈ Edition, 2013.
2. Parbin Singh ―**Engineering Geology and general geology,** S. K. Kataria & Sons, 8ᵗʰEdition, New Delhi, 2013.

REFERENCES:
1. F.G. Bell, "**Fundamental of Engineering Geology"** Butterworths Publications, New Delhi, 2016.
2. Krynine & Judd, "**Principles of Engineering Geology & Geotechnics"**, CBS Publishers & Distribution, 2005.
3. Tony Waltham "**Foundations of Engineering Geology"** Spon press/ Cry press Taylor & Francis, 2009.

E RESOURCES:
1. www.springer.com › Home › Earth Sciences & Geography › Geology.
2. https://en.wikipedia.org/wiki/Tunnels_(novel).
3. www.icevirtuallibrary.com › Journals.
4. www.groundwater.org/get-informed/basics/groundwater.html.
5. www.soest.hawaii.edu/martel/Courses/GG303.

Course Outcomes
At the end of the course, students will be able to
1. Demonstrate an advanced knowledge of how geological principles can be applied to engineering practice.
2. Assess data collected in the field and the laboratory and recognize their geological importance.

3. Understand the structure and composition of earth.
4. Understand how precious earth natural resources in the management of construction industry and mineral based industries.
5. Understand how human activities in construction of major projects such as dams, tunnels, highways and reservoirs and its impact on earth environment & its economics.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. III Semester	
Code: 70106	**STRENGTH OF MATERIALS LAB**	**L**	**T**	**P**
Credits: 2		**-**	**-**	**4**

Prerequisite: Engineering Mechanics, Strength of Materials.

Course Objective: To determine the mechanical properties of different engineering materials under Tension, Compression, Shear Impact, Hardness, Torsion, and elastic constants of beams and springs.

List of Experiments:

1. Tension test on Mild steel
2. Compression test on wood or concrete
3. Shear test
4. Brinell hardness & Rock well hardness test
5. Impact test (Charpy & Izod)
6. Torsion test
7. Spring test
8. Deflection test on (Steel / Wood) Cantilever beam.
9. Deflection test on simple support beam.
10. Deflection test. Continuous beam
11. Verification of Maxwell's Reciprocal theorem on beams.
12. Use of electrical resistance strain gauges.

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

1. Demonstrate the basic knowledge of the mechanical properties of materials.
2. Estimate compressive strength of wood, concrete, brick materials and decide their suitability for the construction purpose.
3. Determine the impact resistance of steel used in construction works.
4. Estimate young's modulus of wood/steel materials.
5. Estimate rigidity modulus for a given spring.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. III Semester		
Code: 70107	SURVEYING LAB		L	T	P
Credits: 2			-	-	4

Prerequisite: NIL

Course Objective: To impart the practical knowledge in the field, it is essential to introduce in curriculum. Drawing of Plans and Maps and determining the area are pre requisites before taking up any Civil Engineering works.

List of Experiments:

1. Survey of an area by chain survey (closed traverse) & Plotting
2. Surveying of a given area by prismatic compass (closed traverse) and plotting after adjustment.
3. Radiation method, intersection methods by plane Table survey
4. Fly leveling (differential leveling)
5. An exercise of L.S and C.S and plotting
6. Two exercises on contouring.
7. Measurement of horizontal angles by method of repetition and reiteration.
8. Heights and distance using Principles of tacheometric surveying (Two Exercises)
9. State-out using total station
10. Determine of area using total station
11. Determination of remote height using total station
12. Distance, gradient, Diff, height between to inaccessible points using total stations.

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

1. Discuss the relative precision expected from pacing, taping, and electronic distance measurement techniques
2. Calculate the errors, standard deviations, standard errors of the mean, accuracy ratio or relative precision of a set of measurements in terms used by the surveyor
3. Determine the earth's curvature effect, by comparing the difference between a horizontal plane and a level (curved) surface on the earth
4. Distinguish between plan view, profile view and cross-sections as used in route surveying and demonstrate understanding of cross-sectioning to attain earthwork data.
5. Determine latitudes and departures for all segments of a closed loop traverse check for closure error, and express the results in the form of the standard accuracy ratio, i.e. accuracy ratio.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: 70108	**ENGINEERING GEOLOGY LAB**	L	T	P
Credits: 2		-	-	4

Prerequisite: NIL

Course Objective: This course deals with the experiments conducted to determine engineering properties of rocks and minerals.

List of Experiments:

1. Study of physical properties and identification of minerals referred under theory.
2. Megascopic and microscopic description and identification of rocks referred under theory.
3. Megascopic and microscopic identification of rocks & minerals.
4. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.
5. Simple Structural Geology problems.

Course Outcomes

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

1. Learn geology and its types, various features like fault, fissures, weathering etc., minerals, rocks, and rock formations in relation to civil engineering structures.
2. Understand various techniques to determine engineering properties of rocks etc.
3. Understand various techniques to analyze and to made possible solutions for various Geological Engineering problems.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. III Semester	
Code: 70M03	**ENVIRONMENTAL SCIENCES** (Common for CE, ME and Min.E)	**L**	**T**	**P**
Credits: NIL		**-**	**2**	**-**

Pre-requisite: NIL

Course Objectives: An interdisciplinary approach to complex environmental problems using basic tools of the natural and social sciences, including geo systems, biology, chemistry, economics, political science and international processes. The ability to work effectively as a member of an interdisciplinary team on complex problem of environment.

MODULE I: Ecosystems: **[5 Periods]**
Definition, Scope and Importance of ecosystem, Concept of ecosystem, Classification of ecosystems, Structure and Structural Components of an ecosystem, Functions of ecosystem, Food chains, food webs and ecological pyramids. Flow of energy.

MODULE II: Natural resources, Biodiversity and Biotic resources: **[8 Periods]**
 Natural Resources: Classification of Resources: Living and Non-Living resources, Renewable and non-renewable 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 – case studies. Energy resources: growing energy needs, introduction to renewable and non renewable energy sources.
Biodiversity and Biotic resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and intrinsic values. Threats to Biodiversity (habitat loss, poaching of wildlife, man-wild life conflicts). Conservation of Biodiversity (In-situ and Ex-situ conservation)

MODULE III: Environmental Pollution and Control   **[7 Periods]**
A: Classification of pollution and pollutants, Causes, effects and control technologies. Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Point and non-point sources of pollution, Major pollutant of water and their sources, drinking water quality standards.
B: Soil Pollution, Soil as sink for pollutants, Impact of modern agriculture on soil, degradation of soil. Marine Pollution: Misuse of International water for dumping of hazardous waste, Coastal pollution due to sewage and marine disposal of industrial effluents. E-waste and its management.

MODULE IV: Global Environmental Problems and Global effects: **[6 Periods]**
 Green house effect, Green House Gases (GHG), Global Warming, Sea level rise, climate change and their impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation   and desertification. International conventions / Protocols: Earth summit, Kyoto protocol and Montréal Protocol.

MODULE V: Towards sustainable future: **[6 Periods]**
Concept of Sustainable Development, Threats to Sustainability, Population and its explosion, Crazy Consumerism, Over-exploitation of resources, Strategies for Achieving Sustainable development, Environmental Education, Conservation of Resources, Urban Sprawl, Sustainable

Cities and Sustainable Communities, Human health, Role of IT in Environment, Environmental Ethics, Environmental Economics, Concept of Green Building, Clean Development Mechanism (CDM).

TEXT BOOKS:
1. R.Rajagopalan, **"Environmental studies From crisis to cure"**, Oxford University Press 2nd Edition, 2005.
2. Anubha Kaushik, C.P.Kaushik, **"Environmental studies"** New age International Publishers,4th Edition,2012

REFERENCE BOOKS:
1. Erach Bharucha, **"Environmental studies"** University Grants Commission, and University Press,IstEdition, 2005.
2. M.Anji Reddy **"Text book of Environmental Science and Technology"** 3rd Edition, 2007
3. Richard T.Wright, **"Environmental Science: towards a sustainable future"** PHL Learning, Private Ltd. New Delhi, 2nd Edition., 2008.
4. Gilbert McMasters and Wendell P.Ela, **"Environmental Engineering and science",**3rd Edition, PHI Learning Pvt. Ltd., 2008.

E RESOURCES:
1. http://www.gdrc.org/uem/ait-terms.html (Glossary of Environmental terms).
2. http://www.environmentalscience.org/ (Environmental sciences Lectures series).
3. Journal of earth science and climatic change (OMICS International Journal).
4. Journal of pollution effects & control (OMICS International Journal).
5. nptel.ac.in/courses/120108004/ (Principles of Environment Management Lectures).
6. http://www.nptelvideos.in/2012/12/fundamentals-of-environmental-pollution.html (NPTEL online video courses IIT lectures).

Course Outcomes
At the end of the course, students will be able to
1. Realize the importance of ecosystem, its structure, services. To make the students aware of different natural functions of ecosystem, which helps to sustain the life on the earth.
2. Use natural resources more efficiently.
3. Understand the impacts of human actions on the environment, its effects and minimizing measures to mitigate them.
4. Identify environmental issues and problems at local, national and international level.
5. To know more sustainable way of living

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code:70B04	**Probability and Statistics** (Common for CE, ME, CSE, IT and Min.E)	**L**	**T**	**P**
Credits: 3		**2**	**2**	**-**

Prerequisite: Basic Probability

Course Objective: This course is meant to provide a grounding in Statistics and foundational concepts that can be applied in modeling processes and decision making. These would come in handy for the prospective engineers in most branches.

MODULE-I: Descriptive measures & Measures of dispersion   **[10 Periods]**
Descriptive measures: Measures of central tendency: Arithmetic mean – median – mode – geometric mean – harmonic mean.
Measures of dispersion: Range – Quartile deviation – mean deviation – standard deviation, Measures of skewness , Measures of kurtosis

MODULE II: Probability   **[10 Periods]**
Introduction to Probability, events, sample space, mutually exclusive events, Exhaustive events, Addition theorem for 2& n events and their related problems. Dependent and Independent events, conditional probability, multiplication theorem , Boole's inequality, Baye's Theorem.

MODULE III: Random Variables and Probability Distributions   **[10 Periods]**
A: Random variables – Discrete Probability distributions. Bernoulli, Binomial, poisson, mean, variance, moment generating function–related problems. Geometric , Negative Binomial distributions (Only mean and Variance).
B: Continuous probability distribution, Normal distribution, mean, variance, moment generating function–related problems. Exponential , Beta and Gamma distributions (Only mean and Variance).

MODULE-IV: **[09 Periods]**
Sampling Distributions: Definitions of population-sampling-statistic, parameter. Types of sampling, Expected values of Sample mean and variance, sampling distribution, Standard error, Sampling distribution of means and sampling distribution of variance. Parameter estimations – likelihood estimate, point estimation and interval estimation.
Testing of hypothesis: Null hypothesis, Alternate hypothesis, type I, & type II errors – critical region, confidence interval, and Level of significance. One tailed test, two tailed test.
Large sample tests:
    1. Testing of significance for single proportion
    2. Testing of significance for difference of proportion
    3. Testing of significance for single mean
    4. Testing of significance for difference of means

MODULE-V: Small sample tests   **[09 Periods]**
Student t-distribution, its properties; Test of significance difference between sample mean and population mean; difference between means of two small samples, Paired t-test, Snedecor's F-

distribution and it's properties. Test of equality of two population variances, Chi-square distribution, its properties, Chi-square test of goodness of fit and independence of attributes

TEXT BOOKS:
1. Walpole Myers Myers Ye. "**Probability & Statistics for Engineers & Scientists**" –Pearson publications, 9th edition 2012.
2. Sheldon M.Ross "**Introduction to Probability and Statistics for Engineers and Scientists**", Academic Press, 5th edition 2014.

REFERENCES:
1. R.K. Jain & S.R.K. Iyengar **"Advanced Engineering Mathematics"** Narosa Publications, 4th edition, 2014.
2. Jay L.Devore **"Probability and Statistics for Engineers and Sciences"** Cengage Learning, 8th Edition, 2012.
3. S C Gupta & V K Kapoor **"Fundamentals of Mathematical statistics"** Sultan Chand, 1st edition.

E RESOURCES:
1. http://www.csie.ntu.edu.tw/~sdlin/download/Probability%20&%20Statistics.pdf
   (Probability & Statistics for Engineers & Scientists text book)
2. http://www.stat.pitt.edu/stoffer/tsa4/intro_prob.pdf (Random variables and its distributions)
3. http://users.wfu.edu/cottrell/ecn215/sampling.pdf (Notes on Sampling and hypothesis testing)
4. http://www.pnas.org/content/93/9/3772.full.pdf (Hypothesis testing and earthquake prediction)
5. http://nsuworks.nova.edu/cgi/viewcontent.cgi?article=2373&context=tqr (Sampling Theory)
6. https://sci-hub.cc/10.1111/j.1540-6261.1996.tb05219.x (probability Distributions)
7. http://nptel.ac.in/courses/117105085/ (Introduction to theory of probability)
8. http://nptel.ac.in/courses/117105085/9 (Mean and variance of random variables)
9. http://nptel.ac.in/courses/111105041/33 (Testing of hypothesis)
10. http://nptel.ac.in/courses/110106064/5 (Measures of Dispersion)

Course Outcomes
At the end of the course, students will be able to
1. Understand central tendency and variability for the given data.
2. Find the Probability in certain realistic situation.
3. Identify distribution in certain realistic situation. It is mainly useful for circuit as well as non-circuit branches of engineering. Also able to differentiate among many random variables involved in the probability models. It is quite useful for all branches of engineering.
4. Calculate mean and proportions (large sample) and to make Important decisions from few samples which are taken out of unmanageably huge populations.
5. Calculate mean and proportions (small sample) and to make Important decisions from few samples which are taken out of unmanageably huge populations.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. IV Semester		
Code: 70109	HYDRAULICS AND HYDRAULIC MACHINERY		L	T	P
Credits: 4			3	2	-

Prerequisite: Fluid Mechanics

Course Objective: To introduce the importance of study of open channel flow, fundamentals of flow in open channels and hydraulic design principles of channels. To get knowledge about hydraulic similitude using dimensional analysis of a prototype and model. To understand the application of momentum principle in impacts of jets on plane and curved surfaces. To impart the knowledge on pumps and turbines, their working principles, efficiencies, work done, specific speed and performance characteristics.

MODULE I: Open Channel Flow [13 periods]
Types of flows- Type of channels– Velocity distribution– Energy and momentum correction factors, Chezy's, Manning's and Bazin formulae for uniform flow– Most Economical sections, Specific energy, Critical flow-critical depth–computation of critical depth–critical, sub critical and super critical flows, Non uniform flow-Dynamic equation for G.V.F, Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method- Rapidly varied flow-hydraulic jump -energy dissipation.

MODULE II: Hydraulic Similitude [13 periods]
Dimensional analysis- Rayleigh's method and Buckingham's pi theorem -study of Hydraulic models– Geometric, kinematic and dynamic similarities- Dimensionless numbers–model and prototype relations.

MODULE III: Basics of Turbo Machinery and Turbo Machinery [12 periods]
A. Basics of Turbo Machinery: Hydrodynamic force of jets on stationary and moving flat vertical, inclined and curved vanes, jet striking centrally and at tip.
B: Turbo Machinery: Velocity triangles at inlet and outlet, expressions for work done and efficiency- Angular momentum principle, Applications to radial flow turbines.

MODULE IV: Hydraulic Turbines [13 periods]
Layout of a typical Hydropower installation – Heads and efficiencies- Classification of turbines-Pelton wheel- Francis turbine- Kaplan turbine– working principle, velocity diagram, work done and efficiency, hydraulic design, Governing of turbines, Differences between types of turbines, Draft tube– theory and function, efficiency, surge tanks, Specific speed of turbines- unit speed- unit quantity- unit power- performance characteristics- geometric similarity- cavitations. Run way speed.

MODULE V: Centrifugal-Pump and Hydropower Engineering [13 periods]
Centrifugal-Pump: 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- cavitations.

Hydropower Engineering: Classification of Hydropower plants– Definition of terms– load factor, utilization factor, capacity factor, estimation of hydro power potential.

TEXT BOOKS:
1. Modi&Seth"**Fluid Mechanics, Hydraulic and Hydraulic Machines**", Standard book house. 20th Edition, 2015.
2. K,Subramanyam"**Open Channel flow**", Tata Mc.Grawhill Publishers,3rd Edition, 2009.
3. Narayanapillai "**Fluid Mechanics &Fluid machines**", Universities press, 3rd Edition, 2009.

REFERENCES:
1. R.K.Bansal "**A text of Fluid Mechanics and Hydraulic Machines**" Laxmi Publications (P)ltd., New Delhi, 9th Edition, 2010.
2. RangaRaju, "**Elements of Open channel flow**" Tata Mc.GrawHill, Publications, 2nd Edition, 2001.

E RESOURCES:
1. http:// nptel.ac.in/courses/105103096/
2. http:// nptel.ac.in/courses/105103082/

Course Outcomes
At the end of the course, students will be able to
1. Apply the knowledge in addressing problems regarding open channels and possess skills to solve problems in uniform, gradually and rapidly varied flows in steady state conditions.
2. Know the importance of studies of hydraulic similitude and build highly representative models for various real time prototypes by considering Geometric, kinematic and dynamic similarities.
3. Gain knowledge on impact of jets on the vanes and application of this knowledge in representing velocity triangles at inlet and outlets and radial flow turbines.
4. Learn about different types of turbines, their working and various engineering characteristics.
5. Learn about different types of pumps, their working and various engineering characteristics along with the basic concepts related to hydropower plant.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. IV Semester	
Code: 70110	ADVANCED SURVEYING	L	T	P
Credits: 3		3	-	-

Prerequisite: Surveying

Course Objective: Student will be able to learn and understand the various basic concept and principles used in surveying to calculate Horizontal Angle, Vertical Angle, Horizontal distance and Vertical distance to study the area of ground profile

MODULE I: Theodolite Surveying [10 Periods]

Types of Theodolite, description, uses and adjustments – temporary and permanent, measurement of horizontal and vertical angles. Measurement of horizontal angle by repetition and reiteration methods-Measurement of (a) vertical angle, (b) direct angle, (c) deflection angle and (d) magnetic bearing- errors in theodolite survey, Principles of Electronic Theodolite.

MODULE II: Trigonometrically Leveling [10 Periods]

Effect of curvature and refraction, axis signal correction, difference in elevation by single and reciprocal observations heights and distance problem for inaccessible points using a base line for same plane and different plane problems.

MODULE III: Traversing and Tacheometric Surveying [10 Periods]

A: Traversing: Methods of traversing traverse computation and adjustments, gale's traverse table, omitted measurements

B: Tacheometric Surveying: Principles of tacheometry, Stadia and tangential methods of Tacheometry.

MODULE IV: Curves [09 Periods]

Types of curves, design and setting out – Theory of simple curves, setting out simple curves by linear and instrumental methods. Obstructions in ranging of simple circular curve. Compound curve: simple compound curve, compound curve separated by a tangent, three centered compound curve. Elements of reverse curve.

MODULE V: Introduction to Modern Surveying Methods [09 Periods]

Total Station, Global positioning system and Geographic information system (GIS).

TEXT BOOKS:

1. B.C.Punmia Ashok Kumar Jain and Arun Kumar Jain "**Surveying**" (Vol – 1, 2 & 3), Laxmi Publications (P) ltd., 14th Edition, 2014.
2. Duggal S K, "**Surveying**" (Vol – 1 & 2), Tata Mc.Graw Hill Publishing Co. Ltd. 4th Edition, 2004.

REFERENCES:

1. Arora K R "**Surveying Vol 1, 2 & 3**", Standard Book House, Delhi, 15th Edition, 2015
2. Chandra A M, "**Plane Surveying**", New age International Pvt. Ltd., Publishers, New Delhi, 3rd Edition 2015.
3. Chandra A M, "**Higher Surveying**", New age International Pvt. Ltd., Publishers, New Delhi, 3rd Edition 2015.

E RESOURCES

1. https://theconstructor.org/surveying/theodolite-parts-functions-surveying/14761/
2. https://theconstructor.org/surveying/total-station-operation-uses-advantage/6605/
3. http://v5.books.elsevier.com/bookscat/samples/9780750669498/9780750669498.PDF
4. http://www.sciencedirect.com/science/article/pii/S0013795203000838
5. https://www.youtube.com/watch?v=chhuq_t40rY
6. https://www.youtube.com/watch?v=6d4mERJFPpI

Course Outcomes

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

1. Prepare Map and Plan for required site with suitable scale
2. Prepare contour Map and Estimate the Quantity of earthwork required for formation level for Road and Railway Alignment.
3. Identify the LS & CS, contour maps and carryout surveying works related to land and civil engineering projects
4. Prepare the Computation of setting out data for setting out of horizontal and vertical curves by various methods
5. Identify the applications of the GIS and GPS for land surveying

Prerequisite: Strength of Materials

Course Objective: To provide the basic concepts of Columns and Struts and calculation of stresses and deformations under Direct, Bending Stresses and in beams subjected to unsymmetrical bending so that to apply the knowledge of solids on engineering applications and design problems.

MODULE I: Torsion, Shafts & Springs, Beams Curved in Plan [10 Periods]
Torsion, Shafts & Spring: Torsion of circular and hollow shafts, Elastic Theory of torsion, Stresses and Deflection in circular solid and hollow shafts. Combined bending moment and torsion of shafts – Strain energy due to torsion- Modulus of Rupture – Power transmitted to shaft- shaft in series and parallel- Closed and open coiled helical springs- Leaf springs- Springs in series and parallel- Design of buffer springs.

Beams Curved in Plan: Introduction–circular beams loaded uniformly and supported on symmetrically placed columns –Semi-circular beam simply-supported on three equally spaced supports.

MODULE II: Direct and Bending Stresses [10 Periods]
Stresses under the combined action of direct loading and bending moment, core of a section – determination of stresses in the case of chimneys, retaining walls and dams–conditions for stability– stresses due to direct loading and bending moment about both axis.

MODULE III: Thin Cylinders & Thick Cylinders [10 Periods]
A: 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.

B: 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 – Thick spherical shells.

MODULE IV: Columns and Struts [09 Periods]
Introduction–Types of columns–Short, medium and long columns–Axially loaded compression members–Crushing load–Euler's theorem-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–Rankine–Gordon formula–Long columns subjected to eccentric loading–Secant formula–Empirical formulae–Straight line formula–Prof.Perry's formula.

MODULE V: Unsymmetrical Bending and Shear Centre   **[09 Periods]**

Unsymmetrical Bending: Introduction–Centroidal principal axes of section–Graphical method for locating principal axes–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 axe through the centroid–Location of neutral axis-Deflection of beams under unsymmetrical bending.

Shear Centre: Introduction-shear centre for symmetrical and unsymmetrical (Channel, I, T & L) Sections

TEXTBOOKS:
1. R.K.Bansal "**Strength of materials**" Laxmi Publications(P)ltd., 6th Edition 2015.
2. Basavarajaiah and Mahadevappa "**Strength of materials**" University press 3rd Edition, 2011

REFERENCES:
1. Ferdinandp Beer "**Mechanics of Solid**", TataMc.Grawhill Publications 1stEdition 2000.
2. S.Ramakrishna and R.Narayan "**Strength of Materials**" Dhanpat Rai publications., 1stEdition 2015.
3. A.R.Basu,NaiSarah "**Strength of Materials**" DhanpatRai&Co., 2nd Edition , 2011.
4. L.S.Srinath "**Strength of Materials**" Macmillan IndiaLtd.,1st edition, 2014.

E RESOURCES:
1. http://www.aboutcivil.org/solid-mechanics.html
2. https://archive.org/details/atextbookoncivi01schogoog
3. https://link.springer.com/journal/11223
4. https://www.journals.elsevier.com/mechanics-of-materials
5. http://nptel.ac.in/courses/105105108/
6. http://nptel.ac.in/downloads/112106141/

Course Outcomes
At the end of the course, students will be able to
1. Know the theory behind the Shafts and springs and their types.
2. Assess the resultant stresses in the case of chimneys, retaining walls and dams and checking their stability. Evaluate bulking loads of a given column when ends are either held in position or are restrained fully and their combinations
3. Calculate the stresses and strains associated with thin-wall spherical and cylindrical pressure vessels and Design the thickness of the thin and thick cylinders subjected to internal pressure
4. Analyze slender, long columns subjected to axial loads.
5. Apply the different methods of unsymmetrical bending analysis. Design simple bars, beams, and circular shafts for allowable stresses and loads/demonstrate the significance and concept of shear centre

2017-18 Onwards (MR-17)	**MALLA REDDY ENGINEERING COLLEGE** (Autonomous)		B.Tech. IV Semester	
Code: 70112	**CONCRETE TECHNOLOGY**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisites: Building Materials, Construction and Planning

Course Objective: To provide the basic knowledge of science and engineering of concrete properties related to civil engineering problems. Going through the course one would develop adequate understanding on concrete production process and properties and uses of concrete as a modern material of construction. The courses will enable one to make appropriate decision regarding ingredient selection and use of concrete.

MODULE I: Cement & Admixtures   **[10 Periods]**
Cement: Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrate cement –Tests on cement– Different grades of cement.
Admixtures: Types of admixtures – mineral and chemical admixtures – properties – dosages – effects – usage

MODULE II: Aggregates   **[10 Periods]**
Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum aggregate size.

MODULE III: Fresh& Hardened Concrete   **[10 Periods]**
A: Fresh Concrete: Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.
B: Hardened Concrete: Water / Cement ratio – Abram's Law – Gelspaoe ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength.

MODULE IV: Testing Of Hardened Concrete & Elasticity, Creep & Shrinkage   **[09 Periods]**
Testing Of Hardened Concrete: Compression tests – Tension tests: Flexure tests – Splitting tests – Pull-out test, Nondestructive 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.

MODULE V: Mix Design & Special Concretes [09 Periods]

Mix Design: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – BIS method of mix design with Admixtures as per IS:10262-2009

Special Concretes: Light weight aggregates – Light weight aggregate concrete – Cellular concrete – High density concrete – Fiber reinforced concrete – Polymer concrete – Types of Polymer concrete – High performance concrete – Self compacting concrete-Self Curing Concrete.

TEXT BOOKS:

1. M.S.Shetty "**Concrete Technology**" S.Chand & Co. Revised Edition; 2006
2. M.L. Gambhir. "**Concrete Technology**" 5th Edition 2013 – Tata Mc. Graw Hill Publishers, New Delhi

REFERENCES:

1. A.M.Neville "**Properties of Concrete**" Low priced Edition – 5th Edition 2012
2. M.L. Gambhir. "**Concrete Technology**" 5th Edition 2013 – Tata Mc. Graw Hill Publishers,New Delhi
3. A.R. Santha Kumar "**Concrete Technology**", Oxford university Press 2006, New Delhi
4. P.K.Mehta and J.M.Monteiro, "**Concrete: Micro structure, Properties and Materials**" –5th Edition 2014 Mc-Graw Hill Publishers.

E RESOURCES:

1. http://www.indianconcreteinstitute.org/
2. http://www.ncbindia.com/
3. www.icijournals.com
4. http://nptel.ac.in/courses/105102012/
5. http://nptel.ac.in/courses/105105104/

Course Outcomes

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

1. Understand various chemical and physical properties of ordinary Portland cement and admixture
2. Acquire knowledge on physical, chemical, thermal and mechanical properties of aggregates
3. Gain knowledge on properties of both fresh and hardened concrete
4. Acquire knowledge on various tests conducted on hardened concrete like tension and compression etc and also effect and factors influencing of elasticity, creep and shrinkage.
5. Design a concrete mix which fulfills the required properties of concrete by using BIS method and development of special concretes and different materials used in them.

Prerequisite: Environmental Sciences

Course Objective: To create awareness in Water supply engineering, providing knowledge about the importance of potable water, treatment methods and the mode of distribution to the public. Explain about sewerage system, its appurtenances, treatment methods and disposal techniques with designs aspects.

MODULE I: Introduction and Sources of Water [13 Periods]
Introduction: Waterborne diseases, Need for protected water supply, Population forecasting methods, design period, Water demand: Types of demand – factors affecting – fluctuations – fire demand in detail – storage capacity, water quality and testing, drinking water standards.
Sources of Water: Sources of water and comparison between quality and quantity and other considerations, Types of Intake, Infiltration galleries, Jack wells, springs, confined and unconfined aquifers and wells.

MODULE II: Sedimentation and Filtration& Disinfection [13 Periods]
Sedimentation: Sedimentation: Types of sedimentation, principles, uniform settling velocity, design of sedimentation tank, Coagulation- flocculation Definition and principles, Types of coagulants, feeding arrangements. Optimum dosage of coagulant- Jar test
Filtration& Disinfection: Filtration theory/ Principles, Construction and working of slow and rapid gravity filters, multimedia filters, design of filters, troubles in operation, comparison of filters, Disinfection – Types of disinfection - Theory of chlorination - chlorine demand, Residual chlorine test.

MODULE III: Distribution Systems and Joints and Valves [12 Periods]
A. Distribution Systems: Distribution systems, Requirements, methods and Types of layouts, Design aspects of distribution systems, Equivalent pipe methods and Hardy Cross method, Service reservoirs.
B. Joints and Valves: Types of Joints, Types of Valves such as sluice valves, air valves, scour valves and check valves, water meters, laying and testing of pipe lines.

MODULE IV: **Conservancy and Water Carriage System** [13 Periods]
Definition of sewage, characteristics of sewage, Decomposition of sewage, cycles of decay examination of sewage – B.O.D, – C.O.D equations. Sewage and storm water estimation – time of concentration – storm water overflows, combined flow, Sewers shapes and materials, Design of Sewer, Sewer appurtenances: Manholes – Inverted siphon – Catch basins – Flushing tanks – Ejectors, pumps and pump houses, house drainage – components requirements, sanitary fittings-traps, one pipe and two pipe systems of plumbing.

MODULE V: **Waste Water Effluent Treatment methods and disposal** [13 Periods]
Lay out of Waste Water Effluent Treatment plant, Primary treatment: Types and classification of screens, grit chambers, skimming tanks, sedimentation tanks, principles and design of biological treatment: Trickling filters, standard, high rate Trickling filter and Activated sludge process. Ultimate disposal of sewage, sewage farming dilution, Sludge digestion tanks – factors affecting – design of Digestion tank – Sludge disposal by drying – septic tanks, working principles and design, soak pits, design of oxidation ponds.

TEXT BOOKS:
1. G.S. Birdi "**Water supply and sanitary Engineeringy"**, Dhanpat Rai & Sons Publishers 2010.
2. Dr. B.C.Punmia**,** Ashok Jain & Arun Kumar Jain, "**Water Supply Engineering**", Vol. I "**Waste water Engineering**", Vol. II, Laxmi Publications Pvt.Ltd, New Delhi 2nd Edition 2016.
3. S.K. Garg**, "**Water Supply Engineering**: Environmental Engineering"** Vol.I Khanna Publications, 2010, New Delhi.

REFERENCES:
1. **"Water and Waste Water Technology"** by Steel. 2. Metcalf and Eddy 2004.
2. Mark J**.** Hammer**, Sr.** Mark J**.** Hammer **"Water and Wastewater Technology**", 6th Edition**,** HDR Engineering**,** Inc. ©2008**;**
3. S.C.Rangwala, revised by K.S.Rangwala & P.S.Rangwala "**Water Supply** and **Sanitary Engineering**" 14th edition, 2014.

E RESOURCES:
1. http://www.nptel.ac.in/courses/105105105/.
2. http://www.nptel.ac.in/courses/105105104/.
3. http:// bloggerfromtashkent.eklablog.com/water-supply-engineering-by-s-k-garg-pdf-a1288.

Course Outcomes
At the end of the course, students will be able to
1. Recognize the importance of protected water supply, water demand and water quality.
2. Acquire knowledge about different treatment methods.
3. Identify a source of water for water supply to a town or city with respect to quality and quantity of water through distribution system.
4. Understand the sources of sewerage, Estimation and design of sewers and its appurtenances.
5. Identify the techniques of disposal methods of waste water and sludge.

Prerequisite: NIL

Course Objective: Understand the standard measurement techniques of fluid mechanics and their applications. Illustrate with the components and working principles of the different types of Turbines and Pumps.

List of Experiments:

1. Calibration of Venturimeter & Orifice meter
2. Determination of Coefficient of discharge for a small orifice / mouthpiece by constant head method.
3. Calibration of contracted Rectangular Notch and / Triangular Notch
4. Determination of Friction factor of a pipe.
5. Determination of Coefficient for minor losses.
6. Verification of Bernoulli's equation.
7. Impact of jet on Vanes
8. Study of Hydraulic jump.
9. Performance test on Pelton wheel turbine
10. Performance test on Francis turbine.
11. Performance characteristics of a Single stage/ multi-stage centrifugal pump.
12. Performance characteristics of a Reciprocating pump.

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

1. Calibrate various flow measuring devices in pipe and open channel flow.
2. Determine various losses and velocity in pipe flow in field.
3. Calibrate the performance characteristics of pumps and turbines.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: 70115	**CONCRETE TECHNOLOGY LAB**	L	T	P
Credits: 2		-	-	4

Prerequisite: Concrete Technology

Course objective: Enable to carry various experiments regarding compressive strength of concrete, tensile strength of concrete, workability test, design mix, modulus of rupture of concrete. All these experiments intended to determine the quality of concrete.

List of Exercises:

1. Normal Consistency, Initial and final setting time of cement.
2. Fineness of cement.
3. Specific gravity of cement and aggregates.
4. Soundness of cement.
5. Bulking of sand.
6. Water absorption test on coarse aggregate.
7. Compressive strength of cement.
8. Workability test on concrete by compaction factor, slump cone and Vee-bee consistometer.
9. Compressive strength of concrete.
10. Split Tensile and Flexural Strength of concrete.
11. Concrete Mix Design.
12. Non-Destructive tests on hardened concrete.

Course Outcomes
At the end of the course, students will be able to
1. Find the properties of cement.
2. Calculate the workability of fresh concrete.
3. Find out the strength of hardened concrete.
4. Do the concrete mix design.
5. Get good idea about the water cement ratio.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: 70M02	**GENDER SENSITIZATION**	**L**	**T**	**P**
Credits: NIL	(Common for CE,EEE,ME,ECE,CSE,IT and Min.E)	-	-	3

Prerequisite: NIL

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

MODULE I: UNDERSTANDING GENDER
Gender: Why Should We Study It? (Towards a World of Equals: Unit -1)
Socialization: Making Women, Making Men (Towards a World of Equals: Unit -2)
Introduction. Preparing for Womanhood. Growing up Male. First Lessons in Caste. Different Masculinities.
Just Relationships: Being Together as Equals (Towards a World of Equals: Unit -2)
Mary iKorn and Onler. Love and Acid just do not Mix. Love Letters. Mothers aniJ Fathers. Further Reading: Rosa Parks-The Brave Heart.

MODULE II: GENDER AND BIOLOGY
Missing Women: Sex Selection and Its Consequences (Towards a World of Equals: Unit -4)
Declining Sex Ratio. Demographic Consequences.
Gender Spectrum: Beyond the Binary (Towards a World of Equals: Unit -10)
Two or Many? Struggles with Discrimination.
Additional Reading: Our Bodies, Our Health (Towards a World of Equals: Unit -13)

MODULE III: GENDER AND LABOUR
Housework: the Invisible Labour (Towards a World of Equals: Unit -3)
"My Mother doesn't Work." "Share the I.oad."
Women's Work: Its Politics and Economics (Towards a World of Equals: Unit -7)
Fact and Fiction. Unrecognized and Unaccounted work. Further Reading: Wages and Conditions of Work.

