ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABUS

Effective from the Academic Year 2017-18 onwards

Department of Mining Engineering (Min.E)

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

To be a center of excellence in Mining Education and Research to produce competent and committed Mining Engineers to face the challenges of the industry and to create good environment for Nation growth. Constantly thriving to provide quality education with a stress on new technologies safety and conservation of minerals.

DEPARTMENT MISSION

To train students with latest technologies and equip them with skills to run the industries with safety conservation and productivity. To have regular contacts with industries research organizations and other institutions and to provide technical solutions. Continued research activities to understand and analyze all technical issues and to find solutions with a stress on safety and production.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: To upgrade students' knowledge in Basic Sciences, Earth Sciences, Humanities & Social Sciences, Management, Environmental Sciences and Basic Engineering domains with an objective of application of these domains in Mining Engineering.

PEO2: To enrich the field oriented knowledge base of the graduates in the areas of geology, exploration, mine planning, management, safety, mine valuation, mineral development, exploitation, mineral beneficiation, environmental impact assessment, reclamation, mine closure and socio-economic and legal issues through inter disciplinary inputs and guidance with an aim of producing wholesome mining engineers.

PEO3: To enhance technical and intellectual competence of the students in mining and allied domains and encourage them for pursuing higher education and carry out R&D activities in the area of mining & other earth science disciplines that support environmental compliance and energy security needed for the societal growth.

PEO4: To make the students successful professionals backed with techno-managerial capabilities to address societal needs with regard to the environment, health and safety, and conservation of our natural resources

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 Mining Engineering will be able to

PSO 1: Solve the mining engineering problems by application of knowledge of basic sciences, engineering, geo-technology, economics, environment & management.

PSO 2: Analyze and evaluate the techno-economic feasibility of mining projects and deep understanding of economic and environmental implications of mine design and operations.

PSO 3: Equipped with skills and knowledge related to mine management, optimization techniques with multi-disciplinary skills for achieving sustainable development of mineral industry.

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.	4.16 %	5- 10 %
2	BS		Basic Sciences (BS) including Mathematics, Physics and Chemistry.	13.54 %	15- 20%
3	ES		Engineering sciences (ES) including Engineering Workshop, Engineering Graphics, Basics of Electrical and Electronics / Mechanical / Computer Engineering.	20.31 %	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.	35.93 %	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.**

Mid – Term Examination -UG				
Part	**Type of Questions**	**No. of questions**	**Marks per question**	**Total**
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
Mid-Term Exam Total				35
Assignment				05
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 a. 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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8.3 b. Machine Drawing:

The distribution of marks is as given below

Part	Type of Questions	No. of questions	Marks per question	Total
CIE for Machine Drawing				
Part A	Day-to-Day Work			20
I Mid Term Examination				
Part B	Choice Questions [4 out of 6]	4	5	20
II Mid Term Examination				
Part B	Choice Questions – Assembly Drawing [1 out of 2]	1	20	20

Part	Type of Questions	No. of questions	Marks per question	Total
SEE for Machine Drawing				
Part A	Choice Questions [2 out of 4]	2	10	20
Part B	Compulsory Questions (Assembly Drawing)	1	40	40
Total				**60**

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 $\geq 65\%$ 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 $\geq$ 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

$SGPA = \left\{ \sum_{i=1}^{N} C_i G_i \right\} / \left\{ \sum_{i=1}^{N} C_i \right\}$ … 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 i^{th} 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.

$CGPA = \left\{ \sum_{j=1}^{M} C_j G_j \right\} / \left\{ \sum_{j=1}^{M} C_j \right\}$… 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 …

$$\text{\% of Marks} = (\text{final CGPA} - 0.5) \times 10$$

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 ≤ 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	Contact hours/week L	T	P	Credits	Scheme of Valuation 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	Contact hours/week L	T	P	Credits	Scheme of Valuation 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**		

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

III SEMESTER

S. No.	Category	Course Code	Name of the course	L	T	P	Credits	Internal (CIE)	External (SEE)	Total Marks
1	ES	70313	Machine Drawing	3	-	-	3	40	60	100
2	ES	70305	Fluid Mechanics and Hydraulic Machines	3	-	-	3	40	60	100
3	ES	70353	Mechanical Technology	3	2	-	4	40	60	100
4	PC	72501	Introduction to Mining Engineering	3	2	-	4	40	60	100
5	PC	72502	Mining Geology	4	-	-	4	40	60	100
6	ES	70239	Mine Electrical and Electronics Lab	-	-	4	2	40	60	100
7	ES	70311	Fluid Mechanics and Hydraulic Machines Lab	-	-	4	2	40	60	100
8	PC	72503	Mining Geology Lab	-	-	4	2	40	60	100
9	MC	70M03	Environmental Science	-	2	-	-	40	60	100
10	AC	70A03	Internship-I	-	-	-	-	-	-	-
			Total	16	6	12	24	**Contact Periods:34**		