MODULE IV: ISSUES OF VIOLENCE
Sexual Harassment: Say Nol (Towards a World of Equals: Unit -6)
Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chdpulum.
Domestic Violence: Speaking Out (Towards a World of Equals: Unit -5)

Is Home a Safe Place? When Women Unite (Film" Rebuilding Lives. Further Reading: New Forums for Justice. Thinking about Sexual Violence (Towards a World of Equals: Unit -11)

Blaming the Victim-1 Fought for my Life...." - Further Reading: The Caste Face of Violence.

MODULE V: GENDER STUDIES

Knowledge: Through the Lens of Gender (Towards a Work/ of Equals: Unit -5)

Point of View. Gender and the Structure of Knowledge. Further Reading: Unacknowledged Women Artists of Telangana.

Whose History? Questions for Historians and Others (Towards a World of Equals: Unit -9)

Reclaiming a Past. Writing other Histories. Further Reading: Missing Pages from Modern Telangana History.

Essential Reading: All the Units In the Textbook, "Towards a World of Equals: A Bilingual Textbook on Gender" written by A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Mina Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Thant

Note: Since it Is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field.

TEXT BOOKS:-

1. Towards a World of Equals: A bilingual Textbook on Gender , A Suneetha -etall

REFERENCE BOOKS:-

1) Sen, Amartya. "More than One Million Women are Missing.' New York Review of Books 37.20 (20 December 1990). Print. We *Were Making History...' Life Stories of Women in the ToIrmgana People's Struggle.* New Delhi: Kali for Women, 1989.

2) Tripti Lahiri. "By the Numbers: Where Indian Women Work." **Women's** *Studios Journal* (14 November 2012) Available online at: http:// blogs.visj.com/ India real time/2012/11/14/by -the-numbers-where-Indan-womenworkP

3) K. Satyanarayana and Susie Thant (Ed.) Steel Nibs Are Sprouting: New Dalit Writing From South India, Dossier 2: Telugu And Kannada htto://harooreollins.co.in/BookDetailasp?Flook Cndet·3732

4) Vimata. "Vantillu (The Kitchen)". *Women Writing in India: 600 BC to the Present. Volume II:* The 20th Century. Ed. Susie Thaw and K. Lalita. Delhi: Oxford University Press 1995. 599-601.

5) Shatrughna, Veena et al. *Women's Work and its Impact on Child Health end Nutrition,* Hyderabad, National Institute of Nutrition, Indian Council of Medical Research. 1993.

6) Stree Shakti Sanghatana. 'We Were *Making I listory ....' Life Stories of Women in the Telangana* People's *Struggle.* New Delhi: Kali for Women, 1989.

E RESOURCES :

1. **http://www.actforyouth.net/resources/rf/rf_gender1_1213.cfm   (UNDERSTANDING GENDER)**

2. **https://www.simplypsychology.org/gender-biology.html(GENDERAND BIOLOGY)**

3. **http://www.yourarticlelibrary.com/essay/essay-on-gender-issues-in-labour-market-in-india/40442/ (GENDER AND LABOUR)**

Course Outcomes

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

Develop a better understanding of important issues related to gender in contemporary India.

1. Sensitize about the 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.
2. Attain a finer grasp of how gender discrimination works in our society and how to counter it.
3. Acquire insight into the gendered division of labour and its relation to politics and economics.
4. Develop a sense of appreciation of women in all walks of life.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: 70A02	**LAW FOR ENGINEERS** (common to CE, EEE, ME, ECE, CSE, IT and Mining)	**L**	**T**	**P**
Credits: NIL		**-**	**2**	**-**

Prerequisite: NIL

Course Objective: The objective of the course is to familiarize students (Prospective engineers) with elementary knowledge of laws that would be of utility in their profession.

MODULE I: Indian legal system [8 Periods]
Introduction to Indian legal system: Constitution of India, sources of law and judicial system.
Contracts and its elements: Contract interpretation, Employment contracts, service contracts, contract of indemnity, employment agreements.

MODULE II: Labour Laws [6 Periods]
Introduction to Labour Laws: Provident fund, ESI, Maternity Benefit (amendments of 2016). Bonus, Gratuity and welfare measures.

MODULE III: Taxation [6 Periods]
A. **Introduction to Taxation:** Income tax act, TDS.
B. Goods and Services Tax (GST)

MODULE IV: IT Act and RTI Act [6 Periods]
Information Technology (IT) Act 2000 and cyber laws
Right to Information Act-2005: Evolution and concept; Practice and procedures.

MODULE V: Intellectual Property Rights [6 Periods]
Intellectual property Rights: Overview, main forms of IP.
Copyright, Trademarks, and Patents with reference to software, circuits, structures and designs.

TEXT BOOK:
1. S.K. Kapur - **Human Rights under International Law and Indian Law** - Central Law Agency – 2001

REFERENCE BOOKS:
1. H.M. Seervai - Constitutional Law of India - Tripathi Publications – 4th Edition, 1991
2. Cornish W. R. - Intellectual Property Rights, Patents, Trademarks, Copyrights & Allied Rights - Sweet & Maxwell– 2008
3. Avtarsingh - Company Law - Eastern Book Co.–2007
4. James Graham - Cyber Security Essentials - CRC Press - 1st Ed., 2011
5. Maskus, Keith E. **Intellectual property rights in the global economy** Institute for International 2000.

E RESOURCES:
1. https://www.youtube.com/watch?v=YBjyU7ciHpU
2. http://nptel.ac.in/courses/109103024/40
3. http://nptel.ac.in/courses/122105020/12
4. http://nptel.ac.in/courses/122105020/17

Course Outcomes

At the end of the course, students will be able to
1. Understand basic concepts of Indian legal system and also the elements of various contracts.
2. Understand the basic concepts of various Labour laws.
3. Gain the basic knowledge of taxation and its procedures.
4. Understand the concept of cyber laws and the legal procedures under IT Act-2000. Also gain the knowledge on Right to Information Act-2005
5. Gain the knowledge of various Intellectual properties and the legal and policy considerations of Intellectual Property Rights.

Prerequisites: NIL

OBJECTIVE: EEA is a think beyond program which will make the student to examine the application of microeconomics theory as applied to the manager's responsibilities in an organization. To explain the basic principles of managerial economics, accounting and current business environment underlying business decision making. This course should emphasize the quantitative and qualitative applications of economic principle to business analysis

MODULE I: Business Environment and Managerial Economics   [8 Periods]
Business Environment: Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Latest trends in Business Environment (Entrepreneurship).
Managerial Economics: Definition, Nature and Scope of Managerial Economics–Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand, Types, Significance of Elasticity of Demand, Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

MODULE II: Theory of Production and Cost Analysis   [6 Periods]
Theory of Production: Production Function – ISOquants and ISOcosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.
Cost Analysis: Cost concepts, Opportunity cost, fixed vs. Variable costs, explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEA.

MODULE III: Market structures and Pricing Policies   [6 Periods]
A: Introduction to Markets & Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.
B: Pricing Policies & Methods: Cost plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, PLC based pricing methods.

MODULE IV: Capital and Capital Budgeting   [6 Periods]
Capital: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance.
Capital Budgeting: Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

MODULE V: Financial Accounting and Ratios [6 Periods]

Financial Accounting: Introduction, Accounting principles, Accounting Cycle, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

Financial Analysis Through Ratios: Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

TEXT BOOKS:
1. Aryasri, **"Managerial Economics and Financial Analysis"**, TMH, 2nd edition, 2005.
2. Varshney & Maheswari, **"Managerial Economics"**, 5th edition Sultan Chand, 2003.

REFERENCE BOOKS:
1. H. Craig Peterson & W. Cris Lewis, **"Managerial Economics"**, PHI, 4th Edition.
2. Domnick Salvatore, **"Managerial Economics In a Global Economy"**, Thomson, 4th Edition.
3. Raghunatha Reddy & Narasimhachary, **"Managerial Economics& Financial Analysis"**, 4th edition Scitech.
4. S.N.Maheswari & S.K. Maheswari, **"Financial Accounting"**, 6th edition Vikas.
5. Dwivedi, **"Managerial Economics"**, Vikas, 6th Edition.

E RESOURCES:
1. http://www.learnerstv.com/Free-Economics-video-lecture-courses.htm
2. http://www.onlinevideolecture.com/?course=mba-programs&subject=microeconomics
3. http://www.learnerstv.com/Free-Management-Video-lectures-ltv034-Page1.htm
4. http://www.learnerstv.com/Free-Management-Video-lectures-ltv637-Page1.htm
5. http://www.onlinevideolecture.com/?course=mba-programs&subject
6. http://nptel.ac.in/courses/110105067/
7. http://nptel.ac.in/courses/110107073/
8. http://nptel.ac.in/courses/110101005/
9. http://nptel.ac.in/courses/109104073/

Course Outcomes

At the end of the course, students will be able to
1. Understand the concepts of managerial economics and their application in evaluating the demand.
2. Evaluate the production function and identifies the least cost combination to control the costs of production.
3. Understand the structures of various market types and their pricing policies.
4. Understand the types of business forms and also be able to evaluate the investments using capital budgeting techniques.
5. Understand the basic concepts of financial accounting and evaluation of company performance using ratio analysis.

Prerequisite: Strength of Materials

Course Objective: To give procedural knowledge to design a system, component or process as per needs and specifications of R C elements such as beams, slabs, columns and footings subjected to various load combinations with different boundary conditions and also the show the impact of engineering solutions on the society and also will be aware of contemporary issues regarding failure of structures due to wrong design, use of poor quality of materials and faulty construction methods.

MODULE I: Concepts of RCC Design & Beams [10 Periods]
Design Philosophies
Design philosophies-Working Stress Method (WSM), Ultimate Load Method(ULM), and Limit State Method(LSM) – Material- Stress- Strain Curves – Safety factors – characteristic values. Stress Block parameters (generalized, rectangular, parabolic) – IS-456-2000 codal provisions
Limit State of Collapse (Flexure):
Limit state design of singly reinforced, doubly reinforced, Flanged sections--T and L beam sections.

MODULE II: Limit State of Collapse in Shear, Torsion and Bond [10 Periods]
Shear Torsion and Bond:
Limit state design of section for shear and torsion. Concept of bond, anchorage and development length, I.S. code provisions
Limit State Design for Serviceability
Limit State Design for Serviceability for deflection, cracking and codal provision. Design examples in simply supported and continuous beams.

MODULE III: Slabs [10 Periods]
A: Types of slabs-one way, two way - simply supported rectangular slabs subjected to only uniformly distributed loads. IS Code Method.
B: Continuous rectangular slabs subjected to only uniformly distributed loads. IS Code Method, Detailing of reinforcement in slabs.

MODULE IV: Columns [09 Periods]
Design of axially loaded circular, square and rectangular columns; Uniaxial and biaxial bending of columns-interaction diagrams. Design of columns subjected to axial load and bending.

MODULE V: Stairs and Footings [09 Periods]
Stairs: Design and detailing of dog legged stairs
Analysis and Design of Footings

Design of Isolated Square, rectangular and Circular footings as per IS code

TEXT BOOKS:
1. P.C.Varghese ―**Limit state designed of reinforced concrete** Prentice Hall of India, New Delhi, 2nd Edition, 2008.
2. N. Krishna Raju and R.N. Pranesh ―**Reinforced concrete design**, New age International Publishers, New Delhi, 3rd Edition, 2009.

REFERENCES:
1. M.L. Gambhir ―**Fundamentals of Reinforced concrete design**, Printice Hall of India Private Ltd., New Delhi, 3rd Edition, 2006.
2. P. Purushotham ―**Reinforced concrete structural elements–behaviour, Analysis and design**, Tata Mc. Graw-Hill, 3rdEdition, 2014.
3. B.C.Punmia, Ashok Kumar Jain and Arun Kumar ―**Reinforced concrete structures**, Vol.1, Laxmi publications Pvt. Ltd., 3rd Edition, 2011.
4. S.Unnikrishna Pillai & Devdas Menon, ―**Reinforced concrete design** Tata Mc. Graw Hill, New Delhi, 3rd Edition, 2009.

E RESOURCES:
1. https://en.wikipedia.org/wiki/Reinforced_concrete
2. http://www.bd.gov.hk/english/documents/code/CoP_SUC2013e.pdf
3. http://www.sturdystructural.com/reinforced-concrete.html
4. http://engineeringvideolectures.com/course/294
5. http://www.nptel.ac.in/courses/105105105/
6. http://www.nptel.ac.in/courses/105105104/

Course Outcomes:
At the end of the course, students will be able to
1. Know the needs and mode of the design philosophies like Working Stress Method (WSM),Ultimate Load Method(ULM), Limit State Method(LSM).
2. Have an idea on flexure, shear, torsion, Bond, anchorage length and to check the Design for Serviceability.
3. Inculcate the design methodology for various slabs using IS Codal Provisions and Detailing of Reinforcement for torsion.
4. Know about compression members like columns and design procedure for various types of columns using IS Code -456-2000.
5. Familiarize about Foundations and their Design.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. V Semester	
Code: 70117	**GEOTECHNICAL ENGINEERING**	L	T	P
Credits: 3		2	2	-

Prerequisite: NIL

Course Objective: To understand the formation of soils, their classification. To analyze the in-situ soil and stresses developed due to loads or surcharge in the soil at any depth and its practical significance. Also to predict the bearing capacities and possible settlements of structures founded on various soils.

MODULE I: Introduction and Index Properties of Soils   **[10 Periods]**
Introduction Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship – Relative density.
Index Properties of Soils Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – I.S. Classification of soils and unified soil classification

MODULE II: Permeability and Effective Stress & Seepage through Soils   **[10 Periods]**
Permeability Soil water – capillary rise – flow of water through soils – Darcy's law- permeability – Factors affecting permeability – laboratory determination of coefficient of permeability – Permeability of layered soils – Insitu permeability tests (Pumping in & Pumping out test).
Effective Stress & Seepage through Soils Total, neutral and effective stress – principle of effective stress - quick sand condition – Seepage through soils – 2-D flow and Laplace's Equation -Flownets: Characteristics and Uses.

MODULE III: Stress Distribution in Soil and Compaction   **[10 Periods]**
A: Stress Distribution in Soil Boussinesq'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.
B: Compaction Mechanism of compaction – factors affecting compaction – effects of compaction on soil properties – Field compaction Equipment – compaction quality control.

MODULE IV: Consolidation   **[09 Periods]**
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 - preconsolidation pressure and its determination - Terzaghi's 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods.

MODULE V: Shear Strength of Soils   **[09 Periods]**

Importance of shear strength **–** Mohr's– Coulomb Failure theories – Types of laboratory strength tests – strength tests based on drainage conditions – Shear strength of sands - dilatancy – Critical Void Ratio – Liquefaction- shear strength of clays.

TEXT BOOKS:
1. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt. Ltd, New Delhi. 6th Edition, 2014
2. Principals of Geotechnical Engineering by Braja M.Das, Cengag e Learning Publishers, 7th Edition, 2014
3. Geotechnical Engineering: Principles and practices of soil mechanics and foundation Engineering by VNS Murthy, Taylor & Francis Group**,**13th Edition, 2015

REFERENCES:
1. Geotechnical Engineering by C. Venkataramiah, New age International Pvt .Ltd, 7th Edition, 2013.
2. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata Mc.Grawhill Publishers New Delhi, 12th Edition,2013.
3. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi., 12th Edition,2012
4. Soil Mechanics and Foundation by by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi,13th Edition ,2015

E RESOURCES
1. http://geotech.fce.vutbr.cz/studium/mech_zemin/soil_mechanics.pdf
2. http://www.alljntuworld.in/wp-content/uploads/2015/12/GTE-Lecture-Notes.pdf
3. http://geotech.fce.vutbr.cz/studium/mech_zemin/soil_mechanics.pdf
4. http://www.nptel.ac.in/courses/105105105/
5. http://www.nptel.ac.in/courses/105105104/

Course Outcomes:
At the end of the course, students will be able to
1. Gain a general understanding on the nature of soil and the classification and evaluation of engineering properties of soil.
2. Recognize the Permeability characteristics of soils and seepage through soils
3. Compute the vertical stress at any depth by deferent methods and also understands the compaction characters.
4. Understand the stress distribution and settlement characteristics of soil when it is subjected to the application of external loads.
5. Evaluate the shear strength characteristics of soil.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 70118	**STRUCTURAL ANALYSIS**	**L**	**T**	**P**
Credits: 3		2	2	-

Prerequisites: Engineering Mechanics, Strength of Materials.

Course Objective: To provide a good knowledge in the analysis of beams and frames. The members of a structure are subjected to internal forces like axial forces, shearing forces, ending and torsional moments while transferring the loads acting on it. Structural analysis deals with analyzing these internal forces in the members of the structures.

MODULE I: Analysis of Frames and Energy Theorems   [10 Periods]
Analysis of Frames Types of frames- Perfect and Imperfect pin jointed frames. Analysis of determinate pin jointed frames using method of joints and method of sections for vertical, horizontal and inclined loads.
Energy Theorems Introduction-Strain energy in linear elastic system, expression of strain energy due axial load, bending moment and shear forces- Castigliano's first theorem - Unit Load Method. Deflections of simple beams and pin jointed plane trusses.

MODULE II: Fixed and Continuous Beams   [10 Periods]
Propped cantilever and fixed beams-fixed end moments for propped cantilever and fixed beams subjected to concentrated loads and uniformly distributed load, triangular load – Clapeyron theorem of three moments – analysis of continuous beams – shear forceand bending moment diagrams for continuous beams.

MODULE III: Three Hinged Arch and Two Hinged Arch   [10 Periods]
A: Three Hinged Arch Arches as structural forms – Examples of arch structures – Types of arches – Analysis of three Hinged- parabolic and circular arches – Settlement and temperature effects.
B: Two Hinged Arch Analysis of parabolic arches- effect of yielding of supports-effect of shortening of rib- effect of temperature change.

MODULE IV: Slope Deflection Method   [09 Periods]
Continuous beams and rigid frames (with and without sway) – Symmetry and antisymmetry – Simplification for hinged end – Support displacements.

MODULE V: Moment Distribution Method   [09 Periods]
Distribution and carry over of moments – Stiffness and carry over factors – Analysis of continuous beams – Plane rigid frames with and without sway.

TEXT BOOKS:
1. Vaidyanadhan, R and Perumal, P**, "Comprehensive Structural Analysis – Vol.1&Vol. 2",** Laxmi Publications, New Delhi, 3rd Edition, 2014.
2. BhaviKatti, S.S, "**Structural Analysis – Vol. 1 & Vol. 2**", Vikas Publishing Pvt Ltd., New Delhi, 4th Edition, 2014.

REFERENCES:
1. S.B. Junnarkar "**Mechanics of structures**", charotar publishing house.31st edition (2014).
2. Pandit & Gupta "**Theory of structures**", Tata Mc. Graw –Hill Publishing co. Ltd., New Delhi. 1st edition 1999.
3. B.C Punmia, Khanna "**Strength of materials**", Laxmi Publications, New Delhi.10th edition 2015.

E RESOURCES:
1. https://www.youtube.com/watch?v=s4CN6aVKhPo
2. http://ascelibrary.org/journal/jsendh
3. http://www.springer.com/engineering/civil+engineering/journal/40091
4. http://seekdl.org/journal_details.php?jourid=130
5. http://www.nptel.ac.in/downloads/105101085/

Course Outcomes:
At the end of the course, students will be able to
1. Find the member forces on frames and to have a good idea on Energy theorems
2. Solve fixed beams, continuous beams and propped cantilever beams.
3. Analyze the three hinged and two hinged arches.
4. Draw the SFD and BMD for beams and trusses using slope deflection method.
5. Draw the SFD and BMD for beams and trusses using Moment distribution method.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 70132	**AIR POLLUTION AND CONTROL** (PROFESSIONAL ELECTIVE -I)	L	T	P
Credits: 4		3	2	-

Prerequisite: Environmental Science

Course Objectives: This course provides the knowledge and understanding of the problems associated with air pollution indoor and outdoor. It also describes the regulations pertinent to air pollution especially due to industries making the student to design proper air pollution control devices.

MODULE I: Air Pollution [13 Periods]

Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non- Point, Line and Areal Sources of air pollution-stationary and mobile sources. Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc., ambient air quality standards.

MODULE II: Thermodynamics and Kinetics of Air-Pollution [13 Periods]

Applications in the removal of gases like SO_x, NO_x, CO, HC etc., air-fuel ratio, Computation and Control of products of combustion.

MODULE III: Meteorological Parameters and Wind Behaviour [12 Periods]
A: Meteorology
Properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagrams, Lapse Rates, Pressure Systems.
B: Plume Dispersion
Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion.

MODULE IV: Control of Particulates [13 Periods]

Control at Sources, Process Changes, Equipment modifications, Design and operation of control equipments – Settling Chambers, Centrifugal separators, Filters, Dry and Wet scrubbers, Electrostatic precipitators.

MODULE V: General Methods of Control of NOx and SOx Emissions [13 Periods]
In-plant Control Measures, process changes, dry and wet methods of removal and recycling. Air Quality Management – Monitoring of SPM, SO, NO and CO Emission Standards.

TEXT BOOKS:
1. M.N.Rao and H.V.N.Rao, **"Air pollution"**, Tata Mc.Graw Hill Company, 26th reprint 2007.
2. R.K. Trivedy and P.K. Goel, **"An introduction to Air pollution"**, B.S. Publications, 2nd revised edition, 2005.

REFERENCES:
1. Daniel Vallero, **"Air Pollution Control: A Design Approach"** Academic Press, 5th Edition, 2014.
2. Karl B. Schnelle, Jr., Russell F. Dunn, Mary Ellen Ternes, "**Air Pollution Control Technology Handbook", CRC** Press, 2nd Edition, 2015.
3. Thad Godish, Wayne T. Davis, Joshua S. Fu, **"Air Quality",** CRC Press, 5th Edition, 2014.
4. Kenneth C. Schifftner, "**Air Pollution Control Equipment Selection Guide",** CRC Press, 2nd edition, 2013.
5. Marco Ragazzi, "**Air Quality: Monitoring, Measuring, and Modeling Environmental Hazards",** Apple Academic Press, 1st Edition, 2016.

E RESOURCES:
1. http://www3.cec.org/islandora/en/item/2195-best-available-technology-air-pollution-control-en.pdf.
2. http://www.eolss.net/sample-chapters/c09/e4-11-05.pdf.
3. https://www.env.go.jp/earth/coop/coop/document/01-apctme/contents.html.

Outcomes:
At the end of the course, students will be able to
1. Identify different sources of air pollution and the effects on human and environment.
2. Gain knowledge in computation of air pollutant removal of gases like SOx, NOx, CO etc.
3. Understand the importance of meteorological parameters like wind, pressure, humidity in dispersing air pollutants.
4. Gain knowledge in designing and operating particulate air control equipment.
5. Acquire the knowledge in designing the control system for gaseous air pollutants.

Prerequisite: NIL

Course Objectives: This course provides the knowledge and understanding of the disaster phenomenon, its different contextual aspects, impacts and public health consequences along with International Strategy for Disaster Reduction. It also has the potential to make the student design and implement disaster mitigation measures.

MODULE I: Concept of Hazards and Disasters [13 Periods]

Environmental Hazards & Disasters Concept of Environmental Hazards, Environmental Stress & Environmental Disasters. Different Approaches & relation with human Ecology – Landscape, Ecosystem and Perception Approach - Human Ecology & its application in geographical researches.

Types of Environmental Hazards & Disasters Natural hazards and Disasters – Man induced hazards & Disasters - Natural Hazards- Planetary Hazards/ Disasters - Extra-Planetary Hazards/ disasters - Planetary Hazards- Endogenous Hazards - Exogenous Hazards.

MODULE II: Classification of Hazards [13 Periods]

Endogenous Hazards Volcanoes: Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes – Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions. Earthquake Hazards/ Disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of earthquakes - Earthquake Hazards in India - Human adjustment, perception & mitigation of earthquake. Landslides: causes and impacts. Avalanches -causes and impacts.

Exogenous Hazards Infrequent events: Cyclones – Lightning – Hailstorms, Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes , distribution human adjustment, perception & mitigation), Cumulative atmospheric hazards/ disasters : Floods-Droughts- Cold waves- Heat waves Floods:- Causes of floods- Flood hazards in India- Flood control measures [Human adjustment, perception & mitigation], Droughts: Impacts of droughts- Drought hazards in India- Drought control measures, Extra Planetary Hazards/ Disasters-Man induced Hazards /Disasters- Physical hazards/ Disasters-Soil Erosion Soil Erosion: Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion. Chemical hazards/ disasters: Release of toxic chemicals, nuclear explosion- Sedimentation processes, Sedimentation processes: Global Sedimentation problems- Regional Sedimentation problems-Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation, Biological hazards/ disasters: Population Explosion.

MODULE III: Approaches and Measures in Disaster Management [12 Periods]

A: Emerging Approaches Three Stages: Pre-disaster stage (preparedness), Emergency Stage, Post Disaster stage (Rehabilitation).

B: Natural Disaster Reduction & Management Provision of Immediate relief measures to disaster affected people, Prediction of Hazards & Disasters, Measures of adjustment to natural hazards

MODULE IV: Disaster Management [13 Periods]

An integrated approach for disaster preparedness, mitigation & awareness. Mitigation- Institutions- discuss the work of following Institution.

a. Meteorological Observatory

b. Seismological Observatory

c. Volcanological Institution

d. Hydrology Laboratory

e. Industrial Safety Inspectorate

f. Institution of Urban & Regional Planners

g. Chambers of Architects

h. Engineering Council

i. National Standards Committee

Integrated Planning- Contingency Management Preparedness –

a] Education on disasters

b] Community involvement

c] The adjustment of Human Population to Natural Hazards & Disasters Role of Media

Monitoring Management- Discuss the programme of disaster research & mitigation of disaster of following organizations.

a] International Council for Scientific Unions [ICSU]- Scientific Committee on Problems of the Environment [SCOPE], International Geosphere- Biosphere programme [IGBP]

b] World Federation of Engineering Organizations [WFED]

c] National Academy of Sciences

d] World Meteorological Organizations [WMO]

e] Geographical Information System [GIS]

f] International Association of Seismology & Physics of Earth's Interior [IASPEI]

g] Various U.N agencies like UNCRD, IDNDR, WHO, UNESCO, UNICEF, UNEP.

MODULE V: Disaster Management in India [13 Periods]

A regional survey of Land Subsidence, Coastal Disaster, Cyclonic Disaster & Disaster in Hills with particular reference to India

Ecological planning for sustainability & sustainable development in India- Sustainable rural development: A Remedy to Disasters-Role of Panchayats in Disaster mitigations **C:** Environmental policies & programmes in India- Institutions & National Centers for Natural Disaster reduction, Environmental Legislations in India, Awareness, Conservation Movement, Education & Training.

TEXT BOOKS:

1. Jagbir Singh, "Disaster Management–Future Challenges and Opportunities", I.K.International Publishing House, 1ˢᵗ Edition, 2005.

2. Coppala P Damon, "Introduction to International Disaster Management", ABD Publishers, 2007.

REFERENCES:

1. R.B.Singh [Ed], "Environmental Geography", Heritage Publishers, New Delhi, 1st Edition, 1990.

2. Kates,B.I & White. G.F, "The Environment as Hazards", oxford publishers, 5th Edition, New York, 1978.

3. R.B. Singh [Ed] – Disaster Management, Rawat Publication, New Delhi, 1st Edition, 2000.

E RESOURCES:

1. http://www.wcpt.org/disaster-management/what-is-disaster-management.
2. http://study.com/academy/lesson/what-are-cyclones-types-causes-effects.html.

Course Outcomes:

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

1. Analyze, evaluate and manage the environmental, social, cultural, economical, legal and organizational aspects influencing vulnerabilities and capacities to face disasters.
2. Assess the different public health aspects at local and global levels as a result of Disaster and can plan well to mitigate them.
3. Gain knowledge in various emerging approaches and measure in disaster management.
4. Understand the role of disaster management through Meteorological Observatory, Seismological Observatory, Volcanological Institution, etc.,
5. Acquire the information about Disaster Management, Ecological planning and sustainable development and Environmental policies, Disaster Reduction programs in India.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. V Semester	
Code: 70134	SOLID WASTE MANAGEMENT (PROFESSIONAL ELECTIVE-I)	L	T	P
Credits: 4		3	2	-

Prerequisite: Environmental Sciences

Course Objective: The main objective of this course is to provide in-depth knowledge about handling of solid waste from cradle to grave. It also provides the knowledge of designing and constructing the solid waste treatment systems.

MODULE I: Introduction to Municipal Solid Waste [13 Periods]
Definition - Sources and impacts of solid waste on environment, Classification of solid waste-composition and its determinants of Solid waste-factors influencing generation-quantity assessment of solid wastes-methods of sampling and characterization.

MODULE II: Collection and Transfer of Solid Waste [13 Periods]
Collection: Collection of Solid waste – collection services – collection system, equipments – time and frequency of collection – labour requirement – factors affecting collection – analysis of collection system – collection routes – preparation of master schedules. Transfer and Transport: Need for transfer operation – transfer stations – types – transport means and methods – location of transport stations - Manpower requirement – collection routes: Transfer stations – selection of location, types & design requirements, operation & maintenance.

MODULE III: Waste Processing and Reuse [12 Periods]
A: Processing Technologies Biological, chemical conversion technologies and Thermal conversion technologies.
B: Reuse of Solid Waste Energy recovery – Incineration – Solidification and stabilization of hazardous wastes – treatment of biomedical wastes.

MODULE IV: Waste Disposal Techniques [13 Periods]
Introduction, composting, principles of composting, factors affecting composting, Vermi composting, waste to energy techniques- Landfill technique, design and operating procedure of landfill.

MODULE V: Solid Waste Management Techniques [13 Periods]
Solid waste management Hierarchy, waste avoidance/waste prevention, Definition of source Reduction, waste reduction at source using 5R's Technique, Solid waste management rules and regulations.

TEXT BOOKS:

1. Jimmy Alexander Faria Albanese, M. Pilar Ruiz, **"Solid Waste as a Renewable Resource: Methodologies"**, Apple Academic Press, 1st edition, 2015.
2. Sunil Kumar, "**Municipal Solid Waste Management in Developing Countries",** CRC Press, 1st edition, 2016.

REFERENCES:

1. P. Jayarama Reddy, **"Municipal Solid Waste Management: Processing - Energy Recovery - Global Examples",** CRC Press - BS Publications 1st Edition, 2015.
2. Elena Cristina Rada, "**Solid Waste Management: Policy and Planning for a Sustainable Society",** Apple Academic Press, 1st Edition, 2016.
3. Syeda Azeem Unnisa, S. Bhupatthi Rav, "**Sustainable Solid Waste Management",** Apple Academic Press, 1st Edition, 2012.

E RESOURCES:

1. http://www.cyen.org/innovaeditor/assets/Solid%20waste%20management.pdf.
2. http://www.slideshare.net/ebchandar/solid-waste-management-5942441.
3. http://www.iitk.ac.in/3inetwork/html/reports/IIR2006/Solid_Waste.pdf.

Course Outcomes:

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

1. Acquire knowledge in classification of solid waste and quality assessment methods of sampling.
2. Understand the solid waste collection and transport methods, and other design requirements, operational maintenance.
3. Gain knowledge in waste processing techniques and to engage in reduce, recycle, and reuse methods.
4. Identify different techniques for waste disposal.
5. Understand solid waste management techniques.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. V Semester	
Code: 70H03	ENGLISH COMMUNICATION AND PRESENTATION SKILLS LAB	L	T	P
Credits: 1	(Common for CE,EEE,ME,ECE,CSE,IT and Min.E)	-	-	2

Course Objective:

The learners need to be aware of the characteristics of technical communication in their workplaces; as a result, they are exposed to different channels of technical communication. Hence the acquired skills make the learners effective communicators using persuasive language. Besides the above said, one of the major objectives is to maintain objectivity in writing documents and to produce professional quality documents using different components of the language.

Introduction: Effective Communication binds any progressive organization. At the B Tech third year level, the Technical Communication and Presentation skills laboratory is introduced to help students succeed in attaining a challenging and a professional career. Each unit aims to reinforce learning and helps the learners perform well before and after they enter the world of work. The course is designed to be practical, stimulating and challenging providing opportunities to the learners to go beyond the classrooms and get empowered in Technical Communication skills. The course enables the students understand the employers' expectations that are varied from company to company while giving them insight into the acceptable norms of attitude, behavior and etiquette. The course also focuses on the presentation skills of the learners

Methodology: Facilitator's role: Since classroom learning augments thinking process, helping them to develop written, spoken and non verbal communication, the facilitator / Faculty would briefly discuss the topics with the students and later on guide them while the students involved in activities, writing work and while making presentations. The facilitator is required to design a lot of practical/industry oriented project works for the students

*Students are required to participate, perform, write and submit the work in the form of written documents or Power Point Presentations to hone their spoken written and non verbal communication skills. Students are to take up field work and submit the project work.

Module – I: Oral Presentation

Mechanics of Presentations – Methodology of Presentation, Importance of Non-verbal communication during presentations– Nuances of Presentation.

*This particular module is for internal evaluation purpose(s).

Module – II: E - Correspondence and Email etiquette

Common web mail services, yahoo, gmail etc, fields to pay attention- To:, Cc:, Bcc:, Reply All, Subject, Salutation, Body, Signature, Font, Caps Lock , Highlight, The 'KISS' strategy   (Keep It Simple and Short,)Points to remember while signing off, Introduction to Technical Vocabulary.

- This Module is purely for internal assessment/evaluation

Module – III: Group Discussion

Initiators- Contributor-Informer-Team Leader-Motivator-Creative Contributor , Importance of , Non verbal communication -eye contact, voice characters, posture, gestures, do's and don'ts, Role play and Simulation- Learners assuming the roles of characters and participating in Group discussion, analysis, or prediction with strictly defined goals.

Module – IV: Interview Skills & Office Etiquette

Preparing for the interview, types of interviews, interview session, importance of non verbal communication during the interview, do's and don'ts of interview, follow up and thanking letter. FAQ's. Formal Conversation, office attire- do's and don'ts, greetings and meetings, speaking to seniors and handshakes, offering and taking visiting cards.

Module – V: Job Hunt Process

SWOT analysis, correspondence and browsing the internet to search for a suitable job(s), job application-cover letter drafting, drafting a winning resume', types of resume's -electronic, video and printed resume's

- Instruction: Students are required to prepare their video resume which will be assessed by the faculty member.

Course Outcomes:

After completion of the course, students will be able to:

1. Give Oral Presentations Confidently.
2. Draft appropriate Resume in accordance with the context.
3. Participate and present their view and ideas logically and confidently.
4. Understand the importance of communication in various settings.
5. Utilize the technology for career advancement.

Reference Books:

1. Chrissie: **Handbook of Practical Communication Skills**: Jaico Publishing house, 1999.
2. Daniels, Aubrey: **Bringing Out the Best in People**:   Tata McGraw-Hill: New York, 2003.Wright, Goulstone, Mark: **Just Listen: Discover the Secret to getting through to absolutely anything** : American Management Association, 2010.
3. Leslie. T. Giblin: **Skill with people** Publication details not known
4. Lewis, Norman: **Word Power Made Easy**: Goyal Publications: New Delhi, 2009.
5. Murthy, A.G, Krishna,:   **Ten Much** : Tata McGraw-Hill :New Delhi, 2010.

E RESOURCES:

1. http://www.mindtools.com/pages/article/newTMC_05.htm
2. http://www.kent.ac.uk/careers/intervw.htm
3. http://www.wikihow.com/Write-a-Report

Prerequisite: NIL

Course Objective: This course deals with the experiments conducted for characterization of water and municipal sewage.

LIST OF EXPERIMENTS:

1. Determination of pH and Turbidity
2. Determination of Conductivity and Total dissolved solids (Organic and Inorganic)
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides and Fluoride
5. Determination of Iron and Nitrates
6. Determination of Dissolved Oxygen.
7. Determination of Total Hardness and sulphates
8. Determination of B.O.D
9. Determination of C.O.D
10. Determination of Optimum coagulant dose.
11. Determination of Chlorine demand.
12. Presumptive Coli form test.

Course Outcomes:
At the end of the course, students will be able to
1. Develop an understanding of the procedure for quantifying quality parameters pH, turbidity and hardness.
2. Learn the procedure for quantifying quality parameter chlorides and importance of chlorides, sulphate, and Total hardness in the field water supply.
3. Understand the procedure for quantifying quality parameter of biochemical oxygen demand and chemical oxygen demand and to infer on the strength of wastewater.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. V Semester		
Code: 70120	GEOTECHNICAL ENGINEERING LAB		L	T	P
Credits: 2			-	-	4

Prerequisite: NIL

Course Objective: Student will gain familiarity with laboratory procedures for assessing the index and engineering properties of soil by conducting appropriate tests and interpretation of experimental results.

LIST OF EXPERIMENTS:
1. Specific gravity, G
2. Atterberg's Limits (LL & PL)
3. Field density-core cutter and sand replacement method
4. Grain size analysis (Sieve and Hydrometer analysis)
5. Permeability of soil, constant and variable head test
6. Compaction test
7. CBR Test
8. Consolidation test
9. Unconfined compression test
10. Tri-axial Compression test
11. Direct shear test.
12. Vane shear test

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

1. Determine the specific gravity of soil fraction by density bottle and pycnometer.
2. Determine the in-situ density of soil by the core cutter and sand replacement method.
3. Obtain knowledge to determine the grain size distribution of coarse grained soil by dry sieve analysis.
4. Gain knowledge to classify the given fine grained soil based on its plasticity characteristics.
5. Determine the coefficient of permeability of soil and also evaluate the shear parameters of soil by various methods.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. VI Semester	
Code:70H06	**INDUSTRIAL MANAGEMENT**	L	T	P
Credits: 2		2	-	-

Prerequisites: NIL

Course Objective: Through reading the text, references and discussion of cases students should be able to understand the fundamentals underlying the management of an organization and Industrial Management.

MODULE I: Introduction to Management [6 Periods]
Introduction to Management Entrepreneurship and organization, Concepts of Management, nature, importance and Functions of Management, Taylor's Scientific Management Theory, Systems Approach to Management, Fayol's Principles of Management,: Mayo's Hawthorne Experiments.
Management Theories Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Leadership Styles, Corporate Social responsibility.

MODULE II: Organizational Structures and Types [6 Periods]
Organizational Structures: Basic concepts related to Organization - Departmentation and Decentralization, Types of mechanistic and organic structures of organization
Types of Organizations: Line organization, Line and staff organization, functional organization, committee organization, matrix organization, Virtual Organization, Cellular Organization, team structure, boundary less organization, inverted pyramid structure, lean and flat Organization structure.

MODULE III: Operations Management [6 Periods]
A: Operations Management Objectives- product design process- Process selection-Types of production system (Job, batch and Mass Production), Plant location-factors- Urban-Rural sites comparison.
B: Plant layout Types of Plant Layouts- Design of product layout- Line balancing (RPW method) Value analysis-Definition-types of values- Objectives- Phases of value analysis- Fast diagram

MODULE IV: Work Study and Statistical Quality Control [7 Periods]
Work Study Introduction, definition, objectives, steps in work study, Method study, definition, objectives, and steps of method study. Work Measurement, purpose, types of study, stop watch methods, steps, key rating, allowances, standard time calculations, work sampling.
Statistical Quality Control: variables-attributes, Shewart control charts for variables- chart, R chart, – Attributes-Defective-Defect- Charts for attributes-p-chart -c chart (simple Problems), acceptance Sampling- Single sampling- Double sampling plans-OC curves, Deming's contribution to quality.

MODULE V: Project Management and contemporary practices   **[7 Periods]**
Project Management (PERT/CPM) Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems)
Contemporary Management Practices Basic concepts of ERP, Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma, Capability Maturity Model (CMM), Bench marking, Balanced Score card.

TEXT BOOKS:
1. Aryasri: *Management Science*, 4th edition, TMH, 2004.(UNITS I,II,III,IV,V)
2. Stoner, Freeman, Gilbert, *Management*, **6th** Ed, Pearson Education, New Delhi, 2004. (UNITS I,II)

REFERENCE BOOKS:
1. Kotler Philip & Keller Kevin Lane, **"Marketing Management"**, PHI, 12th edition, 2005
2. Koontz & Weihrich, **"Essentials of Management"**, TMH, 6th edition, 2005.
3. Panneerselvam **" Production and Operations Management"** PHI,2012.
4. Memoria & S.V. Gauker, **"Personnel Management"**, Himalaya, 25th edition, 2005
5. Samuel C. Certo, **"Modern Management"**, PHI, 9th edition, 2005.

E RESOURCES:
1.http://www.learnerstv.com/Free-Management-Video-lectures-ltv656-age1.htm
2.http://www.learnerstv.com/Free-Management-Video-lectures-ltv728-age1.htm
3.http://freevideolectures.com/Course/2371/Project-and-Production-management
4.Journal of Management, Asia Pacific Journal of research in Business management
5.https://www.youtube.com/watch?v=obzp6biyAN0

Course Outcomes:
At the end of the course, students will be able to
1. Understand the various concepts, principles and theories of management.
2. Design the structure of an organization through understanding various structures of organizations.
3. Understand the basic concepts and processes of operations management.
4. Understand the concept of work study and Statistical Quality Control
5. Understand the basics of project management and also learns various contemporary management practices.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. VI Semester	
Code: 70121	**DESIGN OF STEEL STRUCTURES**	L	T	P
Credits: 3		2	2	-

Prerequisite: Structural Analysis

Course Objective: To provide basic knowledge in the areas of limit state method and the concept of design of structural steel elements. Identify, formulate and solve engineering problems in steel structural elements subjected to tension, compression and flexure loads for steel elements such as beams, tension members, compression members, bolted and welded connections subjected to various load combinations.

MODULE I: Introduction and Connections [10 Periods]
Introduction Materials – Making of iron and steel – types of structural steel – mechanical properties of steel – Concepts of plasticity – yield strength. Loads and load combinations -local buckling behavior of steel. Concepts of limit State Design – Limit States of Strength/collapse – Limit state of Collapse serviceability.
Connections Types of connections- Bolted connections– IS – 800 – 2007 - specifications – Design strengths – efficiency of joint – prying action. Welded connections – Types of welded joints – specifications - Design strengths & requirements.

MODULE II: Tension Members [10 Periods]
Design of tension members– Design strength – Design procedure of splice - lug angle.

MODULE III: Compression Members [10 Periods]
A: Design of compression members – Buckling class – slenderness ratio / design strength – laced – battened columns
B: column splice – column bases.

MODULE IV: Beams [09 Periods]
Design of Beams – Plastic moment – Bending and shear strength / buckling – Built-up sections – laterally supported beams. Design of eccentric connections in both bolted & welded–Design of bolted and welded beam connections– [Framed/un-stiffened / Stiffened seat connection].

MODULE V: Roof Truss [09 Periods]
Design of roof trusses – Types of roof trusses, loads on trusses – Purlin design – Truss design.

TEXT BOOKS:
1. S.K. Duggal , **"Limit State Design of steel structures",** Tata McGraw-Hill, 2nd Edition-2010
2. S.S. Bhavikatti , **"Design of steel structures",** IK international Publication House, New Delhi, 2nd Edition-2010.

REFERENCE BOOKS:
1. Edwin H. Gaylord, Jr. Charles N. Gaylord , **"Design of Steel Structures"** 3rd Edition 1991
2. Ramchandra, **"Design of Steel Structures" Vol. 1 & 2** –Standard Publications, 1st Edition1992
3. N. Subramanian, **"Design of steel structures"** –, Oxford University Press – 2nd Edition 2009.

REFERENCE CODES:
1. IS Code 800-2007
2. IS Code 875 Part 1-5
3. IS Code 808- Steel Tables

E RESOURCES:
1. http://elearning.vtu.ac.in/13/ENotes/DSS/MCN%2006CV72%20VTU%20notes.pdf
2. http://www.aboutcivil.org/steel-structure-lectures-class-notes.h
3. https://www.journals.elsevier.com/journal-of-constructional-steel-research
4. http://nptel.ac.in/courses/105106112/
5. http://nptel.ac.in/courses/105106113/

Course Outcomes:
At the end of the course, students will be able to
1. Apply the basic requirements of the IS: 800-2007 design specifications for steel structural elements.
2. Analyze the behavior of bolted connections and welded connections and design them for both axial and eccentric forces
3. Design of steel members subjected to compression and tension members using simple and built-up sections
4. Design of Beams and Plate Girders subjected to Loadings.
5. Design of Roof Truss and its joints, end bearings.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. VI Semester	
Code: 70122	WATER RESOURCES ENGINEERING	**L**	**T**	**P**
Credits: 3		3	-	-

Prerequisites: Fluid mechanics, Hydraulics & Hydraulic machinery, Engineering Geology

Course Objective: To impart basic knowledge of hydrology, various components of hydrology and their applications and importance of surface and ground water resources and application of these principles to solve hydrologic problems and its significance in design of canals and mechanisms and pathways of water storage, transport and transformation in the landscape.

MODULE I: Surface Water Hydrology [10 Periods]
A. Surface Water Hydrology Water Resources in India, Hydrology in water Resource Planning – Hydrological cycle -Precipitation– Types, Measurement of rainfall, Average depth of rainfall over an area, Mean annual rainfall, consistency of rainfall record – Double mass curve, Infiltration: Definition Factors affecting and its determination, Evaporation and Evapo – Transpiration: Definition Factors affecting and its determination .
B. Runoff Factors affecting runoff, methods of determination of runoff, stream gauging, Hydrograph analysis: Base flow separation, unit hydrograph – Hydrograph of different durations, Applications of unit hydrograph: S-hydrograph, Flood Forecasting Techniques.

MODULE II: Ground Water Hydrology [10 Periods]
Ground water hydrology: Definitions, sub surface distribution of water, ground water movement, Darcy's law–permeability.
Well hydraulics: Steady flow in different types of aquifers and wells – determination of hydraulic properties of aquifer, well losses, specific capacity of well, well efficiency, pumping test and recovery test methods for determination of well yield.

MODULE III: Irrigation [10 Periods]
Irrigation Definition, Necessity and Importance of Irrigation, advantages and ill effects of Irrigation, types of Irrigation, methods of application of Irrigation water, Indian agricultural soils.
Soil-water-plant relationship Vertical distribution of soil moisture, soil moisture constants, soil moisture tension, consumptive use, Duty and delta, factors affecting duty, Determination of canal capacities for cropping patterns consumptive use, Methods of improving soil fertility –Crop Rotation, preparation of land for Irrigation, standards of quality for Irrigation water, Irrigational efficiencies.

MODULE IV: Canal Systems [09 Periods]
Classification of irrigation canals – canal alignment, Design of unlined canals, Regime theories – Kennedy's and Lacey's theories, Design problems.

MODULE V: Reservoir Planning: [09 Periods]

Definition, Types of reservoir investigations for reservoir planning, selection of site for a reservoir, zones of storage in a reservoir, purpose of reservoir, reservoir yield, mass curve and demand curve, Determination of reservoir capacity, yield from a reservoir of given capacity, Reservoir sedimentation, control of reservoir sedimentation, Life of reservoir..

TEXT BOOKS:

1. P. Jayarami Reddy, "**A Text book of Hydrology"**, Laxmi Publication, Delhi, 14th Edition 2009.
2. B.C. Punmia and Pande B.B.Lal, "**Irrigation and Water Power Engineering"**., Laxmi Publications Pvt. Ltd., New Delhi, 18thEdition, 2009.

REFERENCES:

1. S.K. Garg, "**Irrigation Engineering and Hydrology Structures"**, Khanna Publishers, Delhi, 23rd Edition 2009
2. K. Subramanya, "**Engineering Hydrology"**, Tata-Mc Graw Hill Publishing, Delhi, 4th Edition,2013.
3. P.N.Modi, "**Irrigation, Water Resources and Water Power Engineering"**. Standard Book House, Delhi, 6th Edition, 2004.

E -RESOURCES

1. http://textofvideo.nptel.iitm.ac.in/1028/lec40.pdf
2. http://nptel.ac.in/courses/Webcourse
3. Contents/IIT%20Kharagpur/Water%20Resource%20Engg/pdf/m4l06.pdf

Course Outcomes:

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

1. Gain knowledge needed on hydrologic cycle, hydrometeorology and formation of precipitation and apply the various methods of field measurements and empirical formulae for estimating the various losses of precipitation, stream flow, flood and flood routing.
2. Know the basics of ground water and hydraulics of subsurface flows.
3. Gain knowledge on irrigation and different methods of irrigation and understand the concept of soil-water-plant relationship and apply it to schedule irrigation.
4. Gain knowledge and skills on planning and design of canal systems.
5. Gain knowledge on zones of storage in a reservoir, steps for planning reservoir, reservoir sedimentation and its control.

2017-18 Onwards (MR-17)	**MALLA REDDY ENGINEERING COLLEGE** (Autonomous)		**B.Tech. VI Semester**	
Code: 70123	**TRANSPORTATION ENGINEERING**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisites: Building materials, Construction and Planning

Course Objective: To provide the students with basic knowledge of history of roads and planning stages for highways and cross section elements along with the geometric features of highways and drainage problems and remedial measures for construction of safe, durable pavements and traffic signs, signals, markings to control the traffic and for safe flow of vehicles without accidents.

MODULE I: Highway Development and Planning and   **[10 Periods]**
Highway Development and Planning: Highway development in India – Necessity for Highway Planning- Different Road Development Plans.
Highway Planning: Classification of Roads- Road Network Patterns – Highway Alignment-Factors affecting Alignment- Engineering Surveys – Drawings and Reports, Road Projects initiation need based planning.

MODULE II: Highway Geometic Design   **[10 Periods]**
Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements-Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment- Design of Super elevation and Extra widening-Design of Transition Curves-Design of Vertical alignment-Gradients- Vertical curves. Typical cross sections for different types of roads.

MODULE III: Highway Materials and Testing   **[10 Periods]**
A: Highway Materials and Testing
Desirable properties and testing of highway materials: road aggregates, bituminous materials and subgrade soil.
B: Highway Construction & Maintenance
Construction of earth roads, WBM roads, stabilized roads, bituminous pavements, cement concrete roads and joints in cement concrete roads – Maintenance of flexible & rigid pavements - Types and causes of distress. Concept of BOT and BOOT.

MODULE IV: Railway Engineering and Geometric Design of Railway Track   **[09 Periods]**
Introduction to Railway Engineering Permanent way components – Cross Section of Permanent Way - Functions of various Components like Rails, Sleepers and Ballast –Rail Fastenings – Creep of Rails- Theories related to creep – Ageing of Sleepers- Sleeper density.
Geometric Design of Railway Track
Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency – Degree of Curve – Crossings and Turn outs.

MODULE V: Traffic Engineering   **[09 Periods]**

Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies- Data Collection and Presentation-speed studies- Data Collection and Presentation- Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams. Traffic, infrastructural and safety audits.

TEXT BOOKS:

1. S.K.Khanna, C.E.G.Justo, A.Veeraragavan. ‒**Highway Engineering**, Nem Chand and Brothers,Roorkee, 10th Edition, 2015.
2. Dr.L.R.Kadyali, ‒**Traffic Engineering & Transportation Planning** –Khanna publications – 6th Edition 1997.

REFERENCES:

1. Partha Chakraborty and Animesh das, ‒**Principles of Transportation Engineering**‖, Prentice Hall, India– 6th Edition 1997.
2. Flaherty, C.A.O. ‒**Highway Engineering**, Edward Arnold,London, – 6th Edition,1986
3. Mannering, ‒**Principles of Highway Engineering & Traffic Analysis**, Wiley Publishers, New Delhi. , 5th Edition, 1998.
3. Sharma, S.K. ‒**Principles, Practice& Design of Highway Engineering**, S. Chand & Company Ltd., New Delhi, 5th Edition, 1985.

E RESOURCES

1. http://teacher.buet.ac.bd/cfc/CE353/Lec1_Intro_web.pdf
2. https://drive.google.com/file/d/0B-IbNSAhk4D2LXpSc2w2cFh1TGM/view
3. http://www.sciencedirect.com/science/journal/20957564
4. http://www.civilenggforall.com/2016/12/highway-engineering-by-s.k.khanna-and-c.e.g.justo-free-download-pdf-civilenggforall.com.html
5. http://nptel.ac.in/downloads/105101087/
6. http://nptel.ac.in/courses/105105107/

Course Outcomes:

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

1. Understand different modes of transportation and planning stages for highways
2. Design various highway geometric elements using the knowledge of mechanics and applying the principles of equilibrium conditions.
3. Characterize highway materials and understand the various types of highway construction
4. Design various geometric elements of railway track
5. Carryout various traffic engineering studies for traffic data collection

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. VI Semester	
Code: 70124	ADVANCED STRUCTURAL ANALYSIS	L	T	P
Credits: 3		2	2	-

Prerequisites: Engineering Mechanics, Strength of Materials, Structural Analysis.

Course Objective: This course is in continuation of Structural Analysis. Here in advanced method of analysis like Matrix method and Plastic Analysis are covered to identify, formulate and solve problems in structural analysis.

MODULE I: Kani's Method   **[10 Periods]**
Analysis of continuous beams including settlement of supports. Analysis of frame including side sway. Shear force and Bending moment diagrams.

MODULE II: Moving Loads and Influence Lines   **[10 Periods]**
Influence lines for reactions, Shear force and bending moment for statically determinate beams – influence lines for members' forces in pin-jointed frames.

MODULE III: Approximate Method of Analysis   **[10 Periods]**
A: Application to multi storey frames by Portal frame method
B: Application to multi storey frames by Cantilever method

MODULE IV: Flexibility Method   **[09 Periods]**
Equilibrium and compatibility – Determinate vs Indeterminate structures – Indeterminacy -Primary structure – Compatibility conditions – Analysis of indeterminate pin-jointed plane frames, continuous beams, rigid jointed plane frames [with redundancy restricted to two]

MODULE V: Stiffness Matrix Method   **[09 Periods]**
Introduction, Stiffnes matrix, Analysis of continuous beam and plane trusses using system approach, Analysis of simple orthogonal rigid frames using system approach.

TEXT BOOKS:
1. Vaidyanadhan, R and Perumal, P**, "Comprehensive Structural Analysis – Vol.1&Vol. 2",** Laxmi Publications, New Delhi, 3rd Edition, 2014.
2. BhaviKatti, S.S, "**Structural Analysis – Vol. 1 & Vol. 2**", Vikas Publishing Pvt Ltd., New Delhi, 4th Edition, 2014.

REFERENCES:
1. S.B. Junnarkar "**Mechanics of structures**", charotar publishing house.31st edition (2014).
2. Pandit & Gupta "**Theory of structures**", Tata Mc. Graw –Hill Publishing co. Ltd., New Delhi. 1st edition 1999.
3. B.C Punmia, Khanna "**Strength of materials**", Laxmi Publications, New Delhi.10th edition 2015.

E RESOURCES:
1. http://www.vssut.ac.in/lecture_notes/lecture1428730889.pdf
2. http://web.iitd.ac.in/~sbhalla/cel717.pdf
3. https://link.springer.com/journal/40091
4. http://journals.azad.ac.ir/ijase/
5. http://textofvideo.nptel.iitm.ac.in/105101086/lec4.pdf

Course Outcomes:

At the end of the course, students will be able to
1. Draw the SFD and BMD using Kani's method of analysis.
2. Get good knowledge on Moving loads and Influence lines.
3. Solve the structure using approximate method of analysis.
4. Analyze the structure using Flexibility method.
5. Analyze the structure using Stiffness method.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: 70135	PLASTIC ANALYSIS AND DESIGN [PROFESSIONAL ELECTIVE-II]	L	T	P
Credits: 4		4	-	-

Prerequisites: Structural Analysis, DSS

Course Objective: To know the static and kinematic methods of plastic analysis and Analyze the continuous beams of uniform & different c/s. Analyze the single span frames and gable frames and to find out the deflections at working load & ultimate load.

MODULE I: Analysis of Structures for Ultimate Load   [13 Periods]
Fundamental Principles–statical method of Analysis–Mechanism method of analysis – Method of analysis, Moment check – Carry over factor – Moment Balancing Method.

MODULE II: Design of Continuous Beams   [13 Periods]
Continuous Beams of uniform section throughout–Continuous Beams with different cross-sections.

MODULE III: Secondary Design Problems   [12 Periods]
A: Introduction–Influence of Axial force on the plastic moment–influence of shear force – local buckling of flanges and webs
B: lateral buckling – column stability.

MODULE IV: Design of Connections   [13 Periods]
Introduction–requirement for connections–straight corner connections – Haunched connection – Interior Beam-Column connections.

MODULE V: Design of Steel Frames   [13 Periods]
Introduction –Single span frames–simplified procedures for Single span frames – Design of Gable frames with Haunched Connection. Ultimate Deflections: Introduction – Deflection at ultimate load – Deflection at working load – Deflections of Beams and Single span frames.

TEXT BOOKS:
1. L.S.Beedle, "Plastic Design of Steel Frames"
2. B.G.Neal, "Plastic Analysis"

REFERENCES:
1. Horve,"Plastic Analysis**"**

E RESOURCES:

1. http://www.aboutcivil.org/plastic-analysis-definition-principles.html
2. https://2cl405uvd.wordpress.com/2014/07/23/plastic-analysis-and-design-lecture-video-from-nptel/
3. http://www.steel-insdag.org/TeachingMaterial/chapter35.pdf
4. http://nptel.ac.in/courses/105106112/
5. https://www.youtube.com/watch?v=1y4RXCJOkTI

Course Outcomes:

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

1. Outline the different methods of plastic analysis of structures
2. Summarize the basic theorems of plastic analysis
3. Demonstrate the concept of deflection at collapse
4. Apply the techniques to the plastic analysis of beams and Frames
5. Outline the plastic analysis techniques useful for the design of various structural elements

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. VI Semester	
Code: 70136	REHABILITATION AND RETROFITING OF STRUCTURES [PROFESSIONAL ELECTIVE-II]	L	T	P
Credits: 4		4	-	-

Prerequisites: Concrete Technology

Course Objective: To get the knowledge on causes of deterioration, assessment of distressed structures, repairing of structure and provides knowledge of Development of other advanced structural materials and technologies for execution for providing durable repairs and strengthening is the need of the day.

MODULE I: Deterioration & Damage of Structures   [13 Periods]
Introduction– Deterioration of Structures – Distress in Structures – Causes and Prevention- Mechanism of Damage – Types of Damage.

MODULE II: Corrosion of Steel Reinforcement   [13 Periods]
Corrosion of Steel Reinforcement– Causes – Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Phenomena of Desiccation - Case Studies.

MODULE III: Inspection and Testing & Damage Assessment   [12 Periods]
A: Inspection: Symptoms and Diagnosis of Distress
B: Testing & Damage assessment: Evaluation Models –Damage Testing Methods – NDT – Core Samples.

MODULE IV: Rehabilitation Methods and Repair of Structure   [13 Periods]
Rehabilitation Methods – Grouting – Detailing – Imbalance of Structural Stability – Case Studies
Repair of Structure – Common Types of Repairs – Repair in Concrete Structures – Repairs in Under Water Structures – Guniting – ShotCrete – Underpinning – Epoxy - Cement Mortar Injection- Crack Ceiling.

MODULE V: Strengthening of Structures   [13 Periods]
Strengthening of Structures– Strengthening Methods – Retrofitting – Jacketing - Health Monitoring of Structures – Use of Sensors – Building Instrumentation – Bridge Repairs – Seismic Strengthening.

TEXT BOOKS:
1. W. H. Ranso, ―"**Concrete Repair and Maintenance Illustrated"**, RS Means Company Inc 1st Edition,1981.
2. B.L. Gupta and Amit Gupta, ―"**Maintenance and Repair of Civil Structures"**,
   Standard Publications New Delhi, 2nd Edition, 2007.

REFERENCES:

1. A.R. Shantakumar, ―"**Concrete Technology**", Oxford University press, 2ⁿᵈ Edition, 2006.
2. Bungey, ―"**Non-Destructive Evaluation of Concrete Structures**", 2ⁿᵈ edition, 2003
3. Bt. A. Richardson ―"**Building Failures: Diagnosis and Avoidance**", EF & N Spon, London, 3ʳᵈ Edition, 1991.

E RESOURCES:

1. http://cpwd.gov.in/Units/handbook.pdf
2. https://www.smartzworld.com/notes/rehabilitation-retrofitting-structures-notes-pdf-rrs/
3. http://www.smrcorissa.org/
4. http://getreport.in/idea/rehabilitation-and-retrofitting-of-structures-nptel
5. http://getreport.in/idea/rehabilitation-and-retrofitting-of-structures-notes-nptel
6. https://www.youtube.com/watch?v=fikRPFpbgVo

Course Outcomes:

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

1. Understand the causes and prevention of deterioration in structures, interpret the types of damages and understand their mechanisms.
2. Categorize the causes and prevention mechanisms of corrosion in steel reinforcement and fire induced damages
3. Able to Examine to inspect and assess the structures using techniques of visual inspection and NDT
4. Estimate the structural damage and recommend suitable repair and strengthening methods.
5. Make use of the latest health monitoring and building instrumentation methods

Prerequisite: NIL

Course Objective: To develop advanced competencies in the technical, management, and leadership aspects of professional construction management. To broaden the career potential of individuals through applied learning experiences in construction, management; and technology. To Provide advanced preparation in the technical aspects and human factors of the construction industry. To develop a broad perspective needed for those employed in or aspiring to middle and upper management positions within the construction industry.

MODULE I: Construction Planning and Management [13 Periods]
Significance of Construction Management, Objectives and Functions of Construction Management, Types of Construction, Resources for Construction Industry, Various stages in Construction, Construction Management Team & Types of Organization.

MODULE II: Claim Management [13 Periods]
Construction claims, Disputes and project closure- Source of claim, Claim Management, Dispute resolution, Arbitration and its advantages, Arbitration Clause, Construction closure, Contract closure

MODULE III: Contract Management and   Contract Management [12 Periods]
A: Contract Management Types of Construction Contracts and their advantages and disadvantages, Contract Document and conditions of contract. Estimation and its types, Significance of Safety & Quality in construction work.
B: Bidding Definition and Process, Various steps in Bidding, M Book- Muster Roll, Earnest money & Security Deposit,

MODULE IV: Construction Planning [13 Periods]
Project Planning Techniques, Planning of Manpower, Materials, Equipment and Finance, Work Breakdown Structure, Scheduling by Bar Charts, Limitations of Bar Charts

MODULE V: PERT & CPM [13 Periods]
Time estimate- Optimistic time estimate, most likely time estimate, Pessimistic time estimate & Expected time. Project Scheduling, Resource Allocation/Leveling, Network Analysis, Cost- Time Analysis in Network Planning, Float- Total float, free float & Independent float.

TEXT BOOKS:
1. P.S. Gahlot, B.M. Dhir., Construction Planning and Management, New Age International Pvt Ltd 2002.
2. Chitkara, K.K., "Construction Project Management Planning", Scheduling and Control, Tata McGraw-Hill Publishing Co., Ltd., 3rd Edition, 2014.
3. Sharma S.C. Construction Equipment and Management, Khanna Publishers, New Delhi, 2011.
4. B.C Punmia and Khandelwal K.K, Project Planning and control with PERT and CPM, Laxmi Publications, New Delhi, 2002.

REFERENCES:
1. Chitkara, K.K. Construction Project Management: Planning, Scheduling and Control, McGrawHill Publishing Company, New Delhi, 1998.
2. Chris Hendrickson and Tung Au, Project Management for Construction – Fundamental Concepts for Owners, Engineers, Architects and Builders, Prentice Hall, Pittsburgh, 2000.
3. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., Construction Planning, Equipment and Methods, McGraw Hill, Singapore, 2006.
4. Prasanna Chandra, Projects – Planning, Analysis, Selection, Implementation Review, McGraw Hill Publishing Company Ltd., New Delhi. 2006.

E RESOURCES:
1. nptel.ac.in/courses/Webcourse-contents/IIT-%20Guwahati/cpm/
2. https://www.vanameyde.com/Page/9/what-is-claims-management-
3. https://oa.mo.gov/purchasing/bidding-contracts
4. www.slideshare.net/ninoto/pert-cpm-intro

Course Outcomes:

At the end of the course, students will be able to
1. Identify the roles of individuals, companies and agencies involved in the construction process.
2. Lead, manage and participate in construction teams and to concepts of claim management, disputes, arbitration.
3. Identify construction documents for planning and management of construction processes and to understand the construction quality assurance and control.
4. Gain knowledge in scheduling techniques to project planning activities.
5. Acquire knowledge about PERT and CPM techniques.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: 70125	**TRANSPORTATION ENGINEERING LAB**	**L**	**T**	**P**
Credits: 2		-	-	4

Pre Requisite: Transportation engineering

Course Objective: The ability to know the characteristics of road aggregates and properties of the paving bitumen

List of Experiments:

I.   Road aggregates
  1. Aggregate Crushing Value.
  2. Aggregate Impact Value.
  3. Specific Gravity and Water Absorption.
  4. Devals Attrition test.
  5. Los Angels Abrasion test.
  6. Shape test

II.   Bituminous Materials
  1. Penetration test.
  2. Ductility test.
  3. Softening Point test.
  4. Flash and Fire point test.
  5. Viscosity test on Bitumen test.
  6. Bitumen Extraction test.

Course Outcomes:
At the end of the course, students will be able to
1. Evaluate crushing value and impact value of the aggregates.
2. Determine the specific gravity, water absorption, flakiness index and elongation index of aggregates.
3. Evaluate Devals attrition value and Los Angels abrasion value of aggregates.
4. Determine the penetration value, ductility value, softening point value, viscosity value and flash and fire point values of the bitumen.
5. Determine the bitumen extraction value of bitumen.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: 70126	CADD LAB	L	T	P
Credits: 2		-	-	4

Prerequisites: BMCP, Structural Analysis, DRCS

Course Objective: To introduce the students to draft the plan, elevation and sectional views of buildings in accordance with development and control rules satisfying orientation and functional requirements. To introduce the students to analysis and design the structural members using computer softwares.

List of Exercises:

1. Introduction to computer aided drafting
2. Software for CAD – Introduction to different software's
3. Practice exercises on CAD software
4. Drawing of plans of buildings using software
   a) Single storyed buildings
   b) Multi storyed buildings
5. Developing sections and elevations for
   a) Single storyed buildings
   b) Multi storyed buildings
6. Detailing of building components like Doors, Windows, Roof Trusses etc. using CAD software's
7. Exercises on development of working of buildings
8. Analysis and design of simply supported beam using STAAD Pro.
9. Analysis and design of fixed beam using STAAD Pro.
10. Analysis and design of cantilever beam using STAAD Pro
11. Analysis of portal frame using STAAD Pro.

Course Outcomes:
At the end of the course, students will be able to
1. The students will be able to draft the plan, elevation and sectional views of the buildings, Industrial structures, and framed buildings.
2. The students will be able to analyze and design the simple structural members using computer software's.

Prerequisite: NIL

Course Objective: The objective is to make students familiar with professional ethics. It moulds the student to be trustworthy and honest with more professional responsibilities.

MODULE I: Understanding Ethics   [6 Periods]
Ethics- Definition- Ethical Vision- Engineering Ethics- Approaches to Ethical Behavior- Various Connotations of Engineering Ethics- Solving Ethical Conflicts- Ethical Judgment
Ethical Theories- Consensus and Controversy- Models of Professional Roles- Theories about Right Action.

MODULE II: Engineering Ethics   [6 Periods]
Engineering ethics: Sense of Engineering Ethics- Variety of Moral Issued- Types of Inquiry- Moral Dilemmas- Moral Autonomy- Kohlberg's Theory- Gilligan's Theory.
Code of Ethics- Code of Ethics for engineer, Sample Codes- IEEE, ASME, ASCE and CSI, Personal ethics Vs. Professional ethics.

MODULE III: Engineer's Responsibilities and Rights   [8 Periods]
A: Collegiality and Loyalty- Respect for Authority- Professional Rights- Sexual Harassment at Workplace.
B: Conflicts of Interest- Confidentiality- Collective Bargaining- Role of Engineers in Promoting Ethical Climate and balanced Outlook on Law- Ethical Audit.

MODULE IV: Engineer's Responsibility for Safety and Risk   [6 Periods]
Safety and Risk- Types of Risk- Moral Responsibility of Engineers for Safety- Risk Benefit Analysis.
Case Study- Bhopal Gas Tragedy- Chernobyl Disaster- Fukushima Nuclear Disaster.

MODULE V: Global Issues and roles of engineers   [6 Periods]
Multinational corporations, Environmental ethics, Computer ethics, Weapons development.
Engineers as managers, Engineers as expert witnesses and advisors, engineers as responsible experimenters.

TEXTBOOKS:
1. Govindarajan M, Natarajan S, Senthil Kumar V. S, **"Engineering Ethics",** Prentice Hall of India, New Delhi,
2. S.B.Gogate**,"Human Values & Professional Ethics**",Vikas Publishing House Pvt., Ltd., First edition-2011

REFERENCES BOOKS:
1. Charles D. Fleddermann, **"Engineering Ethics",** Pearson Education / Prentice Hall,
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, **"Engineering Ethics – Concepts and Cases"**, Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available) 2003.
3. C.G.Krishnadas Nair, **"Engineering Ethics",** Harishree Publishing Company, Bangalore.
4. R.K.Shukla, Anuranjan Mishra,**"Human Values and Professional Ethics"** Published by A.B.Publication.

E Resources:
1. https://www.slideshare.net/lizakhanam/business-ethics-and-corporate-governance-15588903
2. http://www.enterweb.org/ethics.htm
3. http://nptel.ac.in/courses/110105079/
4. http://nptel.ac.in/courses/109104032/

Course Outcomes:

At the end of the course, students will be able to
1. Understand the basics of ethics and ethical theories.
2. Understand the engineering ethics and code of ethics.
3. Learn the issues related to the engineer's responsibilities and rights.
4. Understand Engineer's Responsibility for Safety and Risk
5. Understand the global issues in ethical point of view and their role in globalization era.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: 70P01	**TECHNICAL SEMINAR**	**L**	**T**	**P**
Credits: 2		**-**	**-**	**4**

Prerequisites: Building materials construction and Planning

Course Objective: To understand that estimates of different items of works and their cost estimates are fundamentals. To know about various types of contracts, tenders, valuations and specifications.