IV SEMESTER

S. No	Category	Course Code	Name of the course	L	T	P	Credits	Internal (CIE)	External (SEE)	Total Marks
1	BS	70B04	Probability and Statistics	2	2	-	3	40	60	100
2	ES	70307	Mechanics of Solids	2	2	-	3	40	60	100
3	PC	72504	Drilling and Blasting	3	-	-	3	40	60	100
4	PC	72505	Surface Mining Technology	4	-	-	4	40	60	100
5	PC	72506	Mining Machinery-I	4	-	-	4	40	60	100
6	PC	72507	Mine Surveying-I	3	-	-	3	40	60	100
7	ES	70354	Mechanics of Solids Lab	-	-	4	2	40	60	100
8	PC	72508	Mine Surveying Lab - I	-	-	4	2	40	60	100
9	MC	70M02	Gender sensitization	-	-	3	-	40	60	100
10	AC	70A02	Law for Engineers	-	2	-	-	-	-	-
			Total	18	6	11	24	**Contact Periods:35**		

V SEMESTER

S. No.	Category	Course Code	Name of the course	L	T	P	Credits	Internal (CIE)	External (SEE)	Total Marks
1	PC	72509	Mine Ventilation	3	2	-	4	40	60	100
2	PC	72510	Mine Surveying-II	2	2	-	3	40	60	100
3	PC	72511	Mining Machinery-II	4	-	-	4	40	60	100
4	PE-I	72512	Mine Construction Engineering	3	2	-	4	40	60	100
		72513	Rock Excavation Engineering							
		72514	Mineral Exploration							
5	OE-I			4	-	-	4	40	60	100
6	PC	72515	Mine Ventilation Lab	-	-	4	2	40	60	100
7	PC	72516	Mine Surveying Lab-II	-	-	4	2	40	60	100
8	HS	70H03	English Communication and Presentation Skills Lab	-	-	2	1	40	60	100
9	AC	70A04	MOOCs/NPTEL Online Course	-	-	-	-	-	-	-
10	AC	70A05	Internship-II	-	-	-	-	-	-	-
			Total	16	6	10	24	**Contact Periods:32**		

VI SEMESTER

S. No.	Category	Course Code	Name of the course	L	T	P	Credits	Internal (CIE)	External (SEE)	Total Marks
1	HS	70H06	Industrial Management	2	-	-	2	40	60	100
2	PC	72517	Mine Hazards and Rescue	3	-	-	3	40	60	100
3	PC	72518	Underground Coal Mining	3	-	-	3	40	60	100
4	PC	72519	Rock Mechanics	3	-	-	3	40	60	100
5	PE-II	72520	Rock Slope Engineering	3	2	-	4	40	60	100
		72521	Underground Coal Gasification							
		72522	Mine Safety Engineering							
6	PE-III	72523	Mine Systems Engineering	3	-	-	3	40	60	100
		72524	Longwall Mining							
		72525	Advanced Surface Mining							
7	PC	72526	Mine Safety Rescue Engineering Lab	-	-	4	2	40	60	100
8	PC	72527	Rock Mechanics Lab	-	-	4	2	40	60	100
9	PR	70P01	Technical Seminar	-	-	4	2	100	-	100
10	MC	70M04	Professional Ethics	-	2	-	-	40	60	100
			Total	17	4	12	24	**Contact Periods:33**		

VII SEMESTER

S. No.	Category	Course Code	Name of the course	L	T	P	Credits	Internal (CIE)	External (SEE)	Total Marks
1	PC	72528	Mineral Processing	3	-	-	3	40	60	100
2	PC	72529	Mine Legislation	3	-	-	3	40	60	100
3	PC	72530	Computer Application in Mining	3	-	-	3	40	60	100
4	PC	72531	Underground Metal Mining	3	-	-	3	40	60	100
5	PE-IV	72532	Mine Planning and design	3	-	-	3	40	60	100
		72533	Numerical methods in Mining Engineering							
		72534	Mine Economics							
6	PE-V	72535	Mine Subsidence Engineering	3	-	-	3	40	60	100
		72536	Small Scale Mining and Marine Mining							
		72537	Ground Control Technology							
7	PC	72538	Mineral Processing Lab	-	-	4	2	40	60	100
8	PC	72539	Computer Applications in Mining Lab	-	-	4	2	40	60	100
9	PR	70P02	Mini Project	-	-	4	2	40	60	100
			Total	18	-	12	24	**Contact Periods:30**		