MODULE I: **[10 Periods]**
General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating.

MODULE II: **[10 Periods]**
 Detailed Estimates of RCC Buildings, Reinforcement bar bending and bar requirement schedules of Beams- Lintel cum Sunshade, slabs and Column Footings.

MODULE III: **[10 Periods]**
A: Contracts: Types of contracts – Contract Documents – Conditions of contract. Valuation of buildings.
B. Standard specifications: Specifications for different items of building construction. Tender, Tender forms, Tender notice, Tender Documents, E tender, Work order

MODULE IV: **[09 Periods]**
Earthwork for roads, canals and culverts-Single pipe culvert and single cell rectangular box culvert, single lane road estimate.

MODULE V: **[09 Periods]**
Rate Analysis – Working out data for various items of work over head and contingent charges.

TEXT BOOKS:
1. B.N. Dutta, "**Estimating and Costing"** UBS publishers, 28th Edition 2016.
2. G.S. Birdie, "**Estimating and Costing"** Dhanapati rai Publications, Edition 2014

REFERENCES:
1. M.Chakraborthi "**Estimating and Costing & Specifications**", UBS Publications, Edition 2006.
2. Kohli, D.D and Kohli, R.C., "**A Text book of estimating and costing(CIVIL)**", S.Chand & Company Ltd., Revised Edition.

REFERENCES CODES:
1. Standard Schedule of rates and standard data book by public works department.
2. I.S. 1200 [Parts I to XXV – 1993 method of measurement of building and Civil Engineering works – B.I.S.]
3. National Building codes.

E RESOURCES
1. www.costeng-solutions.com/detailed_estimating.htm
2. study.com/academy/.../contract-law-terms-definitions-contract-types.html
3. http://ascelibrary.org/doi/abs
4. www.bv-solutions.co.uk/building...validation/building-claims-validation
5. http://nptel.ac.in/courses/108105059/
6. http://nptel.ac.in/courses/105103093/14

Course Outcomes:

At the end of the course, students will be able to
1. Gain knowledge on various Building items, their standard units and principles.
2. Estimate quantity of each item for RCC buildings by different methods of estimation.
3. Evaluate various types of contracts, valuations, tenders and specifications.
4. Estimate Quantity of earthwork for Roads, Canals and culverts.
5. Estimate the cost of materials and man power required stage wise.

Prerequisite: Surveying

Course Objective: To understand the principles, applications, trends and pertinent issues of geographical information systems and sciences, including remote sensing [RS], photogrammetry, cartography, and global positioning system [GPS] in data and information acquisition, extraction, management and analysis; spatial and statistical modeling; mapping and visualization and apply vector and raster spatial data, particularly with regard to local/ state/national issues, emphasizing lands in and near it.

MODULE I: Basic Concepts of Photogrammetry   **[10 Periods]**
Development and classification of Photogrammetry, Aerial Photogrammetric processes: acquisition of data, classification of photographs, photographic scale, relief displacement, flight planning, stereo Photogrammetry, Stereo model compilation, principal and use of stereoscopic 3D view, Orthorectification, Orientation and triangulation, DEM Generation, Map Vs Mosaic, ground control, parallax measurements for height determinations.

MODULE II: Remote Sensing   **[10 Periods]**
Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite, visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

MODULE III: Geographical Information Systems and Data Representation   **[10 Periods]**
A: Geographical Information Systems Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.
B. Types of Data Representation Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS- file management, spatial data- layer based GIS, Feature based mapping.

MODULE IV: GIS Spatial Analysis   **[09 Periods]**
Computational analysis methods [CAM], Visual analysis method, data storage- vector data storage, attribute data storage, overview of data manipulation and analysis, integrated analysis of spatial and attribute data.

MODULE V: Applications of GIS   **[09 Periods]**
Land use/ land cover in water resources, surface water mapping and inventory, Rainfall – Runoff relations and runoff potential indices of watersheds , flood and drought impact assessment and

monitoring, watershed management for sustainable development and watershed characteristics, reservoir sedimentation, fluvial geomorphology, water resources management and monitoring, ground water targeting, identification of sites for artificial recharge structures, drainage morphometry, inland water quality survey and management, water depth estimation and bathymetry.

TEXT BOOKS:
1. LRA Narayana., "**Remote sensing and its applications"**, University Press, 1st Editon, 2014.
2. Peter A Burrough and Rachael A. Mc Donnell, "**Principals of Geo physical information systems"** Oxford Publishers, 1st Editon, 2004.

REFERENCES:
1. C.P.Lo Albert, K.W. Yonng, "**Concepts & Techniques of GIS"**, Prentice Hall [India] Publications, 1st Editon, 2002.
2. M. Anji Reddy, "**Remote sensing and GIS"**, B.S.Publications, JNTU Hyderabad 1st Editon, 2001.
3. S.Kumar, "**Basics of Remote sensing and GIS"**, Laxmi publications, 1st Editon, 2005.

E RESOURCES:
1. https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/earthsciences/pdf/resource/tutor/fundam/pdf/fundamentals_e.pdf.
2. http://www.pasda.psu.edu/tutorials/gisbasics.asp.
3. http://www.crisp.nus.edu.sg/~research/tutorial/intro.htm.

Course Outcomes:

At the end of the course, students will be able to
1. Analyse the principles and components of photogrammetry and remote sensing, gain skills in image analysis and interpretation in preparing thematic maps.
2. Acquire skills in handling instruments, tools, techniques and modelling while using Remote sensing Technology.
3. Explain the concepts and fundamentals of GIS.
4. Understand the data models and data structures used for spatial data and able to perform geospatial analysis and network analysis.
5. Acquire knowledge about remote sensing and GIS in the different civil engineering applications.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. VII Semester		
Code: 70129	FOUNDATION ENGINEERING		L	T	P
Credits: 3			2	2	-

Prerequisite: Geotechnical Engineering

Course Objective: To understand the significance of investigation of soil in the field. To design retaining walls, analyze and predict the possible instability of slopes. Design of shallow foundations and deep foundations.

MODULE I: Soil Exploration and Retaining Walls   **[10 Periods]**
Soil Exploration Need – Methods of soil exploration – Boring and Sampling methods – Penetration Tests – Plate load test – Pressure meter – Planning of Programme and preparation of soil investigation report.
Retaining Walls Types of retaining walls – stability of retaining walls against overturning, sliding, bearing capacity and drainage from backfill.

MODULE II: Slope Stability and Earth Pressure Theories   **[10 Periods]**
Slope Stability Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices, Bishop's Simplified method – Taylor's Stability Number- Stability of slopes of earth dams under different conditions.
Earth Pressure Theories Rankine's theory of earth pressure – earth pressures in layered soils – Coulomb's earth pressure theory – Culmann's graphical method.

MODULE III: **[10 Periods]**
A: Shallow Foundations - Bearing Capacity Criteria Types - choice of foundation – Location of depth – Safe Bearing Capacity – Terzaghi, Meyerhof, Skempton and IS Methods
B: Shallow Foundations - Settlement Criteria Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity - plate load test – allowable settlements of structures.

MODULE IV: Pile Foundation   **[09 Periods]**
Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae – Pile load tests - Load carrying capacity of pile groups in sands and clays – Settlement of pile groups.

MODULE V: Well Foundations   **[09 Periods]**
Types – Different shapes of wells – Components of wells – functions and Design Criteria – Sinking of wells – Tilts and shifts.

TEXT BOOKS:
1. Gopal Ranjan & ASR Rao. "**Basic and Applied Soil Mechanics**" by New Age International Pvt. Ltd, revised 2nd edition, 2006.
2. VNS Murthy. "**Geotechnical Engineering: Principles and practices of soil mechanics and foundation Engineering**"- 7th Edition, 2007.

REFERENCES:
1. Swami Saran, "**Analysis and Design of Substructures**" –Oxford and IBH Publishing company Pvt Ltd, 1st Edition, 1998.
2. S. K.Gulhati & Manoj Datta "**Geotechnical Engineering**" Tata Mc.Graw Hill Publishing company New Delhi, 1st Edition, 2005.
3. K.R. Arora, "**Soil Mechanics and Foundation Engineering**", Standard Publishers and Distributors, Delhi. 1st Edition, 2000.
4. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, "**Soil Mechanics and Foundation**" Laxmi publications Pvt. Ltd., New Delhi, 1st Edition, 2000.
5. Das, B.M. **Principles of Foundation Engineering** –6th Edition [Indian edition]-2007

E RESOURCES
1. https://drive.google.com/file/d/0B5_-VqecjfqpdnN5c2huVk1JN1k/view
2. https://www.researchgate.net/journal/00380741_Soil_Mechanics_and_Foundation_Engineering
3. http://www.nptel.ac.in/courses/105105105/
4. http://www.nptel.ac.in/courses/105105104/

Course Outcomes:

At the end of the course, students will be able to
1. Identify the methods of soil exploration, perform various field tests and also check the stability of retaining wall.
2. Analyze the stability of finite and infinite slopes and evaluate lateral earth pressure using different methods.
3. Compute the bearing capacity and settlement of shallow foundations.
4. Evaluate the load carrying capacity of pile foundation and settlement of pile groups.
5. Recognize different types of well foundations and understand the design criteria.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. VII Semester	
Code: 70138	PRINCIPLES OF BRIDGE ENGINEERING [PROFESSIONAL ELECTIVE-III]	L	T	P
Credits: 3		2	2	-

Prerequisite: DRCS, PSC

Course Objective: Develop an understanding of basic concepts in proportioning and design of bridges in terms of aesthetics, geographical location and functionality intuitive feeling about the sizing of bridge elements. Understand the load flow mechanism and identify loads on bridges.

MODULE I: Introduction to Concrete Bridges   **[10 Periods]**
Introduction- History of Bridges – Types of Bridges, Components of Bridge and its definitions- Classification of Bridges - Selection of Site and Initial Decision Process - Survey and Alignment; Geotechnical Investigations and Interpretations. -Economic span length

MODULE II: Loads on Bridges   **[10 Periods]**
Types of loading-Dead load-live load-Impact Effect-Centrifugal force-wind loads-Lateral loads- Longitudinal forces-Seismic loads-Frictional resistance of expansion bearings, IRC bridge loading standards, Load combinations for different working state and limit state designs

MODULE III: Stresses and design requirements   **[10 Periods]**
A: Secondary Stresses-Temperature Effect- Erection Forces and effects-
B: Width of road way and footway-General Design Requirements of bridges

MODULE IV: Solid Slab Bridges   **[09 Periods]**
Introduction-Method of Analysis and Design-Box Culverts, Pipe Culverts

MODULE V: Girder Bridges   **[09 Periods]**
Introduction-Method of Analysis and Design- Tee Beam Bridge- Courbon's Theory, Grillage analogy

TEXT BOOKS:
    1. Victor D J, essentials of Bridge Engineering, Oxford & IBH, 2007
    2. Raju N K, Design of Bridges, Oxford & IBH, 2009

REFERENCE:
    1. Concrete Bridge Design and Practice by V.K.Raina. 3rd edition Ponnuswamy.S‖,Bridge Engineering, TataMc-Grawhill. 2008.
    2. Jagadeesh.T.R.&Jayaram.M.A, Design of bridge structures, ―Prentice hall of India. 2nd edition 2009.

E RESOURCES:

1. http://teaching.ust.hk/~civl603c/
2. http://www.structuremag.org/?p=10561
3. http://nptel.ac.in/syllabus/105999906/
4. http://nptel.ac.in/syllabus/syllabus_pdf/105102011.pdf
5. http://nptel.ac.in/courses/105106113/9_bridges/1_introduction.pdf

Course Outcomes:

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

1. Develop an understanding of an appreciation for basic concepts in proportioning and design of bridges in terms of aesthetics, geographical location and functionality.
2. Understand the different types of loads on bridges.
3. Understand the different types of stresses acting on bridges.
4. Carry out a design of Solid Slab bridge starting from conceptual design with geometry to sizing of its elements.
5. Carry out a design of Girder bridge starting from conceptual design with geometry to sizing of its elements

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: 70139	FINITE ELEMENT METHODS [PROFESSIONAL ELECTIVE-III]	L	T	P
Credits: 3		2	2	-

Prerequisite: Structural analysis

Course Objective: To provide the fundamental concepts of the theory of Finite Element Methods. To understand the application of FEM for 1D and 2D problems and the proficiency in the application of the Finite element methods to realistic engineering problems.

MODULE I: Introduction to Finite Element Method [10 Periods]
Introduction - Basic Equations in Elasticity– concept of plane stress – plane strain advantages and disadvantages of FEM. Nodes – nodal degree of freedom – strain displacement relations.

MODULE II: Finite Element Analysis [10 Periods]
one dimensional problems–Bar element–Shape functions stiffness matrix–stress – strain, FEA Two dimensional problem – CST – LST element – shape function – stress – strain

MODULE III: FEA of Truss and Beam Elements [10 Periods]
A: Stiffness matrix - shape function – continuous beams. Lagrangian – Serendipity elements
B: Hermit polynomials – regular, Irregular 2 D & 3D – Element –shape functions.
Truss element – stiffness matrix

MODULE IV: Isoparametric Formulation [09 Periods]
Concepts of isoparametric elements for 2D analysis - formulation of CST element, 4 –noded and 8-noded isoparametric quadrilateral elements. Use of jacobian and gauss quadrature techniques - load matrix for 8 noded rectangular isoparametric element [for body forces and surface traction].

MODULE V: [09 Periods]
Solution Techniques: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

TEXT BOOK:

1. J N Reddy ―**Introduction to Finite element method**‖, Tata Mc Graw Hills, 11th Edition, 2010.
2. Chandrupatta, Belegunda "**Finite element method**", Prentice hall of India, 3rd Edition, 2004.

REFERENCES:

1. S.S. Bhavakatti —**Finite element analysis**, New age international publishers, 3rd Edition, 2015.
2. Robert D.Cook, David Malkus, Robert j witt "**Concepts and applications of Finite element method**", Prentice hall of India, 4th Edition, 2004.

E RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc16_me02/announcements
2. https://en.wikipedia.org/wiki/Finite_element_method
3. http:// nptel.ac.in/courses/105106051/
4. http:// nptel.ac.in/courses/105105041/
5. http://nptel.ac.in/Clarify_doubts.php?subjectId=105106051&lectureId=40

Course Outcomes:

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

1. Acquire knowledge on fundamental theory of elasticity and terminology used in FEA.
2. Gain knowledge on formulation of stiffness matrix by using CST and LST Methods.
3. Analyze the elements both regular and irregular by using lagrangian, serendipity and Hermit polynomial method.
4. Formulate Iso-parametric elements of 4 nodes, 8nodes by using Guass, Jacbion techniques.
5. Have knowledge on various solutions techniques like numerical integration, static condensation, assembly elements and static load techniques.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: 70140	**PRESTRESSED CONCRETE STRUCTURES** [PROFESSIONAL ELECTIVE-III]	**L**	**T**	**P**
Credits: 3		**2**	**2**	**-**

Prerequisites: Concrete Technology, DRCS

Course Objective: To understand types, systems and loss of prestressing. Design the flexural members for shear, bond and torsion and design the end blocks. Using the concept of linear transformation and cable profile. Analysis of composite section and their application in design of prestressed concrete bridges. To understand short term and long term deflections and their determination.

MODULE I: Introduction [10 Periods]
Historic development – General principles of prestressing pre tensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel and their characteristics.

MODULE II: Methods and Systems of Prestressing [10 Periods]
Methods and Systems of Prestressing: Pre tensioning and post tensioning methods and systems of pre stressing like Hoyer System, Magnel System Freyssinet system and Gifford – Udall System, Lee McCall system,
Loss of Prestress: Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage bending of member and frictional losses.

MODULE III: Flexure and Shear [10 Periods]
A: Flexure: Analysis of sections for flexure- beams prestressed with straight, concentric, eccentric, bent and parabolic tendons. Stress diagrams - Elastic design of simple PSC slabs and beams of rectangular and I-sections-kern line-cable profile and cable layout
B: Shear: General considerations- principal tension and compression- improving shear resistance of concerete by horizontal and vertical pre stressing and by using inclined or parabolic cables- Analysis of rectangular and I-beams for shear- Design of shear reinforcement- I.S.Code Provisions.

MODULE IV: Transfer of Prestress in Pre Tensioned Members [09 Periods]
Tansmission of pre stressing force by bond-transmission length- flexural bond stresses- IS code provisions- Anchorage zone stresses in post tensioned members- stress distribution in end block- Analysis by Guyon's, Magnel, Zienlinski and Rowe's methods-Anchorage zone reinforcement- I.S.Code provisions.

MODULE V: Composite Beams   and Deflections [09 Periods]

Composite Beams: Different types- propped and unpropped – stress distribution-Differential shrinkage – Analysis of composite beams-General designs considerations.

Deflections: Importance of control of deflections – factors influencing deflections – short term deflections of uncracked members prediction of long term deflections-I.S.Code provisions.

TEXT BOOKS:
1. Prestressed Concrete by Krishna Raju, - Tata Mc.Graw Hill Publications, 5th Edition, 2012
2. Prestressed Concrete by N.Rajasekharan, Narosa publications, 3rd Edition, 2009

REFERENCES:
1. Prestressed Concrete by Ramamrutham, Dhanpatrai Publications, 4th Edition 2013.
2. Design of Prestressed concrete structures by T.Y. Lin & Ned 3rd Edition, 2010.

REFERENCE CODES:
1. BIS code on prestressed concrete, IS 1343-2012

E RESOURCES:
1. https://en.wikipedia.org/wiki/Prestressed_concrete
2. https://www.pci.org/
3. http://nptel.ac.in/courses/105105105/
4. http://nptel.ac.in/courses/105106118/
5. http://www.nptel.ac.in/courses/105106117/

Course Outcomes:

At the end of the course, students will be able to
1. Understand the materials used in pre stressed concrete & general principles of prestressing pre tensioning and post tensioning.
2. Behavior of pre tensioned and post-tensioned in pre stressed concrete structures & losses of pre stress in pre tensioned and post-tensioned members due to various causes.
3. Analysis and Design of section for the flexural and shear beams of pre tensioned and post-tensioned of pre stressed concrete.
4. Transfer of pre stress in pre tensioned member and post tensioned member and stress distribution in end block by various method.
5. Analysis and Design of composite beams and computation of short term & long term deflection in pre stressed concrete member.

Pre Requisites: Fluid mechanics, Hydraulics & Hydraulic machinery, water resources engineering.

Course Objective: To apply an appropriate system approach to optimally operate and design water resources system. The water resources planning and management by the concept of mathematical approaches such as optimization and simulation.

MODULE I: System Concepts [10 Periods]
Definition, classification, and characteristics of systems - Scope and steps in systems engineering - Need for systems approach to water resources and irrigation.

MODULE II: Linear Programming and Application [10 Periods]
Linear Programming: Introduction to Operations research - Linear programming, problem formulation, graphical solution, solution by simplex method - Sensitivity analysis.
Application: To design and operation of reservoir, single and multipurpose development plans - Case studies.

MODULE III: Dynamic Programming and Application [10 Periods]
A: Dynamic Programming:
Bellman's optimality criteria, problem formulation and solutions
B: Application:
To design and operation of reservoirs, Single and multipurpose reservoir development plans - Case studies.

MODULE IV: Simulation [09 Periods]
Basic principles and concepts - Random variant and random process - Monte Carlo techniques, Model development - Inputs and outputs - Single and multipurpose reservoir simulation models - Case studies.

MODULE V: Advanced Optimization Techniques [09 Periods]
Integer and parametric linear programming - Goal programming models with applications discrete differential dynamic programming and incremental dynamic programming Linear decision rule models with application - Stochastic dynamic programming models.

TEXT BOOKS:
1. Vedula & Mujumdar "**Water Resources System Modelling Techniques and Analysis**", Tata Mc.Graw Hill Company Ltd. 5th reprint, New Delhi, 2010.
2. James & Lee **"Water Resources Economics"**, Oxford Publishers, 1st Edition, 2005.

REFERENCES:

1. Hiller F.S and Liebermann G.J., "**Operations Research",** CBS Publications and distributions. New Delhi, 10th Edition, 2015.
2. Chaturvedi. M.C., "**Water Resources Systems Planning and Management**". Tata McGraw Hill, New Delhi, 1st Edition, 1997.
3. Mays L.W., and Tung YK, "**Hydro systems Engineering and Management**". McGraw Hill Inc., New York, 1st Edition, 2002.
4. Goodman Alvin S., "**Principles of Water Resources Planning",** Prentice Hall Inc., Englewood Cliffs, New Jersey, 1st Edition, 1995.

E RESOURCES:

1. *http://*www.elsevier.com/.../analysis...water-resource-systems/.../978-0-444-989.
2. http://www.eolss.net/Sample-Chapters/C07/E2-16-03-01.pdf.
3. http://www.sciencedirect.com/sience/book/.

Course Outcomes:

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

1. Understand the fundamentals and need for systems approaches in water resources management.
2. Design and solve optimization models of water systems and students can able to conduct model-based analysis of integrated water resource systems.
3. Understand criteria, problem formulation and solution with design aspects along with dynamic programming.
4. Gains knowledge in optimization and simulation modeling and applications of water resources problems.
5. Design and solve optimization models and to conduct model-based analysis of integrated water resources system.

Prerequisites: Foundation Engineering, Hydraulics & Hydraulic machinery, Engineering Geology, Water resources engineering.

Course Objective: Design of multi-purpose water retaining structures, to develop skills in the mathematical modeling of both natural and engineered water resource systems that are used to analyze system components.

MODULE I: Gravity Dams [10 Periods]

Definition of Dam, Types of Dams, Introduction to Gravity Dam, Forces acting on a gravity dam, causes of failure of a gravity dam. Elementary profile and practical profile of a gravity dam, limiting height of a low gravity dam, Factors of Safety - Stability Analysis, Foundation for a Gravity Dam, drainage and inspection galleries.

MODULE II: Earth Dams and Spillways [10 Periods]

Earth Dams: Introduction to Earth dams, Types of Earth dams, causes of failure of earth dam, criteria for safe design of earth dam, seepage through earth dam- graphical method, measures for control of seepage

Spillways: Introduction and significance of Spillways, Types of spillways, Design principles of Ogee spillways - Spillway gates. Energy Dissipaters and Stilling Basins - USBR and Indian types of Stilling Basins. Significance of Jump Height Curve and Tail Water Rating Curve.

MODULE III: Diversion Head Works and Weirs on Permeable Foundations [10 Periods]

A: Diversion Head Works: Introduction to Diversion works, Types of Diversion head works- weirs and barrages, layout of diversion head work, Components. Silt Ejectors and Silt Excluders, Causes and failure of Weirs and Barrages on permeable foundations.

B: Weirs on Permeable Foundations: Creep Theories, Bligh's, Lane's and Khosla's theories, Determination of uplift pressure various Correction Factors – Design principles of weirs on permeable foundations using Creep theories - exit gradient, U/s and D/s Sheet Piles - Launching Apron.

MODULE IV: Canal Falls, Cross Drainage Works [09 Periods]

Canal Falls: Definition of canal fall/drop, Types of falls and their location, Design principles of Notch Fall and Sarda type fall. Canal regulation works, design principles of distributory and head regulators, Canal Cross Regulators, canal outlets, types of canal Modules, proportionality, sensitivity and flexibility.

Cross Drainage Works: Introduction and significance of cross drainage works, Types, selection of site, Design principles of aqueduct, siphon aqueduct and super passage. Design of Type II Aqueduct (Under Tunnel)

MODULE V: **Water Power Engineering**   **[09 Periods]**
Development of hydro power in India, assessment of available power, Utilization factor, load factor, diversity factor, storage and pondage, types of hydro power schemes, Components of hydel schemes – fore bay, intake structure, trash racks, water hammer, surge tanks, substructure and super structure of power house .

TEXT BOOKS:
1. S.K. Garg, "**Irrigation Engineering and Hydrology Structures**", Khanna Publishers, Delhi, 23rd Edition, 2009.
2. K.R.Arora, "**Irrigation, Water Power and Water Resources Engineering**" 3rd Edition, Standard Publishers Distributors, 2010.

REFERENCES:
1. P.N.Modi, "**Irrigation, Water Resources and Water Power Engineering**", Standard Book House, Delhi-6, 6th Edition 2004.
2. B.C. Punmia and Pande B.B.Lal "**Irrigation and Water Power Engineering**", Laxmi Publications Pvt. Ltd., New Delhi, 18th Edition, 2006.
3. R.S.Varshney, S.C. Gupta, and R.L. Gupta, "**Theory & Design of Irrigation Structures**" Vol.II, Nem Chand & Bros., Roorkee, 6th Edition, 1993.
4. *S. K. Garg, "Water Supply Engineering*: **"Environmental Engineering***"* Vol.I Khanna Publications, 2010, New Delhi.

E RESOURCES:
1. http://nptel.tvm.ernet.in/Syllabus.php?syl=Civil_Eng/WaterResEngg.php&sub=civil&sem= Semester%207.
2. http://ww.slb.com›...›WaterServices›WaterResources›Engineering.
3. http://Hyd.uod.ac/material/CE404_02_Seepage_Theories.pdf.

Course Outcomes:
At the end of the course, students will be able to
1. Understand the need and mode of irrigation by designing the gravity dams and ability to handle and plan any type of irrigation project.
2. Design hydraulic structures such as earth dams and spillways and water flow controlling and management devices.
3. Gain knowledge about creep theories and design of structures on permeable foundations and their management.
4. Understand Design of man-made water carrying structures and their regulatory works.
5. Acquire knowledge about hydel power.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. VII Semester	
Code: 70143	**RIVER ENGINEERING**	**L**	**T**	**P**
Credits: 3	[PROFESSIONAL ELECTIVE –IV]	**2**	**2**	**-**

Prerequisites: Hydraulics & Hydraulic machinery, Engineering Geology, Water resources engineering.

Course Objective: To understand theoretical concepts of complex behavior of water and sediment movements in rivers. Knowledge on hydraulics of river and to understand the modeling of river hydraulics and river management skills.

MODULE I: River Functions [10 Periods]

Introduction to River Functions: Primary function of a river – River uses and measures – Water and Sediment loads of river – Rivers in India, Himalaya and Peninsular.

MODULE II: [10 Periods]

River Hydraulics A: Steady Flow in Rivers

Introduction to River hydraulics, Types of flows, Physical Properties and Equations: Steady flow in rivers, uniform and non uniform, Turbulence and velocity profiles, resistance coefficients, Boundary conditions and back waters, Transitions – Rating Curve.

B: Unsteady Flow in Rivers

Propagative of surface waves – Characteristics, flood waves – kinematic and diffusion analogy – velocity of propagation of flood waves – Maximum Flood wave.

MODULE III: River Mechanics and River Dynamics [10 Periods]

A: River Mechanics: River Equilibrium: Stability of Channel, regime relations, river bend equilibrium – hydraulic geometry of downstream, Bars and meandering

B: River Dynamics: Degradation and aggradations of river bed, Confluences and branches, River Data base.

MODULE IV: **River Surveys and Model** [09 Periods]

Mapping, Stage and Discharge Measurements, Sediments, Bed and suspended load Physical hydraulic Similitude, Rigid and mobile bed, Mathematical, Finite one dimensional, multi – dimensional ,Water Quality and ecological model.

MODULE V: **River Management** [09 Periods]

River training works and river regulation works, Flood plain management, waves and tides in Estuaries, Interlinking of rivers, River Stabilization.

TEXT BOOKS:

1. Janson PL.Ph., Lvan BendegamJvanden Berg, Mdevries A. Zanen [Eds], "**Principles of River Engineering – The non tidal alluvial rivers**" Pitman, 1st Edition, 1994.
2. P. Jaya Rami Reddy, "**Hydrology**", Laximi Publications, New Delhi, 12th Edition, 2004.

REFERENCES:

1. Warren Viessman, et al., "**Introduction to hydrology**", Thomas Y.Crowell, New York, 5th Edition, 2002.
2. Ven Te chow [eds], "**Handbook of applied hydrology**", McGraw Hill Book company, 1st Edition, 1964.
3. Subramanya K., "**Hydrology**", Tata McGraw Hill Co., New Delhi, 1st Edition, 1994.
4. Patra.K.C, "**Hydrology and Water Resources Engineering**", Narosa Publications, 2nd Edition, New Delhi 2008.

E RESOURCES:

1. http://www.iihr.uiowa.edu/riverflow2016/.
2. http://www.rivergauges.com/.

Course Outcomes:

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

1. Recognize the complex behavior of rivers.
2. Gain the skills to take up research activities in river engineering.
3. Gain knowledge in river mechanics and dynamics.
4. Understand the significance of River survey and model
5. Develop skill of River management.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. VII Semester	
Code: 70130	**REMOTE SENSING & GIS LAB**	**L**	**T**	**P**
Credits: 2		**-**	**-**	**4**

Prerequisites: NIL

Course Objective: Identify different objects and components present in a remote sensing image using visual image interpretation technique. Classify an image into different classes using supervised and unsupervised classification techniques. Understand the basic concepts and components of GIS. Acquire knowledge on creating maps and the techniques used for storage of spatial data and data compression with GIS.

List of Experiments:
REMOTE SENSING:

1. Arial photograph interpretation
2. Visual interpretation of multispectral and panchromatic image
3. Image classification, supervised and unsupervised classifications

GIS:

1. Analog to Digital Conversion – Scanning methods
2. Introduction to software
3. Digital database creation – Point features, Line features, Polygon features
4. Data Editing-Removal of errors – Overshoot and Undershoot, Snapping
5. Data Collection and Integration, Non-spatial data attachment working with tables
6. Dissolving and Merging
7. Clipping, Intersection and Union
8. Buffering techniques
9. Spatial and Attribute query and Analysis
10. DEM

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

1. Perform remotely sensed image classification and identify different objects and components present in an image using visual image interpretation technique.
2. Create a new digitized map and introduce GIS data structures, data input and data presentation
3. Perform different data management tasks using various GIS modules.

Prerequisites: Structural Analysis-I & II

Course Objective: To impart knowledge on testing of beams, columns, trusses and frames.

List of Experiments:
1. Determination of Flexural Rigidity (EI) of a given beam.
2. Verification of Maxwell-Betti's Law.
3. Experiment on three hinged arch.
4. Experiment on two hinged arch.
5. Verification of moment area theorem for slope and deflection of a given beam.
6. Deflection of a statically determinate pin jointed truss.
7. Forces in members of redundant frames.
8. To find deflection of curved members.
9. Unsymmetrical bending of a cantilever beam.
10. Deflection of fixed beam and influence line for reactions.
11. Deflection studies for a continuous beam and influence line for reactions.
12. Study of behavior of columns and struts with different end conditions.

Course Outcomes:
At the end of the course, students will be able to
1. Understand the concept of Maxwell Theorem and its application.
2. Analyse two hinged and three hinged arches.
3. Analyse trusses and beams curved in plan.
4. Calculate the deflection of fixed and continuous beams due to various types of loading.
5. Study the behaviour of columns and struts.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: 70P02	**INDUSTRY ORIENTED MINI PROJECT**	L	T	P
Credits: 2		-	-	4

Prerequisite: Transportation Engineering

Course Objective: To give an overview of Traffic engineering, traffic regulation, management and traffic safety with integrated approach in traffic planning as well.

MODULE I: Traffic Planning and Characteristics [10 Periods]

Road Characteristics – Road user characteristics – PIEV theory – Vehicle – Performance characteristics – Fundamentals of Traffic Flow – Urban Traffic problems in India – Integrated planning of town, country, regional and all urban infrastructure – Towards Sustainable approach. – land use & transport and modal integration.

MODULE II: Traffic Surveys [10 Periods]

Traffic Surveys – Speed, journey time and delay surveys – Vehicles Volume Survey including non motorized transports – Methods and interpretation – Origin Destination Survey – Methods and presentation – Parking Survey – Accident analyses - Methods, interpretation and presentation – Statistical applications in traffic studies and traffic forecasting

MODULE III: [10 Periods]

A: Traffic flow and Control
Traffic Flow Parameters - Categories of Traffic flow- Analysis of speed, flow and density relationship- Highway capacity and Level of service - Types and factors affecting.
B: Traffic Signs, Road Markings, Design of pretimed traffic signals and Signal Co-ordination, Traffic control Aids and Street Furniture.

MODULE IV: Design of Traffic engineering facilities [09 Periods]

Introduction, Types of intersections, Design considerations, Traffic control devices, Conflict areas at intersections, Types of Intersection controls. Types of interchanges. Design of Rotary - Bus stop location and bus bay design - Street lighting- Planning and design of pedestrian facilities.

MODULE V: Trafic Management and Environnemental Control [09 Periods]

Traffic Management- Transportation System Management (TSM) and Travel Demand Management (TDM), Restrictions on Turning Movements, One-way Streets, Traffic Segregation, Traffic Calming, Tidal Flow Operations, Exclusive Bus Lanes - Introduction to Intelligence Transport System (ITS). Air & Noise pollution of different transport modes.

TEXT BOOKS:

1. Kadiyali.L.R. "**Traffic Engineering and Transport Planning**", Khanna Publishers, Delhi, 7th Edition, 2013.

2. Indian Roads Congress (IRC) Specifications: Guidelines and Special Publications on Traffic Planning and Management.

REFERENCES

1. Patha Chakraborty and Animesh Das, Principles of Transportation Engineering, Prentice Hall of India, 2nd Edition, 2005.
2. Roger P.Roess, Elena S.Prassas and William R.Mcshane, Traffic Engineering, 4th Edition, Prentice Hall, 2010.

E RESOURCES

1. http://nptel.ac.in/downloads/105101008/
2. http://www.cdeep.iitb.ac.in/nptel/Civil%20Engineering/Transportation%20Engg%20I/TOC.htm
3. http://textofvideo.nptel.iitm.ac.in/1054/lec2.pdf

Course Outcomes:

At the end of the course, students will be able to
1. Understand the various road user and vehicular characteristics
2. Conduct various traffic surveys for collecting traffic data.
3. Understand the relationship between traffic flow parameters and the principles of signal design.
4. Understand the principles of design of various traffic engineering facilities.
5. Recognize various methods of traffic management and certain aspects of vehicular pollution

Prerequisite: Transportation Engineering

Course Objective: To develop an understanding of types of pavements, stresses in flexible and rigid pavements and design them.

MODULE I: Factors Affecting Pavement Design **[10 Periods]**

Variables Considered in Pavement Design, Types of Pavements, Functions of Individual Layers, Classification of Axle Types of Rigid Chassis and Articulated Commercial Vehicles, Legal Axle and Gross Weights on Single and Multiple Units, Tire Pressure, Contact Pressure, EAL and ESWL Concepts, Traffic Analysis: ADT, AADT, Truck Factor, Growth Factor, Lane, Directional Distributions & Vehicle Damage Factors, Effect of Transient & Moving Loads.

MODULE II: **[10 Periods]**

Introduction to Stresses in Pavements: Vehicle-Pavement Interaction: Transient, Random & Damping Vibrations, Steady State of Vibration, Experiments on Vibration, Stress Inducing Factors in Flexible and Rigid pavements

Stresses In Flexible Pavements and Rigid Pavements: Visco-Elastic Theory and Assumptions, Layered Systems Concepts, Stress Solutions for One, Two and Three Layered Systems, Fundamental Design Concepts, Westergaard's Theory and Assumptions, Stresses due to Curling, Stresses and Deflections due to Loading, Frictional Stresses, Stresses in Dowel Bars & Tie Bars

MODULE III: Design of Flexible Pavements and Design Of Rigid Pavements **[10 Periods]**

A: Design of Flexible Pavements: Flexible Pavement Design Concepts, Asphalt Institute's Methods with HMA and other Base Combinations, AASHTO, IRC Methods.

B: Design Of Rigid Pavements: Calibrated Mechanistic Design Process, PCA, AASHTO & IRC Specifications, Introduction to Pre stressed and Continuously Reinforced Cement Concrete Pavement Design.

MODULE IV: Pavement Material Characterization **[09 Periods]**

Pavement Material Characterization: CBR and Modulus of Subgrade Reaction of Soil, Mineral aggregates – Blending of aggregates, binders, polymer and rubber modified bitumen, Resilient, Diametral Resilient and Complex [Dynamic] Moduli of Bituminous Mixes, Permanent Deformation Parameters and other Properties, Effects and Methods of Stabilization and Use of Geo Synthetics.

MODULE V: **Design Of Pavement For Low Volume Roads and Over Lays   [09 Periods]**
Design Of Pavement For Low Volume Roads Pavement design for low volume roads, Rural road designs – code of practices.
Design Of Over Lays Types of Overlays, Suitability, Design of Overlays Benkelmen beam- flexible overlay over a flexible pavement, flexible overlay over a rigid pavement, rigid overlay over a flexible pavement, rigid overlay over a rigid pavement.

TEXT BOOKS:
1. L R Kadyali, "Principles and Practices of Highway Engineering, 4thEdition 2004, Khanna Publishers , New Delhi.
2. S.K.Sharma, "Principles, Practice and Design of Highway Engineering" 2nd Edition 2012, S.Chand and Company.

REFERENCES:
1. Yoder.J. & Witzorac Mathew, "Principles of Pavement Design", Wiley India Pvt Ltd; 2ndEdition, 2011
2. Yang H. Huang, "Pavement Analysis & Design**"**, Pearson Education; 2nd Edition 2008.

REFERENCE CODES:
1. IRC: 37-2012. Guidelines for the Design of. Flexible Pavements
2. IRC: 58-2012. Guidelines for the Design of. Rigid Pavements
3. IRC: SP: 62-2004. Guidelines for low volume Rural road designs

E RESOURCES
1. https://www.civil.iitb.ac.in/~kvkrao/uploads/5/9/3/7/59372049/ce742lec_14new.pdf
2. http://gnindia.dronacharya.info/CivilDept/Downloads/question_papers/Vsem/Transportation-Engg-1/Unit-3/Flexible-Rigid-Pavements.pdf
3. https://drive.google.com/file/d/0B6ehKjDUHJiGMzNtNjFxT1U0cm8/view
4. http://nptel.ac.in/downloads/105101087

Course Outcomes:
At the end of the course, students will be able to
1. Identify various types of pavements and the factors affecting.
2. Analyze the stresses in flexible and rigid pavements.
3. Design flexible and rigid pavements.
4. Characterize the different pavement materials.
5. Design of low volume roads and overlays.

Prerequisite: Transportation Engineering

Course Objective: Student will understand and apply basic concepts and methods of urban transportation planning in the India.

MODULE I: Introduction [10 Periods]
Role of transportation in the economic development of nations, overview of transport modes, growth trends, National Transport Policy of India – Case studies, transportation planning in the developing world; and comparative international transportation policies; Fundamentals of transportation , Principles of planning, evaluation, selection, adoption, financing, and implementation of alternative urban transportation systems; formulation of community goals and objectives, inventory of existing conditions; transportation modeling trip generation, distribution, modal choice, assignment

MODULE II: Data Collection and Inventories [10 Periods]
Collection of data – Organization of surveys and Analysis, Study Area, Zoning, Types and Sources of Data, Road Side Interviews, Home Interview Surveys, Commercial Vehicle Surveys, Sampling Techniques, Expansion Factors, Accuracy Checks, Use of Secondary Sources, Economic data – Income – Population – Employment – Vehicle Owner Ship.

MODULE III: Travel Demand Issues [10 Periods]
A: Trends, Overall Planning process, Long term Vs Short term planning, Demand Function, Independent Variables, Travel Attributes.
B: Assumptions in Demand Estimation, Detailed approach on 4 step travel demand estimation; Sequential, and Simultaneous Approaches, Aggregate and Disaggregate Techniques.

MODULE -IV: Demand Analysis and Supply Analysis Planning [09 Periods]
Planning for sustainable urban mobility, positive and negative externalities in urban transport, congestion pricing, parking policy, demand management , Urban travel and transportation system characteristics - a systems perspective, Data management and use in decision making, Demand analysis, Urban activity analysis, Supply analysis; Plan Preparation And Evaluation: Travel Forecasts to Evaluate Alternative Improvements, Impacts of New Development on Transportation Facilities. Master plans, Selection of Corridor, Corridor Identification, Corridor deficiency Analysis

MODULE -V: Metropolitan Cities [09 Periods]
Design issues in urban mobility, integrating land use and transport planning; , Overview of urbanization process, city structure and urban activity and infrastructure systems, Economic and social significance of urban infrastructure systems; Transport's Role in tackling Social Inclusion, Economic Impacts of Transport Policy.

TEXT BOOKS:
1. Dr.L.R.Kadyali, "Traffic Engineering & Transportation Planning" –Khanna Publications – 6th Edition 1997
2. M.J.Bruton" Introduction To Transportation Planning", Hutchinson Of London Ltd, 7th Edition 2000.

REFERENCES:
1. Partha Chakraborty and Animesh das, "Principles of Transportation Engineering", Prentice Hall, India– 6th Edition 1997
2. Flaherty, C.A.O. "Highway Engineering", Edward Arnold, London, – 6th Editions 1986.

E RESOURCES
1. http://tripp.iitd.ernet.in/delhibrts/metro/Metro/public%20trpt%20systm%20 %2 review.pdf
2. http://www.vtpi.org/tranben.pdf
3. http://www.ncsl.org/Portals/1/Documents/transportation/P3_State_Statutes.pdf
4. http://nptel.ac.in/courses/105106058/
5. http://nptel.ac.in/courses/105107067/

Course Outcomes:

At the end of the course, students will be able to
1. Design and conduct surveys to provide the data required for transportation planning. Learn and understand zonal demand generation and attraction regression models.
2. Learn and understand demand distribution models (gravity models) and modal split models for mode choice analysis.
3. Develop and calibrate trip generation rates for specific types of land use developments.
4. Make final decisions among planning alternatives that best integrate multiple objectives such as technical feasibility and cost minimization.
5. Understand land use and planning issues related to metropolitan Cities.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. VIII Semester		
Code: 70147	ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT [PROFESSIONAL ELECTIVE-VI]		L	T	P
Credits: 3			3	-	-

Prerequisite: Environmental Studies

Course Objective: The main objective of this course is to provide in-depth knowledge about various methodologies in assessing the environmental impact of various developmental projects. It also provides the knowledge to design a more publicly acceptable project which helps in achieving sustainable development.

MODULE I: Concept of EIA and EIA Methodologies [10 periods]
Concept of EIA Significance of EIA, Factors affecting EIA, Classification of Environmental Parameters, Elements of EIA: Initial Environmental Examination, Preparation of Environmental Base map, Impact Evaluation and Analysis, Environmental Impact Statement (EIS) and Environmental Management Plan (EMP), List of Projects which require EIA.
EIA Methodologies General methodology of EIA with flow chart, EIA Methods: Ad-hoc methods, Matrix methods, Network methods, Environmental Media Quality Index method, Overlay methods, Cost/Benefit Analysis.

Module II: EIA of Soil, Ground water and Surface water [10 periods]
EIA of Soil: Methodology for the assessment of developmental activities on Soil: Delineation of study area, Identification of impacts, Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures, Environmental impacts of Deforestation: Causes, Effects and Mitigation measures.
EIA of Ground water: Ground water quantity and quality impacts, Systematic method for evaluation of various developmental activities on Ground water environment.
EIA of Surface water: Introduction, Projects which create concerns, Methodology for the assessment of Impacts on surface water environment.

MODULE III: [10 periods]
A: EIA of Air and Noise environment:
Air Pollution sources, Generalized approach for assessment of air pollution impact, Effects of Noise on people and their physiological responses, systematic methodology for assessing environmental impacts of noise
B: EIA of Biological Environment
Introduction to Biodiversity and Systematic approach for evaluating Biological impacts, Assessment of impacts of developmental activities on Vegetation and Wild life.

MODULE IV: Environmental Legislation and Case studies   **[09 Periods]**

Environmental Legislation: Legislation policies, Environmental Protection Act, Water Act, Water Cess Act, The Air (Prevention & Control of pollution) Act, Motor Act, Wild life Act.

Case studies: Preparation of EIA for developmental activities: Industrial projects, Land clearing projects, River valley projects, Construction projects, Highways and Road projects.

MODULE V: Environmental Audit   **[09 Periods]**

Environmental Audit: Objectives, Advantages, Types of environmental Audit, Audit protocol, Stages of Environmental Audit: Pre-audit activities, Onsite activities, Evaluation of Audit data and preparation of Audit report, Post audit activities.

TEXT BOOKS:
1. Y. Anjaneyulu, **"Environmental Impact Assessment Methodologies",** BS Publications, CRC Press, 2nd edition, 2011.
2. R.R. Barthwal **"Environmental Impact Assessment",** New Age International Publishers, 2nd edition, 2012.

REFERENCES:
1. M. Anji Reddy, **"Environmental Impact Assessment: Theory and Practice",** BS Publications 1st edition, 2016.
2. Canter, **"Environmental Impact Assessment",** India edition, 1st edition, 2015.
3. N. S. Raman, A.R. Gajbhiye, S.R. Khandeshwar **"Environmental Impact Assessment",** I.K. International Publishing House, Kindle edition, 2014.

E RESOURCES
1. https://en.wikipedia.org/wiki/Environmental_audit
2. https://fenix.tecnico.ulisboa.pt/downloadFile/3779577342892/5.%20EIA%20methodologies. pdf
3. https://www.dlsweb.rmit.edu.au/conenv/envi1128/Reading-CSTI.pdf

Course Outcomes:

At the end of the course, students will be able to
1. Understand the significance of EIA and the methodologies used for assessing the environmental impacts of developmental projects.
2. Identify, predict and assess the impacts of projects on soil, ground water and surface water environment.
3. Identify a systematic methodology for assessing environmental impacts of projects on air, noise and biological environment.
4. Gain knowledge on various Environmental legislations, policies and Acts.
5. Acquire knowledge on environmental audit, procedure and preparation of audit report.

Prerequisite: Geotechnical Engineering and Foundation Engineering

Course Objective: Student is expected to identify basic deficiencies of various soil deposits. Student will be in a position to decide various ways and means of improving the soil and implementing techniques of improvement.

MODULE I: Dewatering and Grouting [10 Periods]
Dewatering Methods of de-watering- sumps and interceptor ditches- single, multi stage well points - vacuum well points- Horizontal wells-foundation drains-blanket drains- criteria for selection of fill material around drains –Electro-osmosis.
Grouting Objectives of grouting- grouts and their properties- grouting methods ascending, descending and stage grouting- hydraulic fracturing in soils and rocks post, grout test.

MODULE II: [10 Periods]
In – Situ Densification Methods in Granular Soils Vibration at the ground surface, Impact at the Ground Surface, Vibration at depth, Impact at depth.
In – Situ Densification Methods in Cohesive Soils Preloading or dewatering, Vertical drains – Sand Drains, Sand wick geodrains – Stone and lime columns – thermal methods.

MODULE III: Geosynthetics and Geoenvironmental Application [10 Periods]
A: Geosynthetics Description, properties, functions and applications of geosynthetics
B: Geoenvironmental Application of Geosynthetics Geomembranes for landfills and ponds, Geosynthetic clay liner, Designing with GCL;s, Filtration, Erosion control, slope protection.

MODULE IV: Reinforced Earth Principles [09 Periods]
Components of reinforced earth – factors governing design of reinforced earth walls – design principles of reinforced earth walls.

MODULE V: Stabilization [09 Periods]
Methods of stabilization-mechanical-cement- lime-bituminous chemical stabilization with calcium chloride, sodium silicate and gypsum. Expansive soils: Problems of expansive soils – tests for identification – methods of determination of swell pressure. Improvement of expansive soils – Foundation techniques in expansive soils – under reamed piles.

TEXT BOOKS:
1. Purushotham Raj. "**Ground Improvement Techniques**", Laxmi Publications, New Delhi, 2nd Edition , 2016.
2. Nihar Ranjan Patra."**Ground Improvement Techniques**", Vikas Publications 1st Edition, 2012.

REFERENCES:
1. Moseley M.P, "Ground Improvement", Blackie Academic and Professional, Boca Taton, Florida, USA. 1st Edition, 1993.
2. Xanthakos P.P, Abramson, L.W and Brucwe, D.A "Ground Control and Improvement", John Wiley and Sons, New York, USA. 1st Edition, 1993.
3. Robert M. Koerner, "Designing with Geosynthetics", Prentice Hall New Jercy, USA, 1st Edition, 1993.
4. Hausmann M.R., "Engineering Principles of Ground Modification", McGraw-Hill International, 1st Edition, 1990

E RESOURCES
1. https://www.slideshare.net/SravanMuguda/ground-improvement-techniques
2. http://www.powershow.com/view/43702b-ZmRmZ/Ground_Improvement_Techniques_For_Highways_powerpoint_ppt_presentation
3. https://www.smartzworld.com/downloads/download/gd-complete-chapter-pdf-notes/
4. https://forumfreak4.files.wordpress.com/2013/06/ground-improvement-techniques-by-purushothama-raj.pdf
5. http://nptel.ac.in/courses/105104034/lecture_pdf/lec1.pdf

Course Outcomes:

At the end of the course, students will be able to
1. Understand various methods of dewatering and grouting.
2. Recognize and classify different In – Situ densification methods in granular and Cohesive Soils.
3. Apply geoenvironmental application of geosynthetics.
4. Understand the design principals of reinforced earth.
5. Classify the methods of stabilization and apply them to different types of soils.

Prerequisites: Geotechnical Engineering and Foundation Engineering

Course Objective: The students will learn the advanced foundation practices and improvised study about the foundation problems and their related solutions in shallow, deep and well foundations. Students will also learn about the foundation practices to be applied for the clay soils.

MODULE I: Introduction [10 Periods]

Introduction Bearing capacity of Footings subjected to Eccentric and inclined loading – Meyerhoff's, Hansen's, Vesic theories – Foundations on layered soils.

MODULE II: [10 Periods]

Elastic settlement of Footings embedded in sands and clays of Infinite thickness – Footings on soils of Finite thickness-Schmertamaunn's method, Janbu method.

MODULE III: Lateral Earth Pressures [10 Periods]

A: Lateral Earth Pressures Rankine - Coloumb's and graphical methods – Stability of cantilever and counter fort retaining walls, Reinforced earth retaining walls.

B: Cantilever sheet piles and anchored bulkheads, Earth pressure diagram - Determination of Depth of embedment in sands and clays – Timbering of trenches- Earth pressure diagrams – Forces in struts.

MODULE IV: Pile Foundations [09 Periods]

Static and dynamic methods-pile groups-negative skin friction-under reamed piles. Settlement of Pile groups resting in sands and clays –laterally loaded piles ultimate capacity of laterally loaded piles.

MODULE V: Caissons and Well Foundations [09 Periods]

Types of caissons – well foundations - Different shapes of wells – Components of wells – functions and Design – Design Criteria – Sinking of wells– lateral stability by Terzaghi's analysis.

Foundations in Expansive soils – Problems in Expansive soils – Mechanism of swelling– Swell Pressure and Swelling potential–Heave–foundation practices–Sand cushion–CNS technique – under – reamed pile Foundations – Granular pile – anchor technique, stabilization of expansive soils

TEXT BOOKS:

1. Das, B.M. ―Principles of Foundation Engineering‖ –PWS Publishing, Singapore -, 4th Edition, 1999.
2. Bowles, J.E. ―Foundation Analysis and Design‖ –McGraw-Hill International, 4th Edition, 1988.
3. VNS Murthy. ―Geotechnical Engineering: Principles and practices of soil mechanics and foundation Engineering- 7th Edition, 2007
4. C. Venkataramah. ―Geotechnical Engineering New Age International Pvt. Ltd, Publishers 3rd Edition, 2006.

REFERENCE BOOKS:

1. Swami Saran, ―Analysis and Design of Substructures‖ –Oxford & IBH Publishing Company Pvt.Ltd 4th Edition, 1988.
2. Gopal Ranjan & ASR Rao, ―Basics and Applied Soil Mechanics New Age International Pvt.Ltd, Publishers 3rd Edition, 2002.

E RESOURCES
1. https://drive.google.com/file/d/0B5_-VqecjfqpdnN5c2huVk1JN1k/view
2. https://www.researchgate.net/journal/00380741_Soil_Mechanics_and_Foundation_ Engineering
3. http://www.nptel.ac.in/courses/105105105/
4. http://www.nptel.ac.in/courses/105105104/

Course Outcomes:

At the end of the course, students will be able to
1. Find out the profiling of soils and the test to be carried out to explore the soils
2. Take the soils samples for estimating the various properties of soils in laboratory
3. Design various shallow foundations for different loadings (eccentric & inclined).
4. Design various deep and well foundations for different loadings.
5. Design the foundation practices on various expansive soils.

Prerequisite: NIL

Course Objective: The aim of this course is to inspire students to become entrepreneurs so that they will emerge as job providers rather than job seekers.

MODULE I: Entrepreneurship [6 Periods]
Concept, knowledge and skills requirement; characteristic of successful entrepreneurs; entrepreneurship process; factors impacting emergence of entrepreneurship;
Differences between Entrepreneur and Intrapreneur, Understanding individual Entrepreneurial Mindset and personality, recent trends in entrepreneurship.

MODULE II: Starting the new venture and Feasibility study [6 Periods]
Starting the venture: generating business idea – sources of new ideas, methods of generating ideas, creative problem solving, opportunity recognition; environmental scanning, competitor and industry analysis;
Feasibility study – market feasibility, technical/operational feasibility, financial feasibility; drawing business plan; preparing project report; presenting business plan to investors.

MODULE III: Sources of Finance and Entrepreneurship programs [8 Periods]
A. **Sources of finance:** Various sources of Finance available: Long term sources Short term sources- Institutional Finance – commercial Banks, SFC's in India - NBFC's in India - their way of financing in India for small and medium business.
B. **Entrepreneurship development programs in India:** The entrepreneurial journey- Institutions in aid of entrepreneurship development: MDI, NIESBUD, EDII, IED. EDP's of SIDBI.

MODULE IV: [6 Periods]
Entrepreneurship Development and Government: Role of Central Government and State Government in promoting Entrepreneurship - Introduction to various incentives, subsidies and grants - Export Oriented Units - Fiscal and Tax concessions available..
Women entrepreneurship: Role and Importance, Growth of women entrepreneurship in India, Issues & challenges - Entrepreneurial motivations.

MODULE V: [6 Periods]
Entrepreneurship and Law: Intellectual property Rights-Patents, Copyrights-Trademarks and Trade secrets- Licensing- franchising, Legal issues and challenges of new venture startups.
Strategic perspectives in entrepreneurship: Strategic planning-Strategic actions- strategic positioning-Business stabilization- Building the adaptive firms-Understanding the growth stage-Unique managerial concern of growing ventures.

TEXT BOOK:

1. D F Kuratko and T V Rao ―Entrepreneurship-A South-Asian Perspective ―Cengage Learning, 2012. (For PPT, Case Solutions Faculty may visit : login.cengage.com)

REFERENCES:

1. Vasant Desai ―Small Scale industries and entrepreneurship‖ Himalaya publishing 2012.
2. Rajeev Roy ―Entrepreneurship‖ 2e, Oxford, 2012.
3. B.Janakiramand M.Rizwana‖ Entrepreneurship Development: Text & Cases,Excel Books,2011.
4. Stuart Read, Effectual Entrepreneurship, Routledge, 2013.
5. Nandan H, Fundamentals of Entrepreneurship, PHI, 2013

E RESOURCES:

1. http://freevideolectures.com/Course/3641/Entrepreneurship-Through-the-Lens-of-Venture-Capital
2. http://www.onlinevideolecture.com/?course=mba-programs&subject=entrepreneurship
3. Journal of Entrepreneurship & Organization Management, Vikalpa, IIMA, IIMB Review, Decision, IIMC, Vision, HBR.
4. http://nptel.ac.in/courses/122106032/Pdf/7_4.pd
5. https://www.scribd.com/doc/21516826/Entrepreneurship-Notes
6. http://freevideolectures.com/Course/3514/Economics-/-Management-/-Entrepreneurhip/50

Course Outcomes:

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

1. Understand the concept of entrepreneurship and challenges in the world of competition.
2. Understands the process of launching a new venture.
3. Understand the sources of finance and also the various entrepreneurship development programmes.
4. Understand the role of government in the development of Entrepreneurship and also gain the knowledge of women entrepreneurship.
5. Understand the legal aspects of entrepreneurship and also the Strategic perspectives of Entrepreneurship.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: 70P04	COMPREHENSIVE VIVA VOCE	L	T	P
Credits: 2		-	-	4

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: 70P05	**MAJOR PROJECT**	L	T	P
Credits: 12		-	-	18

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: 70A06	FINE ARTS/FOREIGN LANGUAGE	**L**	**T**	**P**
Credits: NIL		-	2	-

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech.	
Code: 70132	**AIR POLLUTION AND CONTROL** (Open Elective)	L	T	P
Credits: 4		3	2	-

Prerequisite: Nil

Course Objectives: This course provides the knowledge and understanding of the problems associated with air pollution indoor and outdoor. It also describes the regulations pertinent to air pollution especially due to industries making the student to design proper air pollution control devices.

MODULE I: Air Pollution [13 Periods]
Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non- Point, Line and Areal Sources of air pollution-stationary and mobile sources. Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc., ambient air quality standards.

MODULE II: Thermodynamics and Kinetics of Air-Pollution [13 Periods]
Applications in the removal of gases like SOx, NOx, CO, HC etc., air-fuel ratio, Computation and Control of products of combustion.

MODULE III: Meteorological Parameters and Wind Behavior [12 Periods]
A: Meteorology Properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagrams, Lapse Rates, Pressure Systems.
B: Plume Dispersion Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion.

MODULE IV: Control of Particulates [13 periods]
Control at Sources, Process Changes, Equipment modifications, Design and operation of control equipments – Settling Chambers, Centrifugal separators, Filters, Dry and Wet scrubbers, Electrostatic precipitators.

MODULE V: General Methods of Control of NOx and SOx Emissions [13 periods]
In-plant Control Measures, process changes, dry and wet methods of removal and recycling. Air Quality Management – Monitoring of SPM, SO, NO and CO Emission Standards.

TEXT BOOKS:
1. M.N.Rao and H.V.N.Rao, **"Air pollution"**, Tata Mc.Graw Hill Company, 26th reprint 2007.
2. R.K. Trivedy and P.K. Goel, **"An introduction to Air pollution"**, B.S. Publications, 2nd revised edition, 2005.

REFERENCES:

1. Daniel Vallero, **"Air Pollution Control: A Design Approach"** Academic Press, 5th Edition, 2014.
2. Karl B. Schnelle, Jr., Russell F. Dunn, Mary Ellen Ternes, "**Air Pollution Control Technology Handbook", CRC** Press, 2nd Edition, 2015.
3. Thad Godish, Wayne T. Davis, Joshua S. Fu, **"Air Quality",** CRC Press, 5th Edition, 2014.
4. Kenneth C. Schifftner, "**Air Pollution Control Equipment Selection Guide",** CRC Press, 2nd edition, 2013.
5. Marco Ragazzi, "**Air Quality: Monitoring, Measuring, and Modeling Environmental Hazards",** Apple Academic Press, 1st edition, 2016.

E RESOURCES:

1. http://www3.cec.org/islandora/en/item/2195-best-available-technology-air-pollution-control-en.pdf.
2. http://www.eolss.net/sample-chapters/c09/e4-11-05.pdf.
3. https://www.env.go.jp/earth/coop/coop/document/01-apctme/contents.html.

Course Outcomes:

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

1. Identify different sources of air pollution and the effects on human and environment.
2. Gain knowledge in computation of air pollutant removal of gases like SOx, NOx, CO etc.
3. Understand the importance of meteorological parameters like wind, pressure, humidity in dispersing air pollutants.
4. Gain knowledge in designing and operating particulate air control equipment.
5. Acquire the knowledge in designing the control system for gaseous air pollutants.

Prerequisite: Nil

Course Objectives: This course deals with the general safety requirements during the electrical installations. The course emphasis on the various objectives of energy management and auditing.

MODULE I: RULES & REGULATIONS [13 Periods]

Power sector organization and their roles – significance of IE rules & IE acts – general safety requirements: Span conductor configuration, spacing and clearing, sag, erection, hazards of electricity.

MODULE II: INSTALLATION AND EARTHING OF EQUIPMENTS [13 Periods]

Classification of electrical installation - earthing of equipment bodies – electrical layout of switching devices and SC protection – safety in use of domestic appliances – safety documentation and work permit system – flash hazard calculations – tools and test equipments.

MODULE III: SAFETY MANAGEMENT AND FIRST AID [12 Periods]

A: Safety aspects during commissioning – safety clearance notice before energizing – safety during maintenance – maintenance schedule – special tools – security grand– check list for plant security – effects of electric and electromagnetic fields in HV lines and substations.

B: Safety policy in management & organizations – economic aspects – safety program structure – elements of good training program – first aid – basic principles – action taken after electrical shock – artificial respiration and methods – chocking – poisoning.

MODULE IV: FIRE EXTINGUISHERS [13 Periods]

Fundamentals of fire – initiation of fires – types – extinguishing – techniques – prevention of fire – types of fire extinguishers- fire detection and alarm system – CO_2 and Halogen gas schemes, foam schemes.

MODULE V: ENERGY MANAGEMENT & ENERGY AUDITING [13 Periods]

Objectives of energy management – energy efficient electrical systems – energy conservation and energy policy – renewable source of energy – energy auditing – types and tips for improvement in industry.

TEXT BOOKS

1. John Codick, **"Electrical safety hand book",** McGraw Hill Inc, New Delhi, 2000.
2. V. Manoilov, **"Fundamentals of electrical safety",** Mir Publishers, MOSCOW, 1975.

REFERENCES

1. C.S. Raju, **"A Practical Book on domestic safety",** Sri Sai Publisher, Chennai, 2003.
2. **Power Engineering Hand book**, TNEB Engineers officers, Chennai, 2002.
3. S. Rao, R.C. Khanna, **"Electrical safety, Fire safety engineering and safety management"**, Khanna Publisher, Delhi, 1998.
4. The Indian electricity rules, 1956, authority regulations, 1979, Commercial Law Publication, Delhi, 1999.
5. W.F.Cooper, **"Electrical safety Engineering"**, Newnes-Butterworth company, 1978.

E-RESOURCES

1. http://nptel.ac.in/courses/103106071/5
2. https://beeindia.gov.in/
3. https://www.electrical4u.com/equipment-earthing/
4. https://www.electricaltechnology.org/2015/05/earthing-and-electrical-grounding-types-of-earthing.html

Course Outcomes

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

1. Gain basic knowledge on Indian Power sector organization and their roles.

2. Understand the concepts of earthing and its standards.

3. Acquire the basic knowledge on First aid and safety during electrical installation**.**.

4. Distinguish various fire extinguishers and their classification.

5. Understand the basic concepts of energy auditing.

Prerequisites: Nil

Course Objectives:

The purpose of this course is to teach the concept of Industrial Safety & provide useful practical knowledge for workplace safety which helps identification, evaluation and control of all the hazards and potential hazards to prevent or mitigate harm or damage to people, property or the environment.

MODULE I: Introduction   [13 Periods]

Definition-Development before industrial revolution-Milestones in industrial safety movement Development of accident prevention programs-3 E's of safety- Development of Safety organizations-Safety and health movement- Managing emergency in industries.

MODULE II: Accident Prevention   [13Periods]

Safety and productivity-Fallacies about safety-Industrial psychology in accident prevention Basic philosophy of accident prevention-Unsafe condition, Unsafe act, Injury, Fault of persons Cost of accidents- Safety education.

MODULE III: Safety Organization & Industrial Hygiene and Hazards   [12 Periods]

A: Purpose of a safety organization-Safety policy- Safety committee- types- Role of safety coordinator- Responsibilities, Interferences and Sufferings of safety supervisor-Safety publicity-Accident reporting-Accident investigation-Accident statistics-Safety audits.

B: OSHA and industrial hygiene-work site analysis-recognizing and controlling hazards Occupational diseases prevention-Employee welfare-Statutory welfare schemes, Non statutory schemes-Health hazards-Control strategies- Fire hazards and prevention, Electrical hazard prevention and safety.

MODULE IV: Industrial Process Safety   [13 Periods]

Overview-Safety performance by industry sector-Incident pyramid-Process hazard and risk. Failure of defenses - Process safety management-Scope, Functions, Features and Characteristics. Role of organizational levels in Process safety Management-Assessing organizations safety effectiveness.

MODULE V: Human Side of Safety   [13 Periods]

Management of change-Process and equipment integrity-Human behavior aspects and modes-The Swiss cheese model of industrial accidents-Active and Latent failures-examples - Safety lessons Human Factors influencing the likelihood of failure-Organizational culture, Demographic effects.

TEXT BOOKS
1. Krishnan N.V., **"Safety in Industry",** Jaico Publisher House, 2005.
2. Singh, U.K. and Dewan, J.M., "**Safety, Security and risk management",** APH Publishing Company, New Delhi, 2005.

REFERENCES

1　C. Ray Asfahl, David W. Rieske **" Industrial Safety and health management",** Prentice Hall,2009.
2　R.K. Mishra, **"Safety Management"**, AITBS publishers, 2012.
3　Krishnan N.V., "**Safety in Industry**", Jaico Publisher House, 2005
4　Singh, U.K. and Dewan, J.M., "**Safety, Security and risk management**", APH Publishing Company, New Delhi, 2005.
5　C. Ray Asfahl, David W. Rieske " **Industrial Safety and health management**", Prentice Hall,2009.

E - RESOURCES

1　https://issuu.com/stmjournalspublication/docs/journal_of_industrial_safety_engine
2　http://www.nsc.org.in/index.php?option=com_content&view=article&id=15&Itemid=99
3　http://www.mdpi.com/journal/safety
4　http://www.sciencedirect.com/science/journal/09219110?sdc=1

Course outcomes

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

1.　Identify the evaluation of industrial safety and health standards.
2.　Analyze the philosophies behind industrial accidents.
3.　Apply the hierarchical levels in a safety organization and apply the types of industrial hazards and preventive measures.
4.　Implement the concept of industrial process safety.
5.　Apply the safety procedures for human.

Prerequisites: Nil

Course Objectives: To study different modulation techniques used in analog communications and digital communications. To also introduce basics of satellite and optical communications.

MODULE I: Fundamentals of Analog Communication   [16 Periods]

Principles of amplitude modulation, AM envelope, frequency spectrum and bandwidth, modulation index and percent modulation, AM Voltage distribution, AM power distribution, Angle modulation - FM and PM waveforms, phase deviation and modulation index, frequency deviation and percent modulation, Frequency analysis of angle modulated waves. Bandwidth requirements for Angle modulated waves.

MODULE II: Band-pass Modulation Techniques   [12 Periods]

Introduction, Shannon limit for information capacity, digital amplitude modulation, frequency shift keying, FSK bit rate and baud, FSK transmitter, BW consideration of FSK, FSK receiver, phase shift keying – binary phase shift keying – QPSK, Quadrature Amplitude modulation, bandwidth efficiency, carrier recovery – squaring loop, Costasloop, DPSK.

MODULE III: Base Band Transmission Techniques   [12 Periods]

A: Introduction, Pulse modulation, PCM – PCM sampling, sampling rate, signal to quantization noise rate, companding – analog and digital – percentage error,

B: delta modulation, adaptive delta modulation, differential pulse code modulation, pulse transmission – Intersymbol interference, eye patterns.

MODULE IV: Spread Spectrum and Multiple Access Techniques   [12 Periods]

Introduction, Pseudo-noise sequence, DS spread spectrum with coherent binary PSK, processing gain, FH spread spectrum, multiple access techniques – wireless communication, TDMA and CDMA in wireless communication systems, source coding of speech for wireless communications.

MODULE V: Satellite and Optical Communication   [12 Periods]

Satellite Communication Systems-Keplers Law,LEO and GEO Orbits, footprint, Link model-Optical Communication Systems-Elements of Optical Fiber Transmission link, Types, Losses, Sources and Detectors.

TEXT BOOKS:

1. Wayne Tomasi, **"Advanced Electronic Communication Systems",** 6th Edition, Pearson Education, 2007.

2. Simon Haykin, **"Communication Systems",** 4th Edition, John Wiley & Sons, 2001.

REFERENCE BOOKS:

1. H.Taub,DL Schilling,G Saha,**"Principles of Communication**", 3rd Edition, 2007.
2. B.P.Lathi,"**Modern Analog And Digital Communication systems**", Oxford University Press, 3rd Edition, 2007.
3. Blake, "**Electronic Communication Systems**", Thomson Delmar Publications, 2002.
4. Martin S.Roden, "**Analog and Digital Communication System**", PHI, 3rd Edition, 2002.
5. B. Sklar, "**Digital Communication Fundamentals and Applications**", Pearson Education, 2nd Edition, 2007.

E-RESOURCES:
1. Notes on Communication Systems - https://courses.engr.illinois.edu/ece458/comms2.pdf (Relevant: Chapters 1 to 3)
2. Notes on Modulation Techniques - http://www.ece.lehigh.edu/~jingli/teach/F2005CT/notes/AnalogCommunication.pdf
3. Notes on Digital Communication - https://www.cl.cam.ac.uk/teaching/0708/DigiCommI/dc1.pdf
4. https://www.britannica.com/technology/satellite-communication
5. http://www.radio-electronics.com/info/satellite/communications_satellite/satellite-communications-basics-tutorial.php
6. http://nptel.ac.in/courses/117105131/
7. http://nptel.ac.in/courses/117104127/

Course Outcomes:

At the end of the course, students will be able to:
1. Understand fundamentals of analog communications.
2. Classify different band-pass modulation schemes.
3. Categorize the different base-band modulation schemes.
4. Examine spread spectrum techniques and multiple access mechanisms.
5. Get basic knowledge on satellite and optical communications.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 70537	**SOFTWARE QUALITY ASSURANCE AND TESTING** (Open Elective)	**L**	**T**	**P**
Credits: 4		3	2	-

Prerequisites: Nil

Course Objectives: This course will enable students to learn and understand the importance of standards in the quality management process and their impact on the final product, identify, implement and analyze software quality metrics, learn how to plan a software testing strategy and methodology and to gain software testing experience by applying software testing knowledge and methods to practice-oriented software testing projects.

MODULE I: Software Quality Assurance Framework and Standards   [12 Periods]
SQA Framework - Definition of Quality, Software Quality Assurance, Components of Software Quality Assurance, Software Quality Assurance Plan: Steps to develop and implement a Software Quality Assurance Plan.
Quality Standards - ISO 9000 and Companion ISO Standards, CMM, CMMI, PCMM, Malcom Balridge, 3 Sigma, 6 Sigma.