VIII SEMESTER

S. No.	Category	Course Code	Name of the course	L	T	P	Credits	Internal (CIE)	External (SEE)	Total Marks
1	PE-VI	72540	Material Handling	3	-	-	3	40	60	100
		72541	Geostatistics							
		72542	Mine Environmental Engineering							
2	OE-II			3	-	-	3	40	60	100
3	OE-III			3	-	-	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	70A03	Fine Arts/Foreign Language	-	2	-	-	-	-	-
			Total	9	4	22	24	**Contact Periods:35**		

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 Organizational 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	Tunneling 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 Objectives: 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. 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.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: 70B06	**ENGINEERING PHYSICS**	**L**	**T**	**P**
Credits: 4	(Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	**4**	**-**	**-**

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   **13 Periods**
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**	**-**	**-**

Pre-requisite: 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.

ModuleIII: 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- preparation, 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	L	T	P
Credits: 3	(Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	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.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: 70502	**COMPUTER PROGRAMMING LAB**	**L**	**T**	**P**
Credits: 2	(Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	-	-	4

Software Requirements: 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** (Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	**L**	**T**	**P**
Credits: 2		**-**	**-**	**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. I Semester		
Code: 70A01	**NSS AND SPORTS/YOGA** (common to CE, EEE, ME, ECE, CSE, IT and Mining)	**L**	**T**	**P**
Credits: Nil		**-**	**2**	**-**

Prerequisites: Nil

Course objectives:
To develop physical skills and fitness specific to a particular sport. Provide them the training and coaching towards achieving their group goals. To give the students health and physical fitness to ensure mental and emotional balance. NSS (**National Service Scheme)** provides ample opportunities for the students to participate in the community service programs. To encourage them to become socially and environmentally sensitive, empathetic and responsible individuals of the nation.

MODULE I   **6 Periods**
Introduction and Basic concepts of NSS: History, Philosophy, aims & Objectives of NSS, Emblem, Motto, Song and Other Components of NSS, **NSS Programmes and Activities- Concept of regular activities,** Special camping, Day camps. Basis of adoption of villages/ slums & methodology of survey.

MODULE II   **6 Periods**
Volunteerism and Shramdan- needs &Importance of Volunteerism, Motivation and Constraints of Volunteerism, Shramdan as a part of Volunteerism.

MODULE III   **6 Periods**
Introduction of physical education: Importance of physical education, Athletics (Track events and combined events), Basket ball, Throw ball, Foot ball.

MODULE IV   **6 Periods**
Youth and yoga- yoga as a tool for healthy lifestyle, Yoga as a preventive, promotive & curative method. Pranayam and Different Yoga traditions and their impacts.
Various competitions at different levels- Athletics (field events), volleyball, handball, cricket. Indoor games: Table Tennis, Caroms, chess

MODULE V   **6 Periods**
Environmental Issues- Natural Resource Management (Rain water Harvesting, energy conservation etc.). Waste Management, Disaster Management- Role of youth in Disaster Management.
Civil / Self Defense-Aims and objectives of Civil defense and need for self defense training.

TEXT BOOK:
1. Christopher G. Petre, **"Social Work with Children and Their Families: Pragmatic Foundations "**, Journal Vol:24, No.3, September 18th, 2003, 2nd Edition.

REFERENCE BOOKS:
1. Pamela Grundy & Susan Shackleford, "**Shattering the Glass: The Remarkable History of Women in Basketball**" Published 15th May, 2007.
2. Roger Kahn, "**The Boys of Summer**" , 1st Edition, May 9th 1973.
3. Jaci Burton, "**Perfect Play**", 1st Edition, Feb 1st 2011, series 1.
4. Silva Mehta, Mira Mehta and Shyam Mehta, **"Yoga: The Iyengar Way",** Published by Knopp, 7th April, 1990.
5. Vishnu-Devananda, **"The Complete Illustrated Book of Yoga",** 18th April, 1995.
6. Timothy McCall, **"Yoga as Medicine: The Yogic Prescription for Health and Healing",** published by Harmony, 31st July 2007.
7. Rashmi Bansal, "**Stay Hungry Stay Foolish",** 1st December 2008.
8. Beverly Schwartz, "**Rippling: How Social Entrepreneurs Spread Innovation Throughout the World"**, Published by Jossey – Bass, May 27th 2012.