MODULE II: SQA Metrics and Methodologies   [13 Periods]
Software Quality Assurance Metrics - Software Quality Metrics, product Quality metrics, In-Process Quality Metrics, Metrics for Software Maintenance, Examples of Metric Programs.
Software Quality metrics methodologies   - Establish quality requirements, Identify Software quality metrics, implement the software quality metrics, analyze software metrics results, validate the software quality metrics.

MODULE III: Software Testing Strategy and Environment Establishing   [13 Periods]
A: Software Testing Strategy and Environment Establishing   - Testing policy, structured approach to testing, test factors, Economics of System Development Life Cycle (SDLC) Testing.
B: Software Testing Methodology   - Defects hard to find, verification and validation, functional and structural testing, workbench concept, eight considerations in developing testing methodologies, testing tactics checklist.

MODULE IV: Software Testing Techniques & Tools   [13 Periods]
Software Testing Techniques - Black-Box, Boundary value, Bottom-up, Branch coverage, Cause-Effect graphing, CRUD, Database, Exception, Gray-Box, Histograms, Inspections, JADs, Pareto Analysis, Prototyping, Random Testing, Risk-based Testing, Regression Testing, Structured Walkthroughs, Thread Testing, Performance Testing, White-Box Testing.
Software Testing Tools - Taxonomy of testing tools, Methodology to evaluate automated testing tools, Load Runner, Win runner and Rational Testing Tools, Java Testing Tools, JMetra, JUNIT and Cactus.

MODULE V: Testing Process and Applications   [13 Periods]
Testing Process **-** Eleven Step Testing Process: Assess Project Management Development Estimate and Status, Develop Test Plan, Requirements Phase Testing, Design Phase Testing, Program Phase Testing, Execute Test and Record Results, Acceptance Test, Report test results, testing software installation, Test software changes.

Testing Applications **-** Evaluate Test Effectiveness, Testing Specialized Systems and Applications Testing Client/Server, Web applications, Testing off the Shelf Components, Testing Security, Testing a Data Warehouse.

TEXTBOOKS
1. William E.Lewis, **"Software Testing and Continuous Quality Improvement",** Technical Press, 3rd Edition, 2010.
2. Stephen H.Kan, **"Metrics and Models in Software Quality Engineering**", 2nd Edition, Addison-Wesley Professional, 2003.

REFERENCES
1. William E. Perry, "**Effective Methods for Software Testing**", 3rd Edition, Published by Wiley & Sons, 2006.
2. Dr.K.V.K.K. Prasad, "**Software Testing Tools",** Dream Tech Publishers, 3rd Edition, 2009.

E-RESOURCES
1. https://tienhuong.files.wordpress.com/2009/08/software-testing-and-continuous-quality-improvement-second-edition.pdf
2. https://hientl.files.wordpress.com/2011/12/effective-methods-for-software-testing2.pdf
3. http://ndl.iitkgp.ac.in/document/zyMnqgZQXCJME6wgSqrU87VCGcelOw5mZ-ybmrhKBj79VQPP0_ZQHLqcOopPDoaFWhZybCrPg_joTbBU8ZpGA
4. http://nptel.ac.in/courses/106101061/18

 Course Outcomes:
 On the successful completion of the course, a student will be able to:
1. Define Software Quality Assurance Framework and Standards
2. Outline various Metrics, Methodologies for Measuring SQA.
3. Classify the Software Testing Strategy and Associate it with the Test Environment.
4. Select a Specific Testing Technique and Tool for Software Development.
5. Apply the Test Process on various Software Domains.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code:70619	INFORMATION RETRIEVAL SYSTEMS (Open Elective)	L	T	P
Credits: 4		3	2	-

Prerequisites: Nil

Course Objectives:
This course enables the students to study the fundamentals of DBMS, Data warehouse and Digital libraries, various preprocessing techniques, indexing approaches, various clustering approaches and study different similarity measures. It explores cognitive approaches and search techniques and identifies retrieval techniques in multimedia information systems and query languages.

MODULE I: Information Retrieval Systems and Capabilities　　[13 Periods]
Introduction- Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries. Capabilities- Data Warehouses, Information Retrieval System Capabilities, Search capabilities, Browse capabilities, Miscellaneous capabilities.

MODULE II: Cataloging and Indexing　　[13 Periods]
Cataloging - Objectives, Indexing Process, Automatic Indexing, Information Extraction, Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.
Indexing- Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages.

MODULE III: Clustering and Search Techniques　　[12 Periods]
A: Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters.
B: User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, weighted searches of Boolean systems, Searching the Internet and hypertext.

MODULE IV: Visualization and Evaluation　　[13 Periods]
Information Visualization- Introduction, Cognition and perception, Information visualization technologies, Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems.
Information System Evaluation- Information System Evaluation: Introduction, Measures used in system evaluation, Measurement example – TREC results.

MODULE V: Retrieval Techniques and Libraries　　[13 Periods]
Multimedia Information Retrieval- Multimedia Information Retrieval, Models and Languages, Data Modeling, Query Languages, Indexing and Searching.
Digital Libraries- Libraries and Bibliographical systems, online IR system, OPACs, Digital Libraries.

TEXT BOOKS:
1. Kowalski, Gerald J.Maybury, Mark T, **"Information Storage and Retrieval systems Theory and Implementation"**, 2nd Edition, 2000.
2. Ricardo Baeza-Yate, **"Modern Information Retrieval"**, Pearson Education, 2007.

REFERENCES:
1. David A Grossman and Ophir Frider, **"Information Retrieval: Algorithms and Heuristics",** 2nd Edition, Springer.
2. Frakes, W.B., Ricardo Baeza-Yates, **"Information Retrieval Data Structures and Algorithms",** Prentice Hall, 1992.

E -RESOURCES
1. https://books.google.co.in/books?id=v8CyvsKPdhsCandprintsec=frontcoveranddq=Kowalski,+Gerald+j.Maybury,+Mark+T,+%E2%80%9CInformation+Storage+and+Retrieval+systems+Theory+and+Implementation%22,+2nd+Edition,+2000.andhl=enandsa=Xandved=0ahUKEwiw6PGwmNjTAhWLu48KHXNVAJsQ6AEIITAA#v=onepageandq=Kowalski%2C%20Gerald%20j.Maybury%2C%20Mark%20T%2C%20%E2%80%9CInformation%20Storage%20and%20Retrieval%20systems%20Theory%20and%20Implementation%22%2C%202nd%20Edition%2C%202000.andf=false.
2. https://books.google.co.in/books?id=nsjla44zAfwCandprintsec=frontcoveranddq=Ricardo+BaezaYates,+%E2%80%9CModern+Information+Retrieval%E2%80%9D,+Pearson+Education,+2007andhl=enandsa=Xandved=0ahUKEwjUrLyymdjTAhWJrY8KHeQCAygQ6AEILDAB#v=onepageandqandf=false
3. www.sciencedirect.com/science/article/pii/S1877050916000739
4. cs.ucy.ac.cy/courses/EPL660/lectures.html

Course Outcomes:
On the successful completion of the course, a student will be able to:
1. Recognize the Boolean Model, Vector Space Model, and Probabilistic Model.
2. Explore the indexing techniques.
3. Apply clustering techniques.
4. Examine visualization technologies and system evaluation methods.
5. Classify Information Retrieval utilities.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech		
Code: 72501	INTRODUCTION TO MINING ENGINEERING (Open Elective)	L	T	P
Credits: 4		3	2	-

Prerequisites: Nil

Course Objectives:
To demonstrate the importance of mining in national economy, understand the terminology associated with the discipline and be familiar with the available regulatory mechanism to enable safe & sustainable mining operations. To know the history of mining and describe the correlation between the development of mining and cultural progress. To introduce the field of mining and provide basic input about mining unit operations. To learn the various modes of access and study the methods of designing the access.

MODULE-I: Introduction to mining engineering and Opening up of deposits [**13 Periods**]
Introduction to mining engineering: Significance to mining industry in national economy and infrastructure building, basic mining terminologies, stages in mine life cycle, geo-technical investigations, classification of mining methods and their selection criteria. Opening up of deposits: Types, size and location of entries into underground coal and other minerals.

MODULE-II: Shaft sinking operation [**13 Periods**]
Preliminary geo-technical investigations for a shaft sinking, surface arrangements for sinking shafts and equipment. Methods of sinking shaft in water-logged, pressurized strata in loose and running soils. Mechanized shaft sinking, shaft borers and drop raise method. Need for widening and deepening of operating shafts. Different methods for widening and deepening shafts.

MODULE-III: Development of Workings [**12 Periods**]
A: Drivage of cross cuts, drifts, inclines and raises by conventional and mechanized methods. Calculation of OMS.
B: Arrangements for ventilations, supports, lightings, transportations and drainages. Drilling patterns for underground coal mines and hard rock mines.

MODULE-IV: Mine Supports [**13 Periods**]
Mine supports: Types of support: timber, prop, chock/cog, cross bar, concrete, steel and hydraulic supports. Yielding and rigid supports. Fore poling, roof stitching, roof bolting, applicability, advantages and limitations of various supports, Systematic support rule.

MODULE-V: Tunneling Methods [**13 Periods**]
Conventional method: drilling and blasting method, types of drill patterns, blasting and transportation of muck.
Mechanized method: construction and working principle of tunnel boring machine, applicability, advantages and limitations of tunnel boring machine.
Shield tunneling method: construction and working principle, applicability, advantages and limitations.

TEXT BOOKS:
1. Howard L.Hartman, Jan M.Mutmansky, " **Introductory mining engineering"**, wiley India (P) Ltd.
2. D.J. Deshmukh , "**Elements of mining technology**", Vol-I, Denett & Company .

REFERENCE BOOKS:
1. Roy Piyush Pal, "**Blasting in ground excavations and mines**", Oxford and IBH, 1st edition, 1993.
2. C.P. Chugh, "**Drilling technology handbook**", Oxford and IBH, 1st edition, 1977.

E RESOURCES:
1. https://www.nap.edu/read/10318/chapter/5#23
2. http://www.alta.eu/commodities/mining-technology/surface-mining/long-distance-belt-conveyors/

Course Outcomes:
At the end of the course, students will be able to:
1. Know the status and significance of mining Industry
2. Know about different methods of Shaft sinking operations
3. Know about Development workings
4. Know about different types of supports, their advantages and disadvantages
5. Know about different tunneling methods.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech		
Code: 7B159	TRAINING AND ORGANISATIONAL DEVELOPMENT (Open Elective)	L	T	P
Credits: 4		3	2	-

PREREQUISITES: NIL

COURSE OBJECTIVE:
To enable the students to understand the design of training, implementation and evaluation of training programs in the organization.

MODULE I: Training in organizations [14 Periods]
Introduction to training: Trends in training, Career opportunities in training, important concepts and meanings, Integrating OD.
Strategy and training, understand motivation and performance, aligning training design with learning process.

MODULE II: Training Need analysis [12 Periods]
Need Analysis and Training design: The Training Need Analysis (TNA) Model, TNA and Design, organizational constraints.
Developing objectives, Facilitation of learning and training transfer to the job, design theory.

MODULE III: Training methods [12 Periods]
A: Introduction to methods of training: Matching methods with outcomes, lectures and demonstrations, games and simulations.
B: Onjob Training, computer based training (CBT).

MODULE – IV: Implementation & Evaluation of Training [12 Periods]
Development of training, implementation, transfer of training, major players in training & development.
Rational for evaluation, resistance to training evaluation, types of evaluation.

MODULE V: Organization Development [14 Periods]
Organisational development- An introduction: Organisational Development – Meaning and Definition, History of OD, Relevance of Organisational Development for Managers, Characteristics of OD, Assumptions of OD.

Change Process and Models: Organisational Change, Strategies for Change, Theories of Planned Change (Lewin's change model, Action research model, the positive model), Action Research as a Process, Resistance to Change.

TEXT BOOKS:
1. Anjali Ghansekar **"Training & Development"** Everest, 2013.
2. G Pandu Naik **"Training & Development"** Excel Books, 2012.

REFERENCE BOOKS:
1. P.Nick Blanchard, James W. Thacker, A.Anand Ram, **"Effective Training 4e"**, Pearson, 2012.
2. B,Rathan Reddy **" Effective Human Resource Training & Developing Strategy"** Himalaya,2012.
3. Rolf Lynton, Uday Pareek **"Training for Development"** Sage, 2012.
4. P L Rao : HRD Trainer's Handbook of Management Games, Excel, 2013.
5. Pepper, Allan D, **"Managing the Organisational Development function"**, Aldershot, Gower, 1984.

E RESOURCES:
1. https://hr.unm.edu/employee-and-organizational-development
2. http://managementhelp.org/organizationalchange/
3. https://ww2.mc.vanderbilt.edu/vmgtod/
4. http://nptel.ac.in/courses/122105020/9
5. http://nptel.ac.in/courses/122105020/18

Journals : Vikalpa, IIMA, IIMB Review, Decision, IIMC, Vision, HBR.

Course Outcomes:
At the end of the course, students will be able to:
1. Understand the basic concepts of training and development in an organization.
2. Design a training programme with the knowledge of need analysis.
3. Know about the various training methods that are used in organizations.
4. Know the process of implementation and evaluation of training methods.
5. Gain knowledge of various areas of organizational training.

Prerequisite: Nil

Course Objective: To build business English vocabulary and grammar through lessons on the latest topics in the business world and to upgrade the learners communication and presentation skills and make the students competent in communication at an advanced level. In addition to the earlier mentioned, this course gives a room to groom the learners' personality and make the students self-confident individuals by mastering inter-personal skills, team management skills, and leadership skills by giving hands-on experience about business presentations and attending team meetings.

Introduction:
Effective communication and interpersonal skills are crucial to increase employment opportunities and to compete successfully in the Global market. The real key to the effectiveness of professionals is their ability to put their domain knowledge into effective practice. Every employer today, looks for an extra edge in their employees. The rapid change in the corporate world asks for proper communication skills in almost all kinds of fields. This course is designed to enhance overall communication skills and soft skills amongst the learners including "How to win interviews". The course content for Business Communication and Soft Skills has been developed keeping in mind the standard of Indian students and the industry requirements.

MODULE I: Communication Skills [13 Periods]
Types of communication-Oral, aural and written, reading-Word Power-Vocabulary-technical vocabulary, Rate of speech- pitch, tone-clarity of voice.

MODULE II: Conversation Skills [13 Periods]
Informal and Formal conversation, Verbal and Non - verbal communication. Barriers to effective communication - Kinesics

MODULE III: Reading Skills [13 Periods]
Types of reading–reading for facts, guessing meaning from context, strategies of reading- scanning, skimming, inferring meaning, critical reading.

MODULE IV: Writing and Composition [13 Periods]
Letter-writing-business letters-pro forma culture-format-style-effectiveness, promptness-Analysis of sample letters collected from industry-email, fax, Essay writing-nuances of essay writing, types of essays.

MODULE V: Writing Skills [12 Periods]
Characteristics of writing – mechanics of writing – methodology of writing – format & style-structures of writing – circular writing – memo writing – instructions writing, Report Writing.

REFERENCE BOOKS:

1. Rajendra Pal S Korlaha ,**Essentials of Business Communication**, Hi: Sultan Chand & Sons, New Delhi.
2. Andrew J. Rutherford , **Basic Communication Skills for Technology**,: Pearson Education Asia, Patparganj, New Delhi-92.
3. V. Prasad, **Advanced Communication skills**, Atma Ram Publications, and New Delhi.
4. Raymond V. Lesikav; John D.Pettit Jr.; **Business Communication: Theory & application**, All India Traveler Bookseller, New Delhi-51
5. R K Madhukar, **Business Cimmunication**, Vikas Publishing House Pvt Ltd

E-RESOURCES

1. https://blog.udemy.com/types-of-communication/ (Communication Skills)
2. https://www.skillsyouneed.com/ips/conversational-skills.html (Conversation Skills)
3. http://lrs.ed.uiuc.edu/students/jblanton/read/readingdef.htm (Reading Skills)
4. https://www.thoughtco.com/what-is-composition-english-1689893(Writing and composition)
5. http://www.mansfield.edu/fye/upload/Academic-Reading-Skills.pdf (Reading Skills)
6. http://www.journals.aiac.org.au/index.php/IJALEL/article/view/2471 (Writing Skills)
7. https://www.youtube.com/watch?v=cQruENyLNYI&list=PLbMVogVj5nJSZB8BV29_sPwwkzMTYXpaH   (Communication Skills)
8. https://www.youtube.com/watch?v=p1-etClsXdk&index=5&list=PLbMVogVj5nJSZB8BV29_sPwwkzMTYXpaH   (Conversa**tion Skills)**

Course Outcomes:

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

1. Understand the importance of various forms of non-verbal communication.
2. Participate confidently in business meetings.
3. Gain an understanding about different types of reading skills and employ the same during competitive exams.
4. Recognize the importance of writing in real time situations.
5. Improve the skills necessary to meet the challenge of using English in the business world.

Pre-requisite: Nil

Course Objective: The objective of this course is to familiarize the prospective engineers with techniques in multivariate analysis, some useful special functions. It deals with acquainting the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their profession.

MODULE I: Fourier Series   **[13 Periods]**
Determination of Fourier coefficients, Fourier series, even and odd functions, Half range Fourier sine and cosine expansions. Fourier series in an arbitrary interval - Fourier series for even and odd periodic functions, Half range Fourier sine and cosine expansions.

MODULE II: Fourier Transforms: **[13 Periods]**
Fourier integral theorem - Fourier sine and cosine integrals. Fourier transforms – Fourier sine and cosine transforms – properties – inverse transforms - Finite Fourier transforms – Parsvel's Identity.

MODULE III: Z-transforms   **[12 Periods]**
A: Introduction: Definition, Region of convergence, Linearity property, Damping rule, shifting theorems multiplication theorem, initial value theorem, final value theorem.
B: Inverse z-transforms: power series method, partial fraction method, convolution theorem. Application of z-transforms: difference equations.

MODULE IV: Applications of Single Variable   & Curve tracing   **[13 Periods]**
Applications of Single Variable Radius, centre and circle of curvature , Evolutes – Envelopes.
Curve tracing in Cartesian, Polar and parametric co-ordinates.

MODULE V: Series Solution of ODE & Integration applications: **[13 Periods]**
Series Solution of ODE: Motivation for series solution, Ordinary point and Regular singular point of a differential equation, Series solutions to differential equations around zero , Frobenius Method about zero.
Integration applications: Riemann sums, Integral representation for lengths – areas – volumes & surface areas in Cartesian and polar coordinates

TEXT BOOKS:

1. Kreyszig "**Advanced engineering Mathematics**" John Wiley & Sons, 10th Edition, 2010.
2. B.S. Grewal "**Higher Engineering Mathematics**" Khanna Publishers, 43rd Edition, 2014.

REFERENCE:
1. R.K. Jain & S.R.K. Iyengar "**Advanced Engineering Mathematics**" Narosa Publications, 4th edition 2014.

2. Dr.M.D. Raisinghania **" Ordinary and Partial differential Equations "** S. Chand , 18th Edition
3. Tom M Apostle **"Calculus – Volume-I & II"**, 2nd Edition, Wiley Publications.

E-RESOURCES
1. https://see.stanford.edu/materials/lsoftaee261/book-fall-07.pdf
2. http://www.gnindia.dronacharya.info/ECE2Dept/Downloads/question_papers/ISem/Engg-Maths1/UNIT-1/Curve-tracing.pdf
3. http://ask.fxplus.ac.uk/tools/HELM/pages/workbooks_1_50_jan2008/Workbook21/21_4_eng_app_z_trnsfms.pdf
4. http://www.maths.surrey.ac.uk/hosted-sites/R.Knott/Fibonacci/fib.html
5. http://tutorial.math.lamar.edu/Classes/DE/SeriesSolutions.aspx

Course Outcomes:
After completion of the course, students will be able to:
1. Understand the applications of Fourier series in signal processing, structural Engg. Etc.,
2. Understand the properties of Fourier Transforms in real time applications in earth quake detection etc.,
3. Understand the properties of Z-Transforms in real time applications in all engineering applications.
4. Understand the application of function of single variables.
5. Understand the series solution of the ordinary differential equations, the Frobenious method and applications of Frobenious Series. Also understands the length of a curve, volume and surface revolution.

Prerequisites: Nil

Course Objective: The objective of this course is to make the students familiar with the recent advanced concepts in physics

MODULE I: Special Theory of Relativity: [13 Periods]

Introduction, Concept of theory of relativity, Frames of reference-Inertial, non-inertial; Galilean transformation equations, Michelson-Morley experiment, Einstein theory of relativity, Lorentz transformation of space and time, Length contraction, Time dilation, Variation of mass with velocity, Relativistic relation between energy and momentum.

MODULE II: Holography [13 Periods]

Introduction, Basic principle, Construction and Reconstruction of Hologram, Properties of Hologram, Types of Holograms, Applications- Holographic Interferometry, Acoustic Holography, Holographic Microscopy.

MODULE III: Thin films Synthesis and Characterization [14 Periods]

A: Synthesis Introduction, Deposition techniques-Pulsed Laser Deposition (PLD), Spray Pyrolysis; Nucleation and growth of the thin films, properties (Mechanical, Electrical, Magnetic and Optical).
B: Characterization X-Ray Photoelectron Spectroscopy (XPS), Energy Dispersive X-Ray Analysis (EDAX), Principles and applications of X-Ray Diffraction, Electron Diffraction, Atomic Force Microscopy.

MODULE IV: Photonic Crystals [12 Periods]

Important features of photonic crystals, Presence of photonic band gap, anomalous group velocity dispersion, Micro cavity, effects in Photonic Crystals, fabrication of photonic Crystals, Dielectric mirrors and interference filters, PBC based LEDs, Photonic crystal fibers (PCFs), Photonic crystal sensing.

MODULE V: Solar cell Physics [12 Periods]

Single, poly and amorphous silicon, GaAs, CdS, Cu_2S, CdTe; Origin of photovoltaic effect, Homo and hetero junction, working principle of solar cell, Evaluation of Solar cell parameters, I-V, C-V and C-f characteristics.

TEXT BOOKS

1. R K Gaur and SL Gupta, "**Engineering Physics",** Dhanpat Rai Publications, 8th revised Edition, 2006.
2. B K Pandey and S Chaturvedi, "**Engineering Physics",** Cengage Learning India, Revised Edition, 2014.

REFERENCES:

1. R F Bun shah, "**Hand Book of Technologies for Films and coating",** Noyes publishers, 1st Edition, 1996.
2. B E A Saleh and A C Tech, "**Fundamentals of Photonics",** John Wiley and Sons**,** New York, 1st Edition, 1993.
3. K L Chopra and S R Das, "**Thin film Solar Cells",** Plenum press, 1st Edition 1983**.**
4. K Vijaya Kumar, T Sreekanth and S Chandralingam, "**Engineering Physics",** S Chand and Co 1st Edition, 2008.

E-RESOURCES:

1. http://physics.mq.edu.au/~jcresser/Phys378/LectureNotes/SpecialRelativityNotes.pdf
2. http://www.kfupm.edu.sa/centers/CENT/AnalyticsReports/KFUPM-TFSC-Dec20.pdf
3. https://www.journals.elsevier.com/solar-energy-materials-and-solar-cells
4. https://www.journals.elsevier.com/journal-of-alloys-and-compounds/
5. http://aip.scitation.org/journal/apl
6. http://nptel.ac.in/courses/115101011/
7. http://nptel.ac.in/courses/117103066/11
8. https://www.youtube.com/watch?v=JygZofoFNfE

Course Outcomes:

After completion of this course, students will be able to

1. Be aware of the concepts of special theory of relativity.

2. Analyze the basic concepts of Holography and applications.

3. Acquire the knowledge on synthesis methods of thin films and their characterization techniques.

4. Develop basic knowledge on the photonic crystals

5. Apply the basic concepts of solar cell physics.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech.	
Code: 70B20	CHEMISTRY OF ENGINEERING MATERIALS (Open Elective)	L	T	P
Credits: 4		3	2	-

Pre-requisite: Nil

Course Objective: The objective is to make the students know about the Concept of phase rule and alloys, phase diagrams of different systems. To give knowledge to the students regarding lubricants, abrasives, glass, ceramics, re-fractories and adhesives. To make the students to understand the basic concepts of chemistry to develop futuristic materials for high-tech applications in the area of engineering.

MODULE I: Phase Rule and Alloys [13 Periods]
Phase Rule: Definition of terms : Phase, component, degree of freedom, phase rule equation. Phase diagrams – one component system- water system. Two component system Lead- Silver, cooling curves, heat treatment based on iron-carbon phase diagram - hardening, annealing and normalization. Alloys-fabrication of alloys-Ferrous alloys-Non ferrous alloys-industrial applications.

MODULE II: Lubricants, Abrasives and Adhesives [13 Periods]
Introduction to Lubricants-Mechanism of Lubrication-classification of Lubricants-properties of lubricants-viscosity, flash and fire points, cloud and pour points, decomposition stability, saponification number. Abrasives- natural and artificial abrasives-grinding wheels-abrasive paper and cloth. Adhesives- classification -action of adhesives- factors influencing adhesive action development of adhesive strength.

MODULE III: Cement and Concrete [13 Periods]
A: Introduction-Classification of cement-natural –chemical composition of cement-portland cement-chemical reactions involved in setting and hardening of cement.
B: Additives for cement- mortars and concretes-pre stressed concrete-post tensioning-curing-overall scenario of cement industry-Reinforced concrete constructions-testing and decaying of cement-prevention of cement decay.

MODULE IV: Glass, Ceramics and Refractories [13 Periods]
Structure of glass-properties-Manufacturing of glass-Types of glasses-uses Ceramics-clays-methods for fabrication of ceramic ware plasticity of clays. Ceramic products-glazes. Porcelain and vitreous enamels. Requisites of a good refractory-classification, properties and applications of refractories.

MODULE V: Polymers and Composite Materials [12 Periods]
Structure and properties of polymers-rubber –classification-vulcanization of rubber –preparation properties and application of Buna-S and Buna-N and Thiokol rubber.Biogradable polymers- poly vinyl acetate and poly lactic acid. Liquid crystals-Introduction-structure of liquid crystal forming compounds-classification-chemical properties-importance and applications.

TEXT BOOKS:
1. P.C.Jain and Monica Jain, "**A text Book of Engineering Chemistry"**, DhanpatRai Publications, New Delhi, 12th Edition 2006.
2. M.Thirumala Chary and E.Laxminarayana, **"Engineering Chemistry"** by SciTech publications (INDIA) PVT Ltd, Third Edition,2016.

REFERENCE BOOKS:

1. B.Rama Devi, Ch.Venkata Ramana Reddy and Prasantha Rath,**"Text Book of Engineering chemistry"** by Cengage Learning India Pvt.Ltd,2016.
2. F.W. Billmeyer, "**Text Book of Polymer Science**", John Wiley & Sons, 4th Edition, 1996.
3. M.G. Fontana, N. D. Greene, "**Corrosion Engineering**", McGraw Hill Publications, New York, 3rd Edition, 1996.
4. B.R.Puri,L.R.Sharma&M.S.Pathania,"**Principles of Physical Chemistry**",   S.Nagin Chand &Co., New Delhi, 23rd Edition, 1993.
5. G.A.Ozin and A.C. Arsenault,"**Nanochemistry: A Chemical Approach to Nanomaterials**", RSC Publishing, 3rd Edition, 2005.

E RESOURCES

1. www.istl.org/02-spring/internet.html (Basics on materials)
2. https://books.google.co.in/books?id=J_AkNu-Y1wQC (fuels and lubricants hand book)
3. Journal of materials science (Springer publishers)
4. Journal of materials science and technology (Elsevier publishers)
5. nptel.ac.in/courses/105102012/ (Cement concret technology)
6. nptel.ac.in/courses/112102015/22 (lubricants)

Course Outcomes

After completion of the course, students will be able to

1. Interpret the vitality of phase rule in metallurgy and application of phase rule to one and two component systems.
2. Students know the usage of lubricants in different temperature conditions.
3. The immense importance of basic constructional material, Portland cement in Civil Engineering works.
4. To acquire the knowledge about properties and applications of glass, ceramics and refractories.
5. Students will know vulcanization of rubber, bio-degradable polymers and liquid crystals.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech.	
		L	T	P
Code: 70103	SURVEYING (Open Elective)			
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives: Student will be able to learn and understand the various basic concept and principles used in surveying like Chain Surveying, Compass Surveying, Plane Table Surveying, the field applications and concepts of leveling survey.

MODULE I: Introduction to Basic Concepts [09 Periods]

Introduction, Objectives, classifications and Principles of surveying, Scales, Shrinkage of maps, conventional symbols and code of signals, Surveying Accessories, phases of surveying.

MODULE II: Plane Table Survey [10 Periods]

Instruments employed in plane table survey. Use and adjustment of these instruments including simple alidade. Setting up of the table, Various methods of plane table survey: Radiation method of plane tabling, Intersection or triangulation method of plane tabling, Traversing method of plane tabling, Resection method of plane tabling. Three point and two point problems, errors in plane table survey. Advantages and disadvantages of plane tabling.

MODULE III: Measurement of Distances and Directions: [10 Periods]

A. Linear Distances: Approximate methods, direct methods-chains – tapes, ranging- tape corrections, indirect methods- optical methods –E.D.M methods.
B. Prismatic Compass: Bearings Included Angles, Local Attraction, Magnetic Declination and Dip.

MODULE IV: Leveling and Contouring [09 Periods]

Basic definitions, types of levels and leveling staves, Temporary and permanent adjustments-method of leveling. Booking and determination of levels-HI method – Rise and fall method, effect of curvature if earth and refraction,
Characteristics and Uses of contours, Direct and indirect methods of contour surveying, interpolation and sketching of Contours.

MODULE V: Computation of Areas and Volumes [10 Periods]

Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries, Planimeter. **Volumes**: Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

TEXT BOOKS:

1. B.C.Punmia Ashok Kumar Jain and Arun Kumar Jain "**Surveying**" (Vol – 1, 2 & 3), Laxmi Publications (P) ltd., 14th Edition, 2014.
2. Duggal S K, "**Surveying**" (Vol – 1 & 2), Tata Mc.Graw Hill Publishing Co. Ltd. 4th Edition, 2004.

REFERENCES:
1. Arora K R "**Surveying Vol 1, 2 & 3**", Standard Book House, Delhi, 15th Edition, 2015
2. Chandra A M, "**Plane Surveying**", New age International Pvt. Ltd., Publishers, New Delhi, 3rd Edition 2015.
3. Chandra A M, "**Higher Surveying**", New age International Pvt. Ltd., Publishers, New Delhi, 3rd Edition 2015.

E RESOURCES
1. http://www.whycos.org/fck_editor/upload/File/Pacific
2. http://nptel.ac.in/courses/105107122/
3. https://www.youtube.com/watch?v=chhuq_t40rY

Course Outcomes:

At the end of the course, students will be able to
1. Apply basic geometry to detect difference in plane and arc distance over "spherical" earth surface for typical length survey projects.
2. Identify the importance of the compass survey and its practical applications.
3. Apply basic methods and applications of plane Table survey.
4. Identify the field applications and concepts of leveling survey.
5. Identify the different methods of calculation of area, contouring and measurement of volumes.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 70150	**GREEN BUILDINGS**	L	T	P
Credits: 3	(Open Elective)	3	-	-

Prerequisite: Nil

Course Objective: The purpose of the course is provide an overview of emerging delivery systems for high performance green buildings and the basis on which their sustainability can be evaluated.

MODULE I: [09 Periods]

Introduction to green buildings, green materials, sources of green materials, high-performance green buildings Impacts of building construction, operation, and disposal Methods and tools for building assessment, Green Globes

MODULE II: [10 Periods]

The green building process, Design and construction relationships, benefits of green building quality, healthy and safe environments , Site and landscape strategies.

MODULE III: [10 Periods]

A: Building energy system strategies, Water cycle strategies, Materials selection strategies, Indoor Environmental Quality [IEQ]
B: Analysis and strategies, Construction, team responsibilities and controls, Building commissioning strategies

MODULE IV: [09 Periods]

Economic issues and analysis, Use of the Green Strategies cost estimating tool, Future directions in green, high performance building technologies

MODULE V: [10 Periods]

Carbon accounting Green Building Specification, Case Study on green buildings, Net Zero Energy Buildings, Sustainable Constructions in civil Engineering.

TEXT BOOKS:
1. Abe Kruger and Carl Seville, **" Green Building, Principles and Practices in Residential Construction**", Cengage Publications, 1st edition, 2012.
2. Ross Spiegel, Dru Meadows, **"Green Building Materials: A Guide to Product Selection and Specification"**, 3rd Edition, 2010.

REFERENCES:
1. Charles J. Kibert, **"Sustainable Construction: Green Building Design and Delivery**", 2012.

E RESOURCES:
1. http://www.ncrec.gov/Pdfs/bicar/GreenBuilding.pdf

Course Outcomes:
At the end of the course, students will be able to
1. Identify green building materials and their sources.
2. Understand the construction process of green buildings and their benefits quality, healthy and safe environments.
3. Learn the strategies to construct green buildings.
4. Identify the issues a raised due to construction of green buildings.
5. Gain knowledge on the case studies of green buildings.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 70227	**ENERGY AUDIT AND CONSERVATION**	**L**	**T**	**P**
Credits: 3	**(Open Elective)**	**3**	**-**	**-**

Prerequisites: Nil

Course Objectives: This course deals about the concept of energy conservation, energy management and different approaches of energy conservation in industries, economic aspects of energy conservation project and energy audit in commercial and industrial sector.

MODULE I: Basic Principles of Energy Audit   [9 Periods]
Energy audit - definitions, concept , types of audit, energy index, cost index , pie charts, Sankey diagrams, load profiles, Energy conservation schemes - Energy audit of industries - Energy saving potential, energy audit of process industry, thermal power station, building energy audit.

MODULE II: Energy Management   [9 Periods]

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting, Energy manger, Qualities and functions, language, Questionnaire - check list for top management.

MODULE III: Energy Efficient Motors   [10 Periods]
A: Energy efficient motors, factors affecting efficiency, loss distribution, constructional details.
B: Characteristics - Variable speed, variable duty cycle systems, RMS hp - Voltage variation - Voltage unbalance - Over motoring - Motor energy audit.

MODULE IV: Power Factor Improvement, Lighting & Energy Instruments   [10 Periods]

Power Factor Improvement, Lighting: Power factor – Methods of improvement, location of capacitors, Pf with non linear loads, effect of harmonics on power factor. Power factor motor controllers - Good lighting system design and practice, lighting control, lighting energy audit.
Energy Instruments: Watt meter, data loggers, thermocouples, pyrometers, lux meters, tongue testers , application of PLC's.

MODULE V: Economic Aspects and Analysis   [10 Periods]
Economics Analysis - Depreciation Methods, time value of money, rate of return, present worth method , replacement analysis, life cycle costing analysis - Energy efficient motors, Calculation of simple payback method, net present worth method - Power factor correction, lighting - Applications of life cycle costing analysis, return on investment.

TEXT BOOKS
1. W.R. Murphy and G. Mckay, **"Energy Management",** Butter Worth Publications.
2. John. C. Andreas, **"Energy Efficient Electric Motors",** Marcel Dekker Inc Ltd, 2nd Edition, 1995.

REFERENCES
1. Paul O' Callaghan, **"Energy Management",** Mc-Graw Hill Book Company, 1st Edition, 1998.
2. W.C.Turner, **"Energy Management Hand Book",** A John Wiley and Sons.
3. S. C. Tripathy, **"Utilization of Electrical Energy"**, Tata McGraw Hill, 1993.
4. Guide books for National Certification Examination for Energy Manager / Energy Auditors Book-1, General Aspects (available online).
5. L.C. Witte, P.S. Schmidt and D.R.Brown, **"Industrial Energy Management and Utilization",** Hemisphere Publication, Washington, 1998.

E - RESOURCES
1. http://industrialelectricalco.com/wp-content/uploads/2014/01/Understanding-Energy-Efficient-Motors-EASA.pdf
2. https://beeindia.gov.in/
3. https://beeindia.gov.in/sites/default/files/3Ch10.pdf

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

1. Examine the principles of Energy audit and its process in thermal power station, industries.
2. Analyze the different aspects of energy management.
3. Describe the characteristics of energy efficient motors.
4. Illustrate the power factor improvement, good lighting system practice and the types of energy instruments
5. Analyze the economic aspects of Energy Management.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 70240	ENERGY STORAGE SYSTEMS (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives: This course deals with the need for electrical energy storage, different electrical storage technologies, types and features of energy storage systems and the applications of electrical energy storage.

MODULE I: ELECTRICAL ENERGY STORAGE TECHNOLOGIES   10 Periods

Characteristics of electricity, Electricity and the roles of EES, High generation cost during peak-demand periods, Need for continuous and flexible supply, Long distance between generation and consumption, Congestion in power grids, Transmission by cable.

MODULE II: NEEDS FOR ELECTRICAL ENERGY STORAGE   10 Periods

Emerging needs for EES, More renewable energy, less fossil fuel, Smart Grid uses. The roles of electrical energy storage technologies, The roles from the viewpoint of a utility, The roles from the viewpoint of consumers, The roles from the viewpoint of generators of renewable energy.

MODULE III: FEATURES OF ENERGY STORAGE SYSTEMS   10 Periods

A: Classification of EES systems, Mechanical storage systems, Pumped hydro storage (PHS), Compressed air energy storage (CAES), Flywheel energy storage (FES).
B: Electrochemical storage systems, Secondary batteries, Flow batteries, Chemical energy storage, Hydrogen (H2), Synthetic natural gas (SNG).

MODULE IV: TYPES OF ELECTRICAL ENERGY STORAGE SYSTEMS   9 Periods

Electrical storage systems, Double-layer capacitors (DLC), Superconducting magnetic energy storage (SMES), Thermal storage systems, Standards for EES, Technical comparison of EES technologies.

MODULE V: APPLICATIONS   9 Periods

Present status of applications, Utility use (conventional power generation, grid operation & service) , Consumer use (uninterruptable power supply for large consumers), New trends in applications ,Renewable energy generation, Smart Grid, Smart Micro grid, Smart House, Electric vehicles, Management and control hierarchy of storage systems, Internal configuration of battery storage systems, External connection of EES systems , Aggregating EES systems and distributed generation (Virtual Power Plant), Battery SCADA– aggregation of many dispersed batteries.

TEXT BOOKS
1. James M. Eyer, Joseph J. Iannucci and Garth P. Corey, **"Energy Storage Benefits and Market Analysis"**.
2. **"The Electrical Energy Storage",** IEC Market Strategy Board.

REFERENCES
1. Jim Eyer, Garth Corey, **"Energy Storage for the Electricity Grid: Benefits and Market Potential Assessment Guide, Report",** Sandia National Laboratories, Feb 2010.

E - RESOURCES
1 http://nptel.ac.in/courses/108105058/
2 http://www.nptel.ac.in/courses/108103009/pdf/lec33.pdf

Course Outcomes

At the end of the course, students will be able to
1. Understand the different types of electrical energy storage technologies.
2. Learn about the need for electrical energy storage.
3. Comprehend the various features energy storage systems.
4. Understand the various types of electrical energy storage systems.
5. Emphasize the various applications of electrical energy storage.

2017-18 Onwards (MR-17)	**MALLA REDDY ENGINEERING COLLEGE** (Autonomous)	**B.Tech.**		
Code:70347	**RENEWABLE ENERGY SOURCES**	**L**	**T**	**P**
Credits: 3	**(Open Elective)**	**3**	**-**	**-**

Prerequisites: Nil

Course Objectives:
The objective of this subject is to provide knowledge about different non-conventional energy sources.

MODULE I: Principles of Solar Radiation   [10 Periods]
Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

MODULE II: Solar Energy   [10 Periods]
Solar Collectors: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.
Solar Energy Storage and Applications: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

MODULE III: Wind Energy & Bio-Mass   [10 Periods]
A: Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria.
B: Bio-Mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C. Engine operation and economic aspects.

MODULE IV: Geothermal Energy & Ocean Energy   [09 Periods]
Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India. Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants and their economics.

MODULE V: Direct Energy Conversion   [09 Period]
Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, merit, materials, applications. MHD generators - principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems. Electron gas dynamic conversion - economic aspects. Fuel cells - Principles of Faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

TEXT BOOKS

1. G.D. Rai, "**Non-Conventional Energy Sources",** Khanna publishers , 2011.

2. Tiwari and Ghosal, "**Renewable Energy Resources"**, Narosa Publishing House, 2007.

REFERENCES

1. Twidell& Weir, "**Renewable Energy Sources",** Taylor and Francis Group Publishers-2015.
2. Sukhatme, **"Solar Energy",** McGraw-Hill-third edition-2008
3. B.S Magal Frank Kreith& J.F Kreith "**Solar Power Engineering",** McGraw-Hill Publications-2010.
4. Frank Krieth& John F Kreider, "**Principles of Solar Energy",** McGraw-Hill-1981.
5. Ashok V Desai,"**Non-Conventional Energy**", New International (P) Limited-2003.

E - RESOURCES

1. nptel.ac.in/courses/112105051/
2. https://www.vssut.ac.in/lecture_notes/lecture1428910296.pdf
3. faculty.itu.edu.tr/onbasiogl1/DosyaGetir/62002
4. https://www.journals.elsevier.com/renewable-energy/
5. www.ijrer.org

Course Outcomes

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

1. Understand the principles of solar radiation
2. Recognize solar collectors, Solar energy storage and its applications
3. Classify the harvesting of wind energy & bio-mass energy.
4. Understand the harvesting of geothermal energy & ocean energy.
5. Apply the direct energy conversion methods

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 70351	TOTAL QUALITY MANAGEMENT (Open Elective)	L	T	P
Credits:3		3	-	-

Prerequisites: Nil

Course Objectives:

To give the students an overview of quality and TQM and explaining the salient contributions of Quality Gurus like Deming, Juran and Crosby and general barriers in implementing TQM and also get basic knowledge about ISO.

MODULE I: Introduction   [10 Periods]
Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Quality statements - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, and Customer retention - Costs of quality.

MODULE II: TQM Principles   [10 Periods]
Leadership - Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

MODULE III: Statistical Process Control (SPC)   [10 Periods]
A: Statistical fundamentals – Measures of central Tendency and Dispersion - Population and Sample.
B: Control Charts for variables and attributes, Industrial Examples. Process capability. Concept of six sigma – New seven Management tools.

MODULE IV: TQM Tools   [9 Periods]
Bench marking -Reason to bench mark, Bench marking process - FMEA - Stages, Types. Quality Function Deployment (QFD) - House of Quality - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures

MODULE V: Quality Systems   [9 Periods]
Need for ISO 9000 and Other Quality Systems - ISO 9000-2008 Quality System - Elements, Implementation of Quality System Documentation, Quality Auditing - QS 9000 - ISO 14000 - ISO 18000, ISO 20000, ISO 22000 TS 16949, ISO 14000, AS9100– Concept, Requirements and benefits – case studies.

TEXT BOOKS
1. Dale H. Besterfiled, "Total Quality Management", Third Edition, Pearson Education Asia, Indian Reprint, 2010.
2. Subburaj Ramasamy" Total Quality Management" Tata Mcg raw hill edition, 2012.

REFERENCES
1. Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2011.
2. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012.
3. Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.
4. Dr S. Kumar, "Total Quality Management", Laxmi Publications Ltd., New Delhi 2015.
5. P. N. Muherjee, "Total Quality Management", Prentice Hall of India, New Delhi, 2006.
6. Poornima M. Charantimath "Total Quality Management" Pearson publications,2011.

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1. https://src.alionscience.com/pdf/RAC-1ST/SOAR7_1st_Chapter.pdf
2. https://onlinecourses.nptel.ac.in/noc17_mg18
3. nptel.ac.in/courses/122106032/Pdf/4_2.pdf
4. www.thecqi.org
5. www.emeraldinsight.com/journal/tqm
6. www.emeraldinsight.com/doi/pdf/10.1108/09544789710367712
7. www.statit.com/statitcustomqc/StatitCustomQC_Overview.pdf

Course outcomes
At the end of the course, students will be able to
1. Gain basic knowledge in total quality management relevant to both manufacturing and service industry
2. Implement the basic principles of TQM in manufacturing and service based organization.
3. Apply various SPC tools in real time manufacturing and service industry
4. Implement various TQM tools like FMEA & QFD.
5. Apply various ISO Standards for real time applications

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 70430	DIGITAL DESIGN USING VERILOG HDL (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives: This course introduces the concepts associated with understanding of VLSI Design flow and Verilog language constructs, the Gate level ,behavioral ,switch level and dataflow design descriptions of verilog and also the sequential circuits modeling using verilog and Testing methods.

MODULE I: Introduction to Verilog HDL [8 Periods]
Verilog as HDL, Levels of Design Description, Concurrency, Simulation and Synthesis, Function Verification, System Tasks, Programming Language Interface, MODULE, Simulation and Synthesis Tools.
Language Constructs and Conventions: Introduction, Keywords, Identifiers, White space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data types, Scalars and Vectors, Parameters, Operators.

MODULE II: Gate Level & Data Flow Modeling [10 Periods]
Gate Level Modeling: Introduction, AND Gate Primitive, MODULE Structure, Other Gate Primitives, Illustrative Examples, Tristate Gates, Array of Instances of Primitives, Design of Flip – Flops with Gate Primitives, Delays, Strengths and Construction Resolution, Net Types, Design of Basic Circuit.
Modeling at Dataflow Level: Introduction, Continuous Assignment Structure, Delays and Continuous Assignments, Assignment to Vectors, Operators.

MODULE III: Behavioral Modeling [10 Periods]
A: Introduction, Operations and Assignments, Functional Bifurcation, 'Initial' Construct, 'Always' Construct, Assignments with Delays, 'Wait' Construct, Multiple Always Block, Designs at Behavioral Level, Blocking and Non- Blocking Assignments,
B: The 'Case' Statement, Simulation Flow 'If' an 'If-Else' Constructs, 'Assign- De-Assign' Construct, 'Repeat' Construct, for Loop, 'The Disable' Construct, 'While Loop', Forever Loop, Parallel Blocks, 'Force- Release, Construct, Event.

MODULE IV: Switch Level Modeling [10 Periods]
Switch Level Modeling: Basic Transistor Switches, CMOS Switches, Bi Directional Gates, Time Delays With Switch Primitives, Instantiation with 'Strengths' and 'Delays', Strength Contention with Trireg Nets.
System Tasks, Functions and Compiler Directives: Parameters, Path Delays, MODULE Parameters, System Tasks and Functions, File Based Tasks and Functions, Computer Directives, Hierarchical Access, User Defined Primitives.

MODULE V: Sequential Circuit Description and Testing [10 Periods]
Sequential Circuit Description: Sequential Models - Feedback Model, Capacitive Model, Implicit Model, Basic Memory Components, Functional Register, Static Machine Coding, Sequential Synthesis

Component Test and Verification: Test Bench- Combinational Circuit Testing, Sequential Circuit Testing, Test Bench Techniques, Design Verification, Assertion Verification.

TEXT BOOKS:
1. T R. Padmanabhan, B Bala Tripura Sundari, **"Design Through Verilog HDL"**, Wiley, 2009.
2. Zainalabdien Navabi, **"Verilog Digital System Design"**, TMH, 2nd Edition, 1999.

REFERENCES:
1. Stephen Brown, Zvonkoc Vranesic, **"Fundamentls of Digital Logic with Veilog Design"**, TMH, 2nd Edition, 2010.
2. Sunggu Lee, **"Advanced Digital Logic Design using Verilog, State Machine & Synthesis for FPGA"**, Cengage Learning, 2012.
3. Samir Palnitkar, **"Verilog HDL"**, Pearson Education, 2nd Edition, 2009.
4. Michel D. Ciletti, **"Advanced Digital Design with the Verilog HDL"**, PHI, 2009.

E-RESOURCES:
1. https://www.tutorialspoint.com/vlsi_design/vlsi_design_verilog_introduction.htm
2. http://www.asic-world.com/verilog/first1.html
3. https://doaj.org/article/4f07787948ce4bfc9c468f1cbcf9e190
4. http://nptel.ac.in/courses/106105083/

Course Outcomes:

At the end of the course, students will be able to:
1. Understand overview of Verilog HDL programming and its language constructs.
2. Write Verilog HDL Program for Gate level modeling and dataflow modeling of digital circuits.
3. Understand behavioral modeling constructs and can able to write Verilog HDL program with behavioral modeling.
4. Write Verilog Program for MOS transistors circuits using switch level modeling and also understand usage of system Tasks.
5. Write Verilog Program for sequential circuit which modeled in state machine and understand the concept of Test Bench techniques for digital design verification.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 70438	SATELLITE COMMUNICATIONS (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives:

The objective of the course is to prepare students to excel in basic knowledge of satellite communication principles by providing the students a solid foundation in orbital mechanics and launches for the satellite communication. The course aims at offering the students a basic knowledge of link design of satellite with design examples, a better understanding of multiple access systems and earth station technology and sufficient knowledge in satellite navigation, GPS and satellite packet communications.

MODULE I: Communication Satellite: Orbit and Description [09 periods]

A Brief history of satellite Communication, Satellite Frequency Bands, Satellite Systems, Applications, Orbital Period and Velocity, effects of Orbital Inclination, Azimuth and Elevation, Coverage angle and slant Range, Eclipse, Orbital Perturbations, Placement of a Satellite in a Geo-Stationary orbit.

MODULE II: Satellite Sub-Systems and Satellite Link [10 periods]

Satellite Sub-Systems:

Attitude and Orbit Control system, TT&C subsystem, Attitude Control subsystem, Power systems, Communication subsystems, Satellite Antenna Equipment.

Satellite Link:

Basic Transmission Theory, System Noise Temperature and G/T ratio, Basic Link Analysis, Interference Analysis, Design of satellite Links for a specified C/N, (With and without frequency Re-use), Link Budget.

MODULE III: Propagation Effects and Multiple Access [10 periods]

A: Propagation Effects:

Introduction, Atmospheric Absorption, Cloud Attenuation, Tropospheric and Ionospeheric Scintillation and Low angle fading, Rain induced attenuation, rain induced cross polarization interference.

B: Multiple Access:

Frequency Division Multiple Access (FDMA) – Inter modulation, Calculation of C/N, Time Division Multiple Access (TDMA) - Frame Structure, Burst Structure, Satellite Switched TDMA, On-board Processing, Demand Assignment Multiple Access (DAMA) – Types of Demand Assignment, Characteristics, CDMA Spread Spectrum Transmission and Reception.

MODULE IV: Earth Station Technology, Satellite Navigation and Global Positioning Systems
[10 periods]

Earth Station Technology:

Transmitters, Receivers, Antennas, Tracking Systems, Terrestrial Interface, Power Test Methods, Lower Orbit Considerations.

Satellite Navigation and Global Positioning Systems:
Radio and Satellite Navigation, GPS Position Location Principles, GPS Receivers, GPS C/A Code Accuracy, Differential GPS.

MODULE V: Satellite Packet Communications [09 periods]
Message Transmission by FDMA: M/G/1 Queue, Message Transmission by TDMA, PURE ALOHA-Satellite Packet Switching, Slotted Aloha, Packet Reservation, Tree Algorithm.

TEXT BOOKS:
1. Timothy Pratt, Charles Bostian, Jeremy Allnutt, **" Satellite Communications**", John Wiley & Sons, 2nd Edition, 2003.
2. Wilbur, L. Pritchand, Robert A. Nelson and Heuri G. Suyderhoud, **"Satellite Communications Engineering**", Pearson Publications, 2nd Edition.

REFERENCES:
1. Dennis Roddy, "**Satellite Communications**", Tata Mc.Graw Hill, 2nd Edition, 1996.
2. M. Richcharia, "**Satellite Communications**: **Design Principles**", 2nd Ed., BSP, 2003.
3. Tri.T.Ha, **" Digital Satellite Communications**", Tata Mc.Graw Hill, 2nd Edition, 1990.
4. K. N. Raja Rao **, "Fundamentals of Satellite Communications",** PHI, 2004.

E-RESOURCES:
1. https://www.britannica.com/technology/satellite-communication
2. http://www.radio-electronics.com/info/satellite/communications_satellite/satellite-communications-basics-tutorial.php
3. https://www.nasa.gov/directorates/heo/scan/communications/outreach/funfacts/txt_satellite_comm.html
4. http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1542-0981
5. http://www.inderscience.com/jhome.php?jcode=ijscpm
6. http://nptel.ac.in/courses/117105131/

Course Outcomes:
At the end of the course, students will be able to
1. Understand the historical background, basic concepts and frequency allocations for satellite communication.
2. Demonstrate orbital mechanics, launch vehicles and launchers.
3. Demonstrate the design of satellite links for specified C/N with system design examples.
4. Visualize satellite sub systems like Telemetry, tracking, command and monitoring power systems etc.
5. Understand the various multiple access systems for satellite communication systems and satellite packet communications.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech.	
Code: 70539	ANDROID APPLICATION DEVELOPMENT (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:
This course aims the students to learn the essentials of mobile apps development, aids in developing simple android applications, identify the essentials of android design, file settings, study about user interface design and develop android APIs.

MODULE I: Mobile and Information Architecture [09 Periods]
Introduction to Mobile - A brief history of Mobile, The Mobile Eco system, Why Mobile? Types of Mobile Applications.
Mobile Information Architecture - Mobile Design, Mobile 2.0, Mobile Web development, Small Computing Device Requirements.

MODULE II: Introduction to Android and Installation [09 Periods]
Introduction to Android - History of Mobile Software Development, The Open Handset Alliance-Android platform differences.
Android Installation - The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building a Sample Android application.

MODULE III: Android Application Design and Settings [10 Periods]
A: Android Application Design Essentials - Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents.
B: Android File Settings - Android Manifest File and its common settings, Using Intent Filter, Permissions, Managing Application resources in a hierarchy, working with different types of resources.

MODULE IV: Android UID and Techniques [10 Periods]
Android User Interface Design - Essentials User Interface Screen elements, Designing User Interfaces with Layouts.
Animation Techniques - Drawing and Working with Animation- Drawing on the screen –Working with Text-Working with Bitmaps-Working with shapes-Working with animation.

MODULE V: Android APIs-I & APIs-II [10 Periods]
Android APIs-I - Using Common Android APIs Using Android Data and Storage APIs, Managing data using SQLite, Sharing Data between Applications with Content Providers.
Android APIs-II - Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

TEXT BOOKS
1. James Keogh, **"J2ME: The Complete Reference"**, Tata McGrawHill.
2. Lauren Darcey and Shane Conder, **"Android Wireless Application Development",** Pearson Education, 2nd edition, 2011.

REFERENCES
1. Reto Meier, **"Professional Android 2 Application Development",** Wiley India Pvt Ltd.
2. Mark L Murphy, **"Beginning Android"**, Wiley India Pvt Ltd.
3. Barry Burd, **"Android Application Development All in one"**, 1st edition, Wiley India Pvt Ltd.

E-RESOURCES:
1. http://onlinevideolecture.com/ebooks/?subject=Android-Development
2. https://developer.android.com/training/basics/firstapp/index.html
3. IEEE Transactions on Mobile Computing
4. International Journal of Interactive Mobile Technologies
5. http://nptel.ac.in/courses/106106147/

Course Outcomes
On successful completion of the course, a student will be able to:
1. Classify different types of Platforms.
2. Appreciate the Mobility landscape.
3. Familiarize with Mobile apps development aspects.
4. Design and develop mobile apps, using Android as development platform, with key focus on user experience design, native data handling and background tasks and notifications.
5. Perform testing, signing, packaging and distribution of mobile apps.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech.	
Code: 70544	SOFTWARE PROJECT MANAGEMENT (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil
Course Objectives:
This Course will enables the students to understand the conventional software management and necessary methods for improve software economics, define software project management principles, life cycle, artifacts, to understand and explain process work flows, checkpoints of process, iterative planning, learn and solve process automation, project process instrumentation and control, metrics, tailoring the process, analyze and evaluate project organization responsibilities, management and case studies.

MODULE I: Conventional Software Management and Software Economics   [10 Periods]
Conventional Software Management - The waterfall model, conventional software management performance, Overview of project planning – stepwise project planning.
Improving Software Economics -   Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

MODULE II: Phases and Process   [10 Periods]
The Old and New Way - The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.
Life Cycle Phases - Engineering and production stages, Inception, Elaboration, Construction, Transition phases.
Artifacts of the Process - The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

MODULE III: Software Process and Process Planning   [09 Periods]
A: Work Flows and Checkpoints of the Process   -   Software process workflows, Iteration workflows, Major mile stones, Minor Milestones, Periodic status assessments
B: Iterative Process Planning - Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

MODULE IV: Process Automation and Instrumentation   [09 Periods]
Process Automation   - Automation Building blocks.
Project Control and Process Instrumentation -   The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.
Tailoring the Process - Process discriminates.

MODULE V: Project Organizations and Future SPM   [10 Periods]
Project Organizations and Responsibilities - Line-of-Business Organizations, Understanding Behavior – Organizational Behavior.
Future Software Project Management -   Modern Project Profiles, Next generation Software economics, modern process transitions.
Case Study - The command Center Processing and Display system-Replacement (CCPDS-R)

TEXT BOOKS

1. Walker Royce, **"Software Project Management",** Pearson Education, 2005.
2. Bob Hughes and Mike Cottrell, "**Software Project Management**", Tata McGraw Hill Education, 5th Edition, 2010.

REFERENCES

1. Joel Henry, "**Software Project Management, A Real -World Guide to Success**", Pearson Education, 3rd Edition, 2009.
2. Pankaj Jalote, " **Software Project Management in Practice**", Addison- Wesley, 2002.

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1. https://books.google.co.in/books?isbn=0201309580
2. HTTPS://BOOKS.GOOGLE.CO.IN/BOOKS?ISBN=0070706530
3. http://www.uta.fi/sis/reports/index/R31_2014.pdf
4. http://nptel.ac.in/courses/106101061/18
5. http://nptel.ac.in/courses/106101061/29#

Course Outcomes:

On the successful completion of the course, a student will be able to:

1. Identify the conventional software management planning.
2. Demonstrate the principles of conventional software Engineering, Life cycle Phases, and Artifacts of the process.
3. Apply Work Flows, Checkpoints of the process and Iterative Process Planning.
4. Evaluate metrics for tailoring the process.
5. Design and Apply project responsibilities and analyze various case studies.

Prerequisites: Java Programming
Course Objectives:
This course provides the students a clear understanding of analyzing the way of transportation of data using XML and the significance of Java Bean, develop dynamic web applications using Servlets, build a web application which connects to database and interpret the importance of JSP over Servlets.

MODULE I: Introduction to XML [08 Periods]
Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX

MODULE II: Introduction to Advanced Java and Java Beans [10 Periods]
Advanced Java- Java Swing package: use of System class, Applet Context, signed applet, object serialization, shallow and deep copying, Java collections: Iterators, Array Lists, sets, hash set, hash table, queue, priority queue, class-vector, class- comparable interface.
Java Beans- Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizes, Java Beans API, Introduction to EJB's.

MODULE III: Introduction to Servlets and Servlet Programming [10 Periods]
A: Introduction to Servlets- Tomcat web server, Introduction to Servlets: Lifecycle of a Servlet, JSDK, The Servlet API, The javax. Servlet Package.
B: Servlet Programming - Reading Servlet parameters, Reading Initialization parameters. The javax.servlet HTTP package, Handling Http Request and Responses, Using Cookies-Session Tracking, Security Issues.

MODULE IV: Database and JSP [10 Periods]
Database Access -Database Programming using JDBC, JDBC drivers, Studying Javax.sql
.* package, Accessing a Database from a Servelet. Prepared Statements.
Introduction to JSP- The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment.

MODULE V: JSP Application Development [10 Periods]
Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Conditional Processing: Displaying Values Using an Expression, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session and Application Data – Memory Usage Considerations, Accessing a Database from a JSP page, Deploying JAVA Beans in a JSP Page, Introduction to struts framework.

TEXT BOOKS:
1. Dietel and Nieto, **"Internet and World Wide Web – How to program",** PHI/Pearson Education Asia.
2. Patrik Naughton, Herbert Schildt, "**The Complete Reference, Java",** Third Edition, TMH.
3. Marty Hall and Larry Brow, "**Core servlets and java server pages volume 1: core technologies",** Pearson.

REFERENCES:
1. Paul S. Wang, Sanda Katila.Thomson**, "An Introduction to Web Design and Programming",** Course Technology Inc Publications, 2003.
2. Jon Duckett, Wrox, , "**Beginning Web Programming**", wiley India Pvt. Ltd., 2008.

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1. http://xml.coverpages.org/xtml.html
2. https://www.tutorialspoint.com/html/
3. https://www.javatpoint.com/servlet-tutorial
4. https://ndl.iitkgp.ac.in/result?q={%22t%22:%22search%22,%22k%22:%22web%20technologies%22,%22s%22:[],%22b%22:{%22filters%22:[]}}
5. http://nptel.ac.in/courses/106105084/

Course Outcomes:
On the successful completion of the course, a student will be able to:
1. Understand the role of XML in web programming.
2. Develop applications using Java Beans.
3. Build dynamic web applications using Servlets.
4. Demonstrate how an application can connect to a database.
5. Illustrate the importance of JSP in web programming.

Prerequisites: Nil

Course Objectives:
This course enables the students to evaluate the role of the major types of information systems in a business environment and their relationship to each other, assess the impact of the Internet, Internet technology on business electronic commerce, electronic business, identify the major management challenges to building, using information systems and learn how to find appropriate solutions to those challenges.

MODULE I: Information system development   **[10 Periods]**
Information System- Matching the Information System Plan to the Organizational Strategic Plan – Identifying Key Organizational Objective and Processes and Developing an Information System Development.
Systems Development - User role in Systems Development Process – Maintainability and Recoverability in System Design.

MODULE II: Representations and Analysis   **[10 Periods]**
Models for Representing Systems- Mathematical, Graphical and Hierarchical (Organization Chart, Tree Diagram) – Information Flow – Process Flow – Methods and Heuristics.
Analysis of System Structure - Decomposition and Aggregation – Information Architecture – Application of System Representation to Case Studies.

MODULE III: Information and decision theory   **[10 Periods]**
A: Information Theory: Information Theory – Information Content and Redundancy – Classification and Compression – Summarizing and Filtering – Inferences and Uncertainty.
B: Decision Theory: Identifying Information needed to Support Decision Making – Human Factors – Problem characteristics and Information System Capabilities in Decision Making.

MODULE IV: Role of IT in information system   **[9 Periods]**
Information System Application- Transaction Processing Applications – Basic Accounting Application – Applications for Budgeting and Planning.
Use of Information Technology- Automation – Word Processing – Electronic Mail – Evaluation Remote Conferencing and Graphics – System and Selection – Cost Benefit – Centralized versus Decentralized Allocation Mechanism.

MODULE V: Information system development   **[9 Periods]**
Development of Information Systems-I- Systems analysis and design – System development life cycle – Limitation – End User.
Development of Information Systems-II- Managing End Users – off– the shelf software packages – Outsourcing – Comparison of different methodologies.

TEXT BOOKS:
1. Laudon K.C, Laudon J.P, Brabston M.E, "**Management Information Systems -Managing the digital firm**", Pearon Education, 2004.

REFERENCES:
1. Turban E.F, Potter R.E, "**Introduction to Information Technology**";Wiley, 2 004.
2. Jeffrey A.Hoffer, Joey F.George, Joseph S. Valachich, "**Modern Systems Analysis and Design**", Third Edition, Prentice Hall, 2002.

E -RESOURCES
1. http://iefb.weebly.com/uploads/1/4/2/4/14240576/libri_per_msi.pdf
2. http://www.aabri.com/manuscripts/10736.pdf
3. http://www.nptelvideos.in/2012/11/management-information-system.html

Course Outcomes:
On the successful completion of the course, a student will be able to:
1. Understand the processes of developing and implementing information systems.
2. Analyze various Representations and analysis of system structure.
3. Comprehend the techniques in information theory and decision theory.
4. Implement various applications in Information Systems.
5. Deploy information systems suitable for end users.

Prerequisites: Nil

Course Objectives:
To understand the principles and mechanism of different drilling methods, novel drilling techniques. To learn the basic mechanism of rock fragmentation by blasting. To know the various types of explosives and accessories used in blasting. To learn the different methods of blasting adopted in surface and underground coal / non-coal mines including adverse effects of blasting & their control

MODULE-I: Principles of Drilling and Drill bits   **[9 Periods]**
Principles of drilling: Principles of rock drilling, drillability, drillability index, factors affecting the drillability, selection of drills.
Drill Bits: Various types of drill bits, study of bit life, factors affecting bit life, Thrust feed and rotation

MODULE-II: Explosives   **[10 Periods]**
Historical development, properties of explosives, low and high explosives, ANFO, slurries, Emulsion explosives, heavy ANFO, permitted explosives, testing of permitted explosives, bulk explosive systems-PMS, SMS, substitutes for explosives and their applications- hydrox, cardox, airdox.

MODULE-III: Firing of Explosives and blasting methods   **[10 Periods]**
A: Firing of Explosives: Safety fuse, detonating cord and accessories, detonators, Exploders, Electric firing and non-electric firing, electronic detonators, NONEL blasting.
B: Blasting methods: Preparation of charge, stemming and shot firing, choice and economical use of explosives, misfires, blown out shots, incomplete detonation, their causes, prevention and remedies.

MODULE-IV: Handling of Explosives   **[9 Periods]**
Surface and underground transport of explosives, storage and handling of explosives, magazines, accidents due to explosives, precautions and safety measures during transportation.

MODULE-V: Mechanics of blasting and effects of blasting   **[10 Periods]**
Mechanics of blasting: Factors affecting rock breakage using explosives, theory of shaped charge, detonation pressure, coupling, shock waves impedance, critical diameter.
Effects of blasting: Vibrations due to blasting and damage criteria, fly rocks, dust, fumes, water pollution and controlled blasting.

TEXT BOOKS:
1. Blasting in ground excavations and mines, Roy Pijush Pal, Oxford and IBH, 1st ed 1993
2. Drilling technology handbook, C.P. Chugh, Oxford and IBH, 1st ed, 1977 .

REFERENCE BOOKS:
1. Rock blasting effect and operation, Roy Pijush Pal, A.A. Balkema, 1st ed, 2005
2. Elements of mining technology, Vol-1, D.J. Deshmukh, Central techno, 7th ed, 2001
3. Blasting operations, B.Hemphill Gary, Mc-graw Hill, 1st ed 1981
4. Explosive and blasting practices in mines, S.K.Das, Lovely prakashan, 1st ed, 1993.

E RESOURCES:
1. http://technology.infomine.com/reviews/blasting/welcome.asp?view=full
2. https://miningandblasting.wordpress.com/list-of-technical-papers/

Course Outcomes:
At the end of the course, students will be able to:
1. Understand Principles of drilling and Various types of drill bits
2. Understand different types of Explosives
3. Understand Firing of Explosives and Blasting methods
4. Understand Handling of Explosives
5. Understand Mechanics of blasting and effects of blasting

Prerequisites: Nil

Course Objectives:
The course enables the students to be familiar with the recent developments in various technologies used in underground spaces includes tunneling and cavern projects across the world.

MODULE I: Introduction [10 Periods]
Scope and application, historical developments, art of tunneling, tunnel engineering, future tunneling considerations. Types of Underground Excavations: Tunnel, adit, decline, shaft; parameters influencing location, shape and size; geological aspects; planning and site investigations.

MODULE II: Tunnel Excavations [10 Periods]
Tunneling Methods: Types and purpose of tunnels; factors affecting choice of excavation technique; Methods - soft ground tunneling, hard rock tunneling, shallow tunneling, deep tunneling; Shallow tunnels – cut and cover, cover and cut, pipe jacking, jacked box excavation techniques, methods of muck disposal, supporting, problems encountered and remedial measures.

MODULE III: Drilling and Blasting [10 Periods]
A. Drilling - drilling principles, drilling equipment, drill selection, specific drilling, rock drillability factors; Blasting - explosives, initiators, blasting mechanics,
B. Types of cuts- fan, wedge and others; blast design, tunnel blast performance - powder factor, parameters influencing, models for prediction; mucking and transportation equipment selection.

MODULE IV: Mechanization [9 Periods]
Tunneling by Road headers and Impact Hammers: Cutting principles, method of excavation, selection, performance, limitations and problems. Tunneling by Tunnel Boring Machines: Boring principles, method of excavation, selection, performance, limitations and problems; TBM applications.

MODULE V: Tunnel Services [9 Periods]
Supports in Tunnels: Principal types of supports and applicability. Ground Treatment in Tunneling: Adverse ground conditions and its effect on tunneling; Excavation of large and deep tunnels, caverns. Tunnel Services: Ventilation, drainage and pumping; Tunneling hazards.

TEXT BOOKS:
1. Hudson, J.A., Rock Engineering Systems – Theory and practice, Ellis Horwood, England.
2. Clark, G.B., (1987), Principles of Rock Fragmentation, John Wiley and Sons, New York.

REFERENCES:
1. Legget, R.F., Cities and Geology, McGraw-Hill, NewYork, 624 p., 1973.
2. Johansen, John and Mathiesen, C.F., Modern Trends in Tunnelling and Blast Design, AA Balkema, 154p, 2000.
3. Per-Anders Persson, Roger Holmberg, Jaimin Lee, (1993), Rock blasting and explosives Engineering, CRC Press, p.560.

4. Bickel, J.O., Kuesel, T.R. and King, E.H., Tunnel Engineering Handbook, Chapman & Hall Inc., New York and CBS Publishers, New Delhi, 2nd edition, Chapter 6, 544p, 1997.

E RESOURCES:
1. www.cowi.com/.../bridgetunnelandmarinestructures/tunnels/.../021-1700-020e-10b_
2. https://miningandblasting.wordpress.com/list-of-technical-papers/

Course Outcomes:
At the end of the course, students will be able to:
1. Understand art of tunneling, tunnel engineering, future tunneling considerations
2. Understand different types Tunneling Methods
3. Understand drilling principles, drilling equipment, explosives, initiators, blasting mechanics
4. Understand tunneling by different machines
5. Understand Tunnel Services

2017-18 Onwards (MR-17)	**MALLA REDDY ENGINEERING COLLEGE** (Autonomous)	**B.Tech**		
Code: 7B108	**CREATIVITY AND INNOVATIONS MANAGEMENT** (Open Elective)	**L**	**T**	**P**
Credits: 3		**3**		**-**

Prerequisites: NIL

Course Objectives:

To enhance creative potential by strengthening various mental abilities and shape an ordinary learner to become an extraordinary learner; to expand the knowledge horizon of individual creativity and corporate creativity to transform the living conditions of the society.