E RESOURCES:
1. http://nptel.ac.in/courses/109106059/11
2. http://nptel.ac.in/courses/109106059/12
3. http://nptel.ac.in/courses/109106059/13
4. http://nptel.ac.in/courses/109106059/14

Course Outcomes:
At the end of the course, the student will able to
1. Understand the concepts of National Service Scheme (NSS) and its activities.
2. Gain the essence of volunteerism and shramdan.
3. Understand the rules and procedures of physical education and its events.
4. Learn the basics of yoga and its benefits to the youth in personality development.
5. Gain the knowledge of managing the environmental issues and self defense activities.

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 Objectives:
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   12 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   13 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.
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
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)
10. http://nptel.ac.in/courses/122102009 (Algebraic and transcendental equation)
11. http://nptel.ac.in/courses/112104035/14 (Mathematical methods in engineering and science by Prof. Bhaskar Dasgupta)
12. http://nptel.ac.in/courses/111107063 (Numerical solution of Ordinary Differential Equations)
13. http://nptel.ac.in/courses/111105038 (Numerical Solution of Partial Differential Equations)

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. To find out the Numerical solution of partial differential equations.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: 70B09	**PHYSICS OF MATERIALS**	**L**	**T**	**P**
Credits: 3	(Common for CE, ME and Min.E)	3	-	-

Prerequisites: 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 &Ultrasonic   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, 3rdEdition, 2008.
4. R K Gaur and SL Gupta, "**Engineering Physics**" Dhanpat Rai 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 Ultrasonic.
5. Know relevant the applications of NDT.

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

Prerequisites: Nil

Course Objectives:
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	-	-

Prerequisites: Nil

Course Objectives:
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 analyze 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, Centroidand 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. <u>S. Timoshenko</u>, <u>D.H. Young</u>, <u>J.V. Rao</u> and <u>Sukumar Pati</u>**, "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 (Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	L	T	P
Credits: 2		-	-	4

Prerequisites: 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
3. 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.

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/2/14309868938d576a532b71360b7354 268380727a22/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**	**L**	**T**	**P**
Credits: 2	(Common to CE, EEE, ME, ECE, CSE, IT and Min.E)	**-**	**-**	**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** (Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	L	T	P
Credits: Nil		-	-	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 indispensable 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:
1. Find the smallest root of non-linear equation using Ramanujan's method
2. Solve the system of non-homogeneous linear equations using Gauss-Jacobi method
3. Solve the system of non-homogeneous linear equations using Gauss-siedal method
4. Lagrange's interpolation for unevenly spaced points

MODULE III:
1. Numerical solution of first order O.D.E. using Euler's method.
2. Numerical solution of first order O.D.E. using 4th order Runge-Kutta method.
3. Numerical Integration using Trapezoidal Rule
4. 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: 70313	MACHINE DRAWING		L	T	P
Credits: 3			3	-	-

Prerequisites: Engineering Graphics

Course Objectives:

To understand projections of simple machine elements and understand assembly drawings of typical machine parts such as Connecting rod, Eccentric, Cross head, Machine vice, Screw jack, Plummer block, Tail stock & valves.

Machine Drawing Conventions:
Need for drawing conventions - introduction to IS conventions
a) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features
b) Types of sections - selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
c) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs, springs.
d) Title boxes, their size, location and details - common abbreviations & their liberal usage
e) Assembly drawings - working drawings of machine parts.

I. Drawing of Machine Elements and simple parts:
Selection of Views, additional views for the following machine elements and parts with every drawing proportion.
    a) Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
    b) Keys, cotter joints and knuckle joint.
    c) Riveted joints for plates
    d) Shaft coupling, socket and spigot pipe joint.
    e) Journal, pivot and collar and foot step bearings.

II. Assembly Drawings:
Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.
    a) Engine parts - Stuffing boxes, Cross heads, Eccentrics, Petrol Engine connecting rod, Piston assembly.
    b) Other machine parts - Screws jacks, Machine Vices, Plummer block, Tailstock and Square tool post.
    c) Valves- Steam stop valve, Spring loaded safety valve andFeed check valve

Note: First angle projection is to be adopted. The student should be provided working drawings of actual parts.

TEXT BOOKS

1. K.L.Narayana, P.Kannaiah **"Machine Drawing"**, New Age Publishers, 5th edition, 2016.
2. RK Dhawan "**Machine Drawing"**, S.Chand Publications, Revised edition, 2014
3. N.D.Bhatt "**Machine Drawing",** Charotar Publishing House pvt ltd, 48th edition, 2013

REFERENCES

1. P.S.Gill "**Machine Drawing"**, S.K. Kataria & Sons publisher, 17th edition, 2009.
2. Rajput "**Machine Drawing",** Lakshmi Publications
3. K.C.JOHN "**Machine Drawing**", PHI Learning Pvt Ltd, 2009
4. N.D. Junnarkar "**Machine Drawing**", Pearson Education India, 2007.

E - RESOURCES

1. http://nptel.ac.in/courses/105108069/

2. http://www.me.metu.edu.tr/courses/me114/Lectures/assembly.htm

3. http://www.nature.com/nature/journal/v58/n1510/abs/058543c0.html

Course Outcomes:

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

1   Know the basic conventional representation of materials which is fundamental to the subject.
2   Know the nomenclature of threads, bolts, nuts, set screws, tap
3   Know the importance of joints like cotter joints, knuckle joint and also come to know how the power being transmitted from one shaft to other.
4   Draw the Journal bearings, collar and foot step bearings
5   Draw the assembly drawings of machine parts.
6   Understand the importance of assembly drawing from different machine parts
    (stuffing box, cross heads, eccentrics, petrol engine parts, screw jack, tail stock, etc.)

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. III Semester	
Code: 70305	**FLUID MECHANICS AND HYDRAULIC MACHINES** [Common to EEE, ME and Mi. Engg.]	**L**	**T**	**P**
Credits: 3		3	-	-

Prerequisites: Engineering Mechanics

Course Objectives:

The objective of this subject is to provide the knowledge of fluid power and analyze the performance of various hydraulic machines like turbines, compressors and pumps.

MODULE I: Fluid statics   10 Periods
Dimensions and units: physical properties of fluids- specific gravity, viscosity surface tension- vapor pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure – measurement of pressure- Piezometer, U-tube and differential manometers.
Hydro static forces on plane and curved surfaces. Buoyancy and floatation: Meta center, stability of floating body. Submerged bodies. Calculation of metacenter height.

MODULE II: Fluid Kinematics & Fluid Dynamics   10 Periods

Fluid kinematics: 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 dimensional flow. Velocity potential and stream function – flow net.
Fluid dynamics : Surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, Measurement of flow: pilot tube, venturimeter and orifice meter, Flow nozzle, Turbine flow meter, momentum equation and its application on pipe bend.

MODULE III: Closed Conduit Flow & Boundary Layer Concepts   10 Periods
Closed conduit flow: Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line.
Boundary Layer Concepts: Definition, thickness, characteristics along thin plate, laminarand turbulent boundary layers (No derivation) boundary layer in transition, separation of boundary layer, submerged objects – drag and lift.

MODULE IV: Turbo machinery and Hydraulic Turbines   09 Periods
Basics of turbo machinery: Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work don and efficiency, flow over radial vanes.
Hydraulic Turbines : Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies , hydraulic design –draft tube theory- functions and efficiency. Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

MODULE V: Centrifugal Pumps & Reciprocating Pumps   09 Periods
Centrifugal pumps: Classification, working, work done – manomertic head- losses and efficiencies specific speed- pumps in series and parallel-performance characteristic curves, NPSH.
Reciprocating pumps: Working, Discharge, slip, indicator diagrams.

TEXT BOOKS
1. Modi and Seth, "**Hydraulics, fluid mechanics including hydraulic machines**", Standard Publishers, 19th Edition, 2013
2. R.K. Bansal, "**Fluid Mechanics and hydraulic Machines**", Laxmi Publications, 9th Edition, 2010.

REFERENCES
1. R.K. Rajput, "**Fluid Mechanics and Hydraulic Machines**", S.Chand, 5th Edition, 2013.
2. D. Rama Durgaiah, **"Fluid Mechanics and Machinery"**, New Age International (P) Ltd, 1st editions, 2007
3. James W. Dally, William E. Riley **"Instrumentation for Engineering Measurements"**, John Wiley & Sons Inc. 3rd editions, 1989.
4. Vijay Gupta and S.K.Gupta, "**Fluid Mechanics and Applications**", New-Age International Ltd. 1999.
5. Banga & Sharma, "**Hydraulic Machines**", Khanna Publishers, 7th Edition, 2007

E - RESOURCES
1. NPTEL
2. www.sanfoundry.com/best-reference-books-fluid-mechanics-and-machinery/
3. https://www.elsevier.com/journals

Course Outcomes:

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

1:   Know the dimension and units of fundamental properties.

2:   Understand the concept of fluid kinematics and dynamics.

3:   Understand and solve the problems of closed conduit flow & boundary layer concepts.

4:   Analyze the performance of turbo machinery and hydraulic turbines.

5:   Understand the principles of centrifugal and reciprocating pumps.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B. Tech III Semester	
Code: 70353	**MECHANICAL TECHNOLOGY**	**L**	**E**	**P**
Credits: 4		3	2	-

Prerequisites: Engineering Mechanics

Course Objectives: To introduce fundamentals of mechanical engineering to the student emphasizing the importance of power transmitting elements, power generating engines, compressors and their applications in real life

MODULE I: Cams   **13 Periods**
Cams: Definitions of cam and followers – their uses – Types of followers and cams – Terminology – Typesof follower motion - Uniform velocity – Simple harmonic motion and uniform acceleration. Maximum velocity and maximum acceleration during outward and return strokes in the above 3 cases.

MODULE II: Belt, Rope and Chain Drives   **13 Periods**
Belt, Rope and Chain Drives : Introduction, Belt and rope drives, selection of belt drive- types of beltdrives,V-belts, materials used for belt and rope drives, velocity ratio of belt drives, slip of belt, creep of belt, tensions for flat belt drive, angle of contact, centrifugal tension, maximum tension of belt, Chains- length, angular speed ratio, classification of chains.

MODULE III: Toothed gears, Introduction to Conventional Machine Tools & Introduction to NC & CNC machines   **13 Periods**

Toothed gears: types – law of gearing, condition for constant velocity ratio for transmission of motion, Formof teeth: cycloidal and involutes profiles. Velocity of sliding – phenomena of interferences – Methods of interference. Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact – Introduction to Helical, Bevel and worm gearing.
Introduction to Conventional Machine Tools: Lathe Machine, Milling Machine, Drilling Machine, Shaping Machine & Grinding Machine, Working Principle, Tools.
Introduction to NC & CNC machines: Advances of NC and CNC machines over conventional machines and applications.

MODULE IV: IC Engines   **13 Periods**
IC Engines: IC Engine components and basic engine nomenclature, classification of IC Engines, otto cycle, diesel cycle, two stroke and four stoke cycle spark ignition and compression ignition engines. Application of IC Engines study of fuel supply systems in SI and CI Engines, study of fuel ignition, cooling and lubrication systems. Simple calculations of indicated power, brake power, mechanical efficiency, thermal efficiency and fuel consumption. Coal diesel, coal water, slurries as alternate fuels. Simple maintenance techniques.

MODULE V: Air Compressors   **12 Periods**

Air Compressors: Compressed air generation and applications. Types of air compressors, reciprocating and rotary compressors like roots blower, vane type, centrifugal, axial flow, screw type. Equation for kg of air compressed with and without clearance volume in a reciprocating air compressor, two stage air compressor with inter cooling, simple problems. Distribution of compressed air, application of compressed air, in Mining machinery, maintenance of compressed air, distribution systems.

TEXT BOOKS
1. V. GANESHAN**"Internal Combution Engines",** Tata McGraw-Hill.
2. Rattan **"Theory Machines",** Tata McGraw-Hill.
3. Prof. Yahya**"Turbines Compressors and Fans",** Tata McGraw-Hill.
4. Prof. D.J. Deshmukh **"Elements of Mining Technology"** (Vol- I & II), Tata McGraw-Hill
5. P.N Rao **"Manufacturing Technology",** Vol. II, Tata McGraw-Hill.

REFERENCES
1. R.S. Khurmi & J.K. Gupta **"Thermal Engineering",** S Chand.
2. Heywood **"I.C. Engines",** McGraw Hill.
3. RK Jain & S C Gupta **"Production Technology",** Kanna Publishers
4. **"Production Technology", Hand book, HMT**

E- RESOURCES
1. https://ssmengg.edu.in/weos/weos/upload/EStudyMaterial/Mechanical/4thSem/theoryofmachine/Cams%20and%20Followers.pdf
2. http://nptel.ac.in/courses/112106137/pdf/2_1.pdf
3. http://nptel.ac.in/courses/112105129/pdf/R&AC%20Lecture%2019.pdf

Course Outcomes

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

1. Understand about the application of cam in different fields

2. Understand Transmission of motion using belt drives and they can apply it in their domain
3. Understand the terms and nomenclature associated with gears

4. Understand Internal combustion engines and appreciate their use in mining.

5. Understand the use and application of compressed air and working of reciprocating compressor

6. Understand the application of different mechanical devices like gears, cams, compressors in mining.

Prerequisite: Under graduate Physics, Chemistry and Math's.

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   12Periods
Significanceto 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   12Periods
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   12Periods
Part A: Drivage of cross cuts, drifts, inclines and raises by conventional and mechanized methods. Calculation of OMS.
Part B: Arrangements for ventilations, supports, lightings, transportations and drainages. Drilling patterns for underground coal mines and hard rock mines.

MODULE-IV: Mine supports   12Periods
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   **12Periods**

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. Introductory mining engineering-, Howard L.Hartman, Jan M.Mutmansky/ wiley India (P) Ltd
2. Elements of mining technology Vol-I - D.J. Deshmukh /Denett & Company

REFERENCE BOOKS:
1. Roy Piyush Pal, Blasting in ground excavations and mines, Oxford and IBH, 1st ed 1993
2. C.P. Chugh, Drilling technology handbook, Oxford and IBH, 1sted, 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-beltconveyors/
3. Indian Mining Journal

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

1. Know the status and significance of mining Industry.
2. Apply different methods of Shaft sinking according to the ground conditions.
3. Know about Development of workings.
4. Know about different types of supports, their advantages and disadvantages.
5. Know about different tunneling methods.

Prerequisite: Under graduate Physics and Chemistry

Objectives:
To introduce fundamentals of mining geology to the student emphasizing the importance of propertiesof rocks, soils and minerals. Course is also aimed at explanation of geology of tunnels, geology of bore hole drilling and excavation.

MODULE-I:Land forms and Mineralogy   **12Periods**
Origin or mode of development, characteristic features and engineering considerations of land forms developed by rivers, wind, oceans and volcanoes
Mineralogy: physical and chemical properties, classification of minerals and properties of common silicate minerals, oxides and sulphides.

MODULE-II:Petrology   **12Periods**
Igneous rocks: Magma and lava, extrusive and intrusive forms, classification and description of some common igneous rocks.
Sedimentary rocks: Sedimentation process**,** classification and description of some common sedimentary rocks
Metamorphic rocks: Process of metamorphism, textures and structures of metamorphic rocks, classification and description of some metamorphic rocks

MODULE-III:Structural Geology and Stratigraphy
PART-A:Structural Geology   **12Periods**
Strike and dip, fundamental type, characteristic features and mechanics of folds, faults, joints and unconformities.
PART-B: Stratigraphy
Principles of stratigraphy, geological time scale.

MODULE-IV:Genesis of Mineral deposits   **12 Periods**
Definition of ore, gangue**,** tenor and grade of ore, processes and formation of ore deposits including coal and petroleum
Mineral Resources of India: Major and minor mineral resources of India, origin and distribution

MODULE-V:Mineral Exploration   **12 Periods**
Geological, geophysical and geochemical exploration of mineral deposits**,** Estimation and determination of mineral reserves by different methods

TEXT BOOKS:
1. Mining Geology by Arogya Swamy, Oxford & IBH Publishing Company ,(1996)
2. Mining Geology by Mc Kinstry, Prentice-Hall

REFERENCE BOOKS:
1. Mineral Resources of India by Krishna Swamy, Oxford & IBH,2nd edition (1984)
2. Engineering Geology & Geotechnics by Krynine and Hudd/McGraw-Hill.
3. Economic Mineral Deposits Alan M. Bateman (Author), M.L. Jensen (Editor), John Wiley & Sons Inc; 3rd edition (1979).

E RESOURCES:
1. http://dmg.kerala.gov.in/
2. http://www.mininggeology.ausimm.com.au/

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

1. Know different types of land forms formed by rivers,wind, oceans and volcanoes.
2. Know igneous rocks, Sedimentary rocks, and metamorphic rocks.
3. Know Structural Geology and Stratigraphy.
4. Know Genesis of Mineral deposits and Mineral Resources of India.
5. Know Geological, geophysical and geochemical exploration of mineral deposits.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. III Semester	
Code: 70239	**MINE ELECTRICAL AND ELECTRONICS LAB**	**L**	**T**	**P**
Credits: 2		**-**	**-**	**4**

Course Objective:

To impart hands on experience in basic electrical laws, characteristics and applications of electronic devices like PN junction diode and zener diode.

LIST OF EXPERIMENTS:

1. Verification of Ohm's Law.

2. Verification of KCL and KVL.

3. Verification of RMS value of complex wave.

4. Determination of branch currents and node voltages of a given electrical network by simulation.

5. Study of methods of earthing electrical equipment used below ground.

6. Study of flame proof electrical apparatus.

7. Identification and practical exposure to R, L, C Components (Color Codes),Potentiometers, Coils, Relays,Bread Boards, PCB's, LEDs,

8. Forward & Reverse Bias Characteristics of PN Junction Diode.

9. Forward & Reverse Bias Characteristics of Zener diode

10. Zener diode as a voltage Regulator (Variable supply-constant load, Constant supply-variable load)

11. Half Wave Rectifier with & without filters.

12. Full Wave Rectifier with & without filters.

Course Outcomes:

At the end of the course, students will be able to
1. Verify basic electrical laws.
2. Study electrical earthing equipment's.
3. Determine the characteristics of PN Junction Diodeand Zener diode.
4. Analyze the various rectifier circuits.
5. Design a voltage regulator using Zener diode

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. III Semester	
Code: 70311	**FLUID MECHANICS AND HYDRAULIC MACHINES LAB**	**L**	**T**	**P**
Credits: 2	[Common to EEE, ME and Min. Engg.]	**-**	**-**	**4**

Course Objectives:

To provide practical knowledge in principles of fluid flow, losses, performance testing of hydraulic turbines and hydraulic pumps.

LIST OF EXPERIMENTS:

1. Performance test on impact of jet on Vanes.

2. Performance Test on Pelton Wheel.

3. Performance Test on Francis Turbine.

4. Performance Test on Kaplan Turbine.

5. Performance Test on Single Stage Centrifugal Pump.

6. Performance Test on Multi Stage Centrifugal Pump.

7. Performance Test on Reciprocating Pump.

8. Calibration of Venturimeter.

9. Calibration of Orifice meter.

10. Determination of friction factor for a given pipe line.

11. Determination of minor losses (sudden contraction, expansion, pipe bend and union) in given a pipeline.

12. Validation of Bernoulli's Theorems.

Course Outcomes

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

1. Analyze the performance of turbines.

2. Analyze the performance of centrifugal and reciprocating pump.

3. Analyze the performance of venturimeter and orifice meter.

4. Determine the minor losses in various pipes.

5. Demonstrate the Bernoulli's equation in Bernoulli's apparatus.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech III Semester		
Code:72503	**MINING GEOLOGY LAB**	**L**	**T**	**P**
Credits: 2		**-**	**-**	**4**

Objectives:
To identify minerals, rocks, ores and geological structures. To learn geological mapping, remote sensing techniques and geophysical methods

LIST OF EXPERIMENTS:

1. Identification and physical properties of impartment rock-forming and ore-forming minerals.

2. Identification and distinguish characteristics of important igneous, sedimentary and metamorphic rocks.

3. Determination of srike and dip of planar features by clinometer compass.

4. Study of models pertaining to folds, faults and unconformities.

5. Study and interpretation of Topographic Maps.

6. Study of Geological Maps of Andhra Pradesh & India.

7. Study of Geomorphologic Map of India and Tectonic Map of India.

8. Study of Seismotectonic Atlas of India.

9. Vertical Electrical sounding Survey to determine depth to water table & bed rock.

10. Determination of unconfined compressive strength of important rocks

Course Outcomes:
At the end of the course, students will be able to:
1. Identify the properties of rock forming and ore forming minerals.

2. Determine the strike and dip planar features by clinometer compass.

3. Identify the folds, faults and unconformities.

4. Knowledge of geology mapping.

5. Determine the unconfined compressive strength of important rocks.

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

Prerequisite: 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: 7 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: 9 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 groundwater, flood sand 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 nonrenewable energy sources.
Biodiversity and Biotic resources: Introduction, Definition, genetic, species and ecosystem diversity. Values of biodiversity: consumptive use, productive use, social, ethical, aesthetic and intrinsic values. Threats to Biodiversity (habitatloss, poaching of wildlife, man-wildlife conflicts). Conservation of Biodiversity (In-situ and Ex-situ conservation)

MODULE III: Environmental pollution and control 9 Periods
Part 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.
Part 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: **8 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 studiesFrom crisis to cure"**, Oxford University Press 2nd Edition, 2005.
2. AnubhaKaushik, 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, 1stEdition, 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 and make aware of Different natural functions of ecosystem, this helps to sustain the life on the earth.
2. Use natural resources more efficiently.
3. Make aware of the impacts of human actions on the environment, its effects and minimizing measures to mitigate them.
4. Educate regarding environmental issues and problems at local, national and international level.
5. Know more sustainable way of living.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B. Tech III Semester		
Code: 70A03	Internship-I		L	T	P
Credits: Nil			-	-	-

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: Nil