MODULE I: Creativity [10 Periods]

Realms of Creativity: Creativity Concept- Convergent and Divergent Thinking- Creative abilities - Creativity Intelligence, Enhancing Creativity Intelligence-Determinants of Creativity - Process-

Roots of Human Creativity-Biological, Mental, Spiritual Social- Forms of Creativity-Essence, Elaborative and Expressive-Existential, Entrepreneurial and Exponential.

MODULE II: Creative Personality [10 Periods]

Creative Personality: Traits - Congenial to Creativity- Motivation and Creativity- Strategies for Motivation for being creative-

Conductive Environment: Formative Environment and Creativity- Environmental Stimulants-Blocks to Creativity- Strategies for unblocking Creativity.

MODULE III: Corporate Creativity [10 Periods]

A: Corporate Creativity: Creative Manager- Creative Problems Solving, Techniques of Creative Problem Solving- Perpetual Creative Organizations-Creative Management Practices:

B: Various Management techniques: Human Resource Management, Marketing Management, Management of Operations, Management of Product Design and Growth Strategies – Collective Creativity.

MODULE – IV: Creative Organisation [9 Periods]

Creative Organisation: Issues and approaches to the Design of Creative Organizations - Successful innovative organization structure.

Mechanisms stimulating Organizational Creativity- Creative Societies, Model of creative society.

MODULE – V: Management of Innovation [9 Periods]

Management of Innovation: Nature of Innovation-Technological Innovations and their Management, Management Innovative entrepreneurship.

Agents of Innovation-Skills for Sponsoring Innovation, Practice cases and situations.

TEXT BOOKS
1. P. N. Rastogi, **"Managing Creativity of Corporate Excellence"**, Macmillan, New Delhi.

REFERENCE BOOKS:
1. Jone Ceserani, Pater Greatwood, **"Innovation and Creativity",** Crest Publishing House, New Delhi.
2. Pradip Khandwalla, **"Lifelong Creativity"**- An Unending Quest, Tata McGraw Hill, 2006.
3. Pradip Khandwalla, **"The Corporate Creativity"** -The Winning Edge, Tata McGraw Hill New Delhi.
4. Christensen Clayton, **"Innovation and General Manager"**, Tata McGraw Hill.
5. Margaret. A,Whit& Gary D. Bruton- **"The Management of Technology Innovation- A Strategic Approach".**
6. CSG Krishnama Charyulu & R. Lalitha- **"Innovation Management"**, Himalaya Publishing House, 2007.

E RESOURCES:
1. http://www.learnerstv.com/Free-Management-Video-lectures-ltv132-Page1.htm
2. http://linksp.com/article/Reingold-LINK-Creative-Manager-Job-Posting-Jan-15.pdf
3. http://creativeskillset.org/creative_industries/advertising_and_marketing_communications/job_roles
4. http://nptel.ac.in/courses/109101003/15
5. http://nptel.ac.in/courses/109104107/

Course Outcomes:
At the end of the course, students will be able to:
1. Understand the basic concepts of creativity management.
2. Develop a creative personality and can become an extraordinary learner.
3. Student will be able to understand the techniques of Creative Problem Solving and Creative Management Practices.
4. Understand the Issues and approaches to the Design of Creative Organizations and Mechanisms stimulating Organizational Creativity.
5. Understand the nature and management of innovation.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech		
Code: 7B136	DIGITAL MARKETING	L	T	P
Credits: 3	(Open Elective)	3	-	-

Prerequisites: NIL

Course Objective:
The objective of this course is to expose the student to digital marketing mainly for lead generation and retention activities in both business to business and business to consumer environments.

MODULE-I: Digital marketing [9 Periods]
Introduction of Digital Marketing: Digital Marketing meaning- need of digital marketing- Digital Marketing Vs Traditional Marketing- Digital Marketing Process-
Creating digital marketing strategy- Digital Marketing era and the way forward.

MODULE-II: Search Engine and Social media Optimization [10 Periods]
Introduction to Search Engine Optimization: What is Search Engine?, Type of Search Engines, Search Engine Optimization Types- SEO life cycle Difference between Organic and Inorganic- Keyword Research -Google Trends- On-Page Optimization- Off-Page Optimization.
Introduction to Social Media Optimization: Social Media- importance- Social Media Marketing- Branding - Paid Advertising – Blogging- Face book –Twitter, LinkedIn- Slide Share- Social Media Management Tool (SMMT).

MODULE-III: Google Adwards and tools [10 Periods]
A. Google Adwards: Navigating through Google AdWords- Understanding Google AdWords Structure- Writing Ads in Google AdWords
B. Google Tools: Keyword Planner Tool- Google Webmaster Tool- Google Analytics- Reporting and Analysis Tool.

MODULE-IV: E-Mail marketing [10 Periods]
Email Marketing: How Email works?- Challenges while sending bulk emails- Solution over challenges- Types of email marketing- Email marketing Tools
Designing of Email template- Email marketing scheduler- Email marketing success tracking - Lead Generation for Business.

MODULE-V: Forms of Digital Marketing [9 Periods]
Other forms of Digital marketing: Mobile marketing- Inbound marketing-content marketing
E-commerce marketing- affiliate marketing- YouTube channel marketing.

Text Books
1. Vandana Ahuja, **Digital Marketing – Oxford Higher Education-2015**

Reference books:

1. Philip Kotler, Kevin Lane Keller, Abraham Koshy and Mithleshwar Jha: **Marketing Management,** 13/e, Pearson Education, 2012.
2. Michael miller, **B2B Digital Marketing: Using the Web to Market Directly to Businesses, 1/e,** Pearson Education.
3. Dave Chaffey, Fiona Ellis-Chadwick**, Digital Marketing: Strategy, Implementation and Practice,** Pearson, 6th edition -2015.
4. Jeanniey Mullen, David Daniels, Email Marketing: an Hour a Day, Times Knowledge series-2010.

E Resources:

1.http://freevideolectures.com/Course/2752/Future-of-Marketing
2.http://www.onlinevideolecture.com/?course=mba-programs&subject=marketing-fundamental
3.http://nptel.ac.in/courses/110104070/
4.http://nptel.ac.in/courses/110104068/

Course Outcomes:
At the end of the course, students will be able to:
1. Learn the basics of digital marketing and also be able to develop a comprehensive digital marketing strategy
2. Understand the concept of search engine and its optimization process.
3. Understand the basic concepts of social media marketing and its management.
4. Learn the basics of Google Adwards and tools and its application in digital marketing.
5. Learn various emerging platforms of digital marketing.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech.		
Code: 70H08	INTERPRETATION SKILLS AND ANALYTICAL WRITING (Open Elective)	**L**	**T**	**P**
Credits: 3		3	-	-

Prerequisite: Nil

Course Objective: To determine how well the students can develop a compelling argument in writing for an academic audience. Further helps them to involve in critical thinking and persuasive writing exercises. This course also intends to develop effective writing skills to analyze and evaluate the data and ideas for better comprehension. On the other hand this course encourages students to learn strategies for becoming accurate readers and critical analysts.

Introduction:
Developing Analytical writing skills through interpretation of literature and enabling the students to think critically. It assesses the ability to articulate and support complex ideas, construct and evaluate arguments and sustain a focused and coherent discussion. Interpreting the text triggers the students analytical and critical thinking skills while expanding their outlook.

Methodology:
- Giving them exercises pertaining to translation of their thoughts into words.
- Giving them vocabulary exercises in different contexts.
- Find supporting evidence.
- Make an outline

MODULE I: Introduction to Interpretation Skills [10 Periods]
- Interpretation in different settings
- Interpretation of Literature
- Understanding the main ideas in the text
- Vocabulary by Theme

From the short novel: Animal Farm: George Orwell

MODULE II: Approaches to Reading [9 Periods]
- Biographical
- Historical
- Gender
- Sociological

MODULE III: Critical Reading [10 Periods]
- Introduction
- The Theme
- Figurative language and characterization
- Interpreter's role and ethics
- Interpretation of story.
- Interpretation of characters
- Animal characters

- Human characters
- Key events
- Things
- Places

MODULE IV: Analytical Writing   [10 Periods]
- Responding to various situations
- Entering into the role and responding
- Analyze an ISSUE
- Analyze an Argument
- Verbal Reasoning
- Interpretive Reports

From the short novel: Animal Farm : George Orwell

MODULE V: Creative Writing   [9 Periods]
- Figurative Language
- Imagery
- Writing a short Poem
- Writing a short Story

REFERENCES
1. GRE by CliffsTestPrep-7th edition
2. GRE Exam- **A Comprehensive Program**
3. M H Abraham **Glossary of English Literary terms**
4. GD Barche **Interpreting Literature- A Myth and a Reality**
5. Wilbur Scott- **Five approaches to literary criticism**.

E RESOURCES

1. http://www.brad.ac.uk/staff/pkkornakov/META.htm(Introduction to Interpretation Skills)
2. http://literacyonline.tki.org.nz/Literacy-Online/Planning-for-my-students-needs/Effective-Literacy-Practice-Years-1-4/Approaches-to-teaching-reading (Approaches to Reading)
3. https://www.csuohio.edu/writing-center/critical-reading-what-critical-reading-and-why-do-i-need-do-it (Critical Reading)
4. https://www.ets.org/gre/revised_general/about/content/analytical_writing   (Analytical Writing)
5. http://www.writerstreasure.com/creative-writing-101/ (Creative Writing)
6. http://www.academypublication.com/issues/past/jltr/vol04/06/11.pdf   (Interpreting Skills)
7. http://onlinelibrary.wiley.com/doi/10.1111/j.1540-4781.1983.tb01478.x/full (Approaches to Reading)
8. https://vhhscougars.org/files/vhhs/docs/n10/crj_faqs.pdf (Critical Reading)
9. http://www.msmbainusa.com/articles/entrance-preparations/prepare-for-gre-analytical-writing-tasks/ (Analytical Writing)
10. http://scholarworks.rit.edu/jcws/aimsandscope.html (Creative Writing)
11. https://www.youtube.com/watch?v=N0ePX99GM70 (Approaches to Reading)
12. https://www.youtube.com/watch?v=5Hc3hmwnymw   (Critical Reading)
13. https://www.youtube.com/watch?v=ix1qUEM9ahg (Analytical Writing)
14. https://www.youtube.com/watch?v=6Y2_oQobo_0 (Creative Writing)

Course Outcomes:

After completion of the course, students will be able to:

1. Think critically and help in writing analytically.
2. Get real life experiences through interpretation of literature.
3. Learn strategies for becoming accurate readers and critical analysts
4. Think logically towards social, political, economical, legal and technological issues.
5. Draw their career vision and mission independently.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech.	
Code: 70H09	**WORLD LITERATURES** (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisite: Nil

Course Objectives:
The undergraduates need to know about the societies across the globe to understand their society better and to bring awareness about the societies across the globe. As a result the students would understand the cultures of different nations as they are going to enter into global careers and have a considerable knowledge about these cultures of different nations will help them to cope with the culture shock. Identify and describe distinct literary characteristics of modern literature. This further helps the learners to effectively communicate ideas related to modern works during class and group activities.

MODULE I:
- **Introduction to literature** [9 Periods]

- **Elements of literature(Key Concepts)**

MODULE II: [9 Periods]

- **Figures of Speech**

MODULE III: [10 Periods]
- **Poetry**

Ode to Autumn by **John Keats**
Mending the Wall by **Robert Frost**
Clouds and Waves by **Ravindranath Tagore**

MODULE IV: [10 Periods]
- **Short Stories**

  The Eyes are Not Here by **Ruskin Bond**
  The Policeman and the Rose by **Raja Rao**
  Cat in the Rain by **Ernest Hemmingway**

MODULE V: [10 Periods]

- **One - act plays**

  A Marriage Proposal by Anton Chekov

  The Price by Arthur Miller

REFERENCES

1. Guy de Maupassant, "**Original Short Stories of Maupassant",** The Floating Press, 2014.
2. Robin Pickering-Iazzi, "**Unspeakable Women: Selected Short Stories Written by Italian Women during Fascism",** The Feminist Press, New York, 1993.

ERESOURCES

1. www.naosite.lb.nagasaki-u.ac.jp/dspace/bitstream/.../keieikeizai70_03_08.pdf
2. www.poetryfoundation.org
3. www.bigbridge.org/BB17/poetry/indianpoetryanthology/Gieve_Patel.html
4. http://gepeskonyv.btk.elte.hu/adatok/Anglisztika/74Barcs%E1k/index.html   (Introduction to literature)
5. http://hrsbstaff.ednet.ns.ca/ldownie/Eng%2011%20seven_key_elements_of_literature.htm (Elements of literature)
6. https://literaryterms.net/figures-of-speech/ (Figures of Speech)
7. http://www.one-act-plays.com/ (One-Act-Plays)
8. https://bridgepoint.equella.ecollege.com/curriculum/file/cd11d642-a307-496d-b8f0-9c207abc4b42/1/ENG125%20-%20About%20Journals.p (Introduction to literature)
9. http://www.biblicalresearchjournal.org/brj-pages_pdf/001ewb_figures_of_speech.pdf (Figures of Speech)
10. https://www.youtube.com/watch?v=xC3M9EqduyI&list=PLbMVogVj5nJSrNC8yTkDpzu5u RzX5re9q (Introduction to literature)
11. https://www.youtube.com/watch?v=YM6rdgXvemM (Poetry)

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

1. Learn about the literatures of different nations and continents.
2. Understand the cultures of different societies of the world and are ready to cope with the culture shock they might experience when set to work in global environment.
3. Display a working knowledge of the historical and cultural contexts of world literature.
4. Analyze literary works for their structure and meaning.
5. Write analytically about literature using guidelines.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 70B14	**APPLIED STATISTICS** (Open Elective)	L	T	P
Credits: 3		3	-	-

Pre-requisite: Nil

Course Objective: Uncertainty is found everywhere. It is therefore essential to understand the techniques for handling and modeling it. This course is meant to provide a grounding in Statistics and foundational concepts that can be applied in modeling processes and decision making. These would come in handy for the prospective engineers in most branches.

MODULE I: Analysis of Variance & Analysis of Co-variance [9 Periods]
Analysis of Variance (ANOVA): one-way & two-wav ANOVA and multiple comparisons. Introduction to Factorial design - 2^2 and 2^n Factorial design.
Analysis of Co-variance (ANCOVA) (Only one way). Conducting ANCOVA – Two way

MODULE II: Design of Experiments [10 Periods]
Design of Experiments: Importance and applications of design of experiments. Principles of experimentation, Analysis of Randomized Block Design (R.B.D) , Completely randomized Design (C.R.D) and Latin Square Design (L.S.D) including one missing observation, expectation of various sum of squares. Comparison of the efficiencies of above designs.

MODULE III: Statistical Quality Control [10 Periods]
A: Importance of SQC in industry. Statistical basis of Shewart control charts. Construction of control charts for variables (mean,range and standard deviation) and attributes (p, np, c & d charts with fixed and varying sample sizes).
B: Interpretation of control charts. Natural tolerance limits and specification limits process capability index. Concept of Six sigma and its importance, Single and double sampling plans.

MODULE IV: Correlation, Regression & Time Series [10 Periods]
Correlation & Regression: Correlation, Coefficient of correlation, the rank correlation. Regression, Regression Coefficient, The lines of regression: simple regression, regression for 3 independent variables
Time Series: Fitting a trend line to a time series, Method of least Squares and Method of Moving Averages, Measure of Seasonal Variation.

MODULE V: Queuing Theory [9 Periods]
Structure of a queuing system, Operating Characteristics of queuing system, Transient and Steady states, Terminology of Queuing systems, Arrival and service processes, Pure Birth-Death process Deterministic queuing models, (M/M/1):(∞:FIFO) Model, (M/M/1):(N:FIFO) Model .

TEXT BOOKS:
1. V.K.Kapoor and S.C.Gupta, **"Fundamentals of Applied Statistics"**, Sultan Chand & Sons , New Delhi.
2. J K Sharma, **"Operations research Theory and applications",** Macmillan publishers India limited, 4th edition.

REFERENCE
1. Willam Feller : **"Introduction to Probability theory and its applications"**. Vol–I, Wiley 2nd edition.
2. GoonAM, Gupta MK, Das Gupta B : **"Fundamentals of Statistics"**, Vol-I, The World Press Pvt.Ltd.,
3. Montgomery, **"Applied statistics and probability for engineers"**. John Wiley Publications, 5th edition.
4. V.K.Kapoor and S.C.Gupta: **"Fundamentals of Mathematical Statistics"**, Sultan Chand & Sons , New Delhi

E-RESOURCES
1. https://onlinecourses.science.psu.edu/stat502/node/183 (ANCOVA)
2. http://www.uoguelph.ca/~dsparlin/sqc.htm (Statistical Qualitycontrol)
3. http://irh.inf.unideb.hu/~jsztrik/education/16/SOR_Main_Angol.pdf   (Basic   Queueing Theory)
4. https://www.math.kth.se/matstat/gru/sf2943/ts.pdf (Time Series Analysis)
5. http://nptel.ac.in/courses/105105045/40 (correlation and regression Analysis)

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

1. Perform Analysis of variance, ANCOVA and design of experiments in manufacturing firms.
2. Apply advanced design of experiments and their applications.
3. Understand the concept of quality control, Six Sigma and its importance to real life problems.
4. Understand the concept of Correlation, regression and Application of Time-series,
5. Find the expected queue length, the ideal time, the traffic intensity and the waiting time.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)			B.Tech.	
Code: 70B16	OPTIMIZATION TECHNIQUES (Open Elective)		L	T	P
Credits: 3			3	-	-

Pre-requisites: Nil

Course Objective: This course deals with the extremely important topics under the broad umbrella of optimization. This is synonymous with efficiency which is the underlying prime rationale for all scientific and technological advances and progress.

MODULE I: Introduction to Operations Research [10 Periods]
Definition, scope, objectives, phases, objectives, models and limitation of Operations Research, Linear Programming Problem-Formulation of LPP, Graphical solution of LPP, Simplex method, Artificial variable, big-M method, two-phase method, degeneracy & unbound solution.

MODULE II: Transportation Problems [10 Periods]
Formulation, solution, Un balanced Transportation problem, Finding basic feasible solution-Northwest corner rule, least cost method and Vogel's approximation method. Optimality test: the stepping stone method and MODI method.
Assignment Models: Formulation. Hungarian method for optimal solution. Solving unbalanced problem. Travelling salesman problem as assignment problem.

MODULE III: [10 Periods]
A: Sequencing Models: Solution of sequencing problem-processing n jobs through 2 machines, processing n jobs through 3 machines, processing 2 jobs through m machines, processing n jobs through m machines.
B: Replacement Models: Replacement of items that deteriorate whose maintenance cost increase with time without change in the money value. Replacement of items that fail suddenly: individual replacement policy, group replacement policy.

MODULE IV: Game Theory [9 Periods]
Competitive games, rectangular game, saddle point, minimax (maximin) method of optimal strategies, value of the game. solution of games with saddle points, dominance principal. Rectangular games without saddle points-mixed strategy for2x2 games.

MODULE V: Inventory Models [9 Periods]
Inventory cost, Models with deterministic demand-model (a) demand rate uniform and production rate infinite, model(b) demand rate non-uniform and production rate infinite, model(c)demand rate uniform and production rate finite.

TEXT BOOKS
1. S.D.Sharma, **"Operations Research",** Kedarnath & Ramnath Publisher, 15th edition, 2013.
2. J.K. Sharma, **"Operations Research Theory & Applications",** Macmillan India Ltd, 4th edition.

REFERENCE
1. P.Sankara Iyer, **"Operations Research",** Tata McGraw-Hill, 2008.
2. Taha, **"Operations Research"**, TMH, 2010.

3. A.M.Natarajan,P.Balasubramani,A.Tamilarasi, **"Operations Research",** Pearson Education, 2005.
4. Hiller & Libermann, **"Introduction to Operations Research",** McGraw Hill Publications, 9th Edition, 2010.

E-RESOURCES
1. http://www.mhhe.com/engcs/industrial/hillier/etext/PDF/chap03.pdf (LPP)
2. http://ocw.nctu.edu.tw/upload/classbfs121001503719748.pdf (Transportation Problems)
3. http://shodhganga.inflibnet.ac.in/bitstream/10603/19544/12/7_chapter%201.pdf (Replacement Models)
4. https://www.math.ucla.edu/~tom/GameTheory/mat.pdf (Game Theory)
5. http://www.ime.unicamp.br/~andreani/MS515/capitulo12.pdf (Inventory Models)

Course Outcomes:
After completion of the course students will be able to:
1. Find feasible solution to LPP by various Methods.
2. Minimize the cost and time by using Travelling salesmen Problem.
3. Understand the various concepts of Replacement model problems.
4. Solve the game theory problems.
5. Understand the various concepts of inventory models.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 70B18	NANO MATERIALS	L	T	P
Credits: 3	(Open Elective)	3	-	-

Prerequisites: Nil

Course Objective: The objective is to provide different methods of synthesis and characterization of nano materials.

MODULE I: Physical Methods [10 periods]

Bottom-up approachand Top-down approach, Inert gas condensation, Arc Discharge, lasers ablation, laser pyrolysis, ball milling, molecular beam epitaxial, and electro deposition.

MODULE II: Chemical methods [10 periods]

Nanocrystals by chemical reduction, photochemical synthesis, electrochemical synthesis, Nano crystals of semiconductors.

MODULE III: Thermal Methods & Surface Characterization [10 periods]
III A-Thermal Methods:

Thermolysis route – spray pyrolysis and solved metal atom dispersion, sol-gel method solvothermal and hydrothermal routes, solution combustion synthesis, CVD method.

III B: Surface Characterization

Scanning electron microscopy (SEM), Transmission electron microscopy (TEM). Photo luminescence Spectroscopy.

MODULEIV: Compositional and structural Characterization techniques [9 periods]

X-Ray Photoelectron Spectroscopy (XPS), Energy Dispersive X-Ray Analysis(EDAX),Principles and applications of X-Ray Diffraction, Electron Diffraction, and Electron probe microanalysis(EPMA).

MODULEV: Properties and Applications of Nano materials [9 periods]

Carbon Nano Tube (CNT) – Single-Wall Carbon Nano Tube (SWCNT), Multi-wall carbon Nano tube (MWCNT), Activated carbon, Fullerene, Graphene, Quantum wire and Quantum dots

TEXT BOOKS:

1. C N R Rao, A Muller and A K Cheetham **"The chemistry of Nanomaterials: Synthesis, Properties and Appliocations"** John Wiley, First Edition, 2004

2. Hari Singh Nalwa, **"Nanostructured Materials and Nanotechnology",** Academic Press, First Edition, 2002.

REFERENCES:

1. Charles P Poole Jr "**Introduction to Nanotechnology",** John Willey & Sons, 1st Edition, 2003

2**.** C Dupas, P Houdy, M Lahmani, Nanoscience**: "Nanotechnologies andNanophysics",** Springer-Verlag Berlin Heidelberg, 1st Edition, 2007

3. T Pradeep, "**NANO: The Essentials: Understanding Nanoscience and Nanotechnology***".* Tata McGraw-HillPublishing Company Limited, Revised Edition, 2007

4. Z L Wang, "**Characterization of Nanophase Materials***" Wiley-VCH, 1st Edition*, 2000.

5. K Vijaya Kumar, T Sreekanth and S Chandralingam, "**Engineering Physics",** S Chand and Co 1st Edition, 2008.

E-RESOURCES:

1. http://nptel.ac.in/courses/103103033/module9/lecture1.pdf

2. http://courses.washington.edu/overney/NME498_Material/NME498_Lectures/Lecture4-Overney-NP-Synthesis.pdf

3. https://www.ttu.ee/public/m/Mehaanikateaduskond/Instituudid/Materjalitehnika_instituut/MTX9100/Lecture11_Synthesis.pdf

4. http://www.materialstoday.com/nanomaterials/journals/

5. https://www.journals.elsevier.com/nanoimpact

6. http://www.springer.com/materials/nanotechnology/journal/12274

7. http://nptel.ac.in/courses/118104008/

8. http://nptel.ac.in/courses/118102003/

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

1. Be aware of different physical methods of synthesis of nano materials.
2. Be aware of different chemical methods of synthesis of nano materials.
3. Understand different thermal methods of synthesis of nano materials and to learn different surface characterization techniques.
4. Acquire the different compositional and structural characterization techniques.
5. Develop basic knowledge on the properties and applications of few nano materials

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 70B19	NDT AND VACUUM TECHNOLOGY (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objective: The objective is to provide a basic level of understanding on Non-destructive testing and Vacuum technology.

MODULE I: Introduction to Non destructive testing [10 periods]
Introduction, Objectives of Non destructive testing, Types of defects – Cracking, Spalling, Staining, Construction and Design defects, Honey combing, Dusting, Blistering, Rain damage.

MODULE II: Methods of Non destructive Testing [10 Periods]
Liquid penetration method, Dye penetration method, Radiographic testing, Ultrasonic Inspection method, Pulse Echo method, Magnetic particle testing, Eddy current Testing.

MODULE III: Introduction to Vacuum Technology and Flow meters [10 Periods]
A: Introduction to Vacuum Technology
Definition of vacuum, Degrees of vacuum and their ranges; Review of Kinetic theory of gases; Definitions of particle flux, mono layer formation time, pressure; Elementary gas transport phenomena; Knudsen's and Reynolds' numbers; Throughput, mass flow and conductance;
B: Flow meters
Molar flow, Mass flow and throughput; Rota meters and chokes; differential pressure techniques;

MODULE IV: Pressure gauges [9 Periods]
Classification, Direct and indirect gauges, Indirect gauges – Pirani gauge, Thermocouple gauge, Ionization gauge, hot cathode gauge, Penning gauge

MODULE V: Vacuum Pumps [9 Periods]
Introduction, Pumping speed, Rotary vane pump, Turbo molecular pump, Diffusion pumps

TEXT BOOKS:
1. B K Pandey, S Chaturvedi, **"Engineering Physics",** Cengage learning, 1st Edition, 2014
2. John. F. O'Hanlon, **"A User's guide to Vacuum technology",** Wiley, 3rd Edition, 2003

REFERENCE BOOKS:
1. M R Srinivasan, **"Physics for Engineers",** New Age international, 1st reprint, 2007
2. R K Gaur and S L Gupta, "**Engineering Physics",** Dhanpat rai, Reprint, 2006
3. Krishna Seshan, "**Hand Book of Thin film deposition",** Noyes, 2nd Edition, 2002

E-Resources:
1. http://www.enfm.net/catalog/catalog/enfm-usa.pdf
2. http://web.itu.edu.tr/~arana/ndt.pdf

3. http://www.issp.ac.ru/ebooks/books/open/Nondestructive_Testing_Methods_and_New_Applicat ions.pdf
4. https://www.journals.elsevier.com/ndt-and-e-international/
5. https://www.journals.elsevier.com/vacuum
6. http://nptel.ac.in/courses/114106035/35
7. http://nptel.ac.in/courses/112101004/37
8. http://nptel.ac.in/courses/112106138/22

Course Outcomes:
After completion of the course, student will be able to:
1. Be aware of the concepts of NDT
2. Learn different methods of NDT.
3. Get Introduced to Vacuum technology and learn the concepts of flow meters.
4. Develop basic knowledge of pressure gauges.
5. Understand the concepts of different vacuum pumps.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech.	
Code: 70B21	NANO CHEMISTRY	L	T	P
Credits: 3	(Open Elective)	3	-	-

Prerequisites: Nil

Course Objective: The objective is to make the learners know about the scope of nanoscale materials and their versatile properties. To give knowledge of various instrumental techniques in analyzing the nanomaterials. To make aware of the learners about different applications of nano materials.

MODULE I : Nano Chemistry-I [8 Periods]
Introduction -synthesis of nanostructure materials, Bottom-up approach and Top-down approach With examples-sol-gel method,-solvothermal and hydrothermal routes, Chemical Vapor Deposition and precipitation methods.

MODULE II: Nano Chemistry-II [10 Periods]
Properties of nano materials-Electronic properties, Energy bands and gaps in semiconductors, Fermi surfaces-Optical properties- Fluorescence/luminescence, photoluminescence/fluorescence, electroluminescence, quantum dot.Magnetic properties-mechanical properties-thermal properties.

MODULE III: Instrumental Analysis [10 Periods]
A: Characterization techniques: Principles involved in Scanning Electron Microscopy(SEM), Electron Dispersion Spectroscopy(EDS).
B: Transmission Electron Microscopy (TEM), Dynamic Light Scattering (DLS) and Atomic Force Microscopy(AFM) -Illustrative examples.

MODULE IV : Carbon Nano Tubes and Application [10 Periods]
Carbon Nano structures ,types and preparation of Carbon Nano tubes.Nano structured crystals. Graphene, Carbon nano-fibers- Carbon clusters and Fullerenes- optical and telecommunication applications.Organic Nano Solar cells and its applications.

MODULE V: Environmental Nanotechnology [10 Periods]
Implications of Nanotechnology & Research needs-Nano structured Catalysts TiO_2 Nano particles for Water purification- Nano membranes in Drinking water treatment and desalination, Nano membranes in Sea desalination-Nano particles for treatment of Chlorinated Organic Contaminants.

TEXT BOOKS:
1. Mark A. Ratner, D. Ratner. **"Nanotechnology a gentle introduction to the next big idea"** ,Pearson Education Inc., Asia, 2003.
2. Pradeep.T. "Nano: The essentials-understanding nano science and nanotechnology". Tata Mc.Graw Hill, New Delhi, 2007.

REFERENCES:

1. A. K. Haghi, Ajesh K. Zachariah, Nandakumar Kalariakkal. **"Nanomaterials: Synthesis, Characterization, and Applications"**. Apple Academic Press, 2013.

2. Brechignac C., Houdy P., Lahmani M. (Eds.) **"Nanomaterials and Nanochemistry"** (Springer,) 748p. ISBN 978-3-540-72993-8, 2007
3. Phani kumar. **"Principles of nanotechnology",** Scitech Publications 2nd Edition, 2010.
4. Preeti jain, Shankar lal Garg. **"Environmental Nanotechnology"** Lap lambert Academic publishing , 2015.

E RESOURCES
1. www.docbrown.info/page03/nanochem02.htm (Nanochemistry applications)
2. https://books.google.co.in/books?isbn=352732626X (concepts of nanochemistry)
3. Journal of nanostructure in chemistry (springer publishers)
4. Nanochemistry (wiley publishers)
5. nptel.ac.in/courses/118104008/6 (Introduction to nanomaterials)
6. nptel.ac.in/courses/118104008/ (Nanostructures and nanomaterials)

Course Outcomes
After completion of the course, students will be able to
1. Students will learn the different synthetic methods of the nano materials.
2. To know the student Electronic, optical and magnetic properties of nanomaterials.
3. To acquire the knowledge various instrumental methods of analysis (TEM, EDS, SEM, DLS &AFM).
4. The students can come to know the carbon nano tubes, carbon nano fibers, nano structured catalysts and organic nano solar cells.
5. Students will learn usage of nano materials in the purification of water.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 70B22	PHOTOCHEMISTRY AND SPECTROSCOPY (Open Elective)	L	T	P
Credits: 3		3	-	-

Pre-requisite: Nil

Course Objective: The objective is to make the students know about the impact of light on matter and the implications of it also to bring awareness to explore the consequences of light matter interaction.To give knowledge to the learners regarding the structural identification /determination utilizing the different regions of electromagnetic spectrum.

MODULE I: **Photochemistry I**   **[10 Periods]**
Introduction   to photochemistry, atomic orbitals,molecular orbitals,thermal and photochemical reactions. Fundamental principles of photochemistry-Interaction of light with chemical substances.absortion spectra, electronic transition.spin multiplicity, singlet and triplet of excited state.

MODULE II: **Photochemistry II**   **[10 Periods]**
Laws of photochemistry - Grotthuss–Draper law, Stark–Einstein law and Lambert-Beer Law. Quantum efficiency – determination.Jablonski Diagram-Fluorescence and Phosphorescence. Chemiluminescence and Thermoluminescence with examples. Photosensitization.

MODULE III: Absorption Spectroscopy   **[10 Periods]**
A: Introduction and importance; Principles and instrumentation; Interferences - Chemical & Spectral methods.
B: Applications of Atomic Absorption Spectroscopy for qualitative and quantitative analysis. UV-Visible spectroscopy: principles, applications for qualitative and quantitative analysis.

MODULE IV: IR Spectroscopy   **[09 Periods]**
Introduction- basic   principles, Instrumentation. Identification of some functional groups applications for qualitative and quantitative analysis.

MODULE V: Nuclear Magnetic Resonance Spectroscopy   **[09 Periods]**
Introduction-basic principles , Instrumentation – chemical shift- Spin-Spin splitting- coupling constant, Spin decoupling, shift reagents. Structure determination, applications of proton NMR spectroscopy.

TEXT BOOKS:

1. Mohan Jag, **"Organic spectroscopy: Principles and applications",** 2nd Edition, 2000.
2. R.O. Kan**, "Organic Photochemistry",** McGraw-Hill series in advanced chemistry, New York, 1966**.**

REFERENCES:

1**.** J.Mendham, R.C. Denney, J.D. Barnes and M.J.K. Thomas, **"Vogel's Text Book of Quantitative Chemical Analysis",** Pearson Education Pvt. Ltd., New Delhi, 6th edition, 1999.
2. C.N. Banwell and E.M.Mc cash, **"Fundamentals for molecular spectroscopy"** 4th edition, 1994.
3. N.J Turro, **"Modern molecular photochemistry",** The Benjamin/comings publishing 1991.

4. John R.Dyer , K.L. Rinehart, **"Applications of Absorption Spectroscopy of Organic Compounds",** Prentice-Hall of India Pvt. Ltd., New Delhi, 1969.
5. Hobart H.Willard and D.U.Merritt & J.R.J.A, **"Instrumental Methods of Analysis",** Dean, C.E.S Publishers and distributors, 1986.

E RESOURCES
1. photobiology.info/Ilichev.html (photochemistry theoretical concepts and reaction mechanisms)
2. https://chem.libretexts.org/.../Spectroscopy/...Spectroscopy/Infrared_Spectroscopy (IR spectroscopy)
3. www.spectroscopynow.com/.../journal/sepspec1730journal/Spectroscopy-Europe-Ma (Magazine)
4. Journal of spectroscopy (Hindawi publishers)
5. nptel.ac.in/courses/103108100/31 (Infrared spectroscopy)
6. https://www.youtube.com/watch?v=o8zELwp358A (UV-Visible spectroscopy)

Course Outcomes
After completion of the course, students will be able to:
1. Aware about the light matter interaction.
2. Understand various law's of photochemistry such as Grotthuss-Draper, Stark-Einstein and Lambert-Beer law's.
3. Get knowledge about qualitative and quantitative analysis of various samples by Absorption spectroscopy.
4. Identify the functional groups in organic molecules by IR spectrum.
5. Acquire the knowledge of structural elucidation of organic molecules by proton NMR spectroscopy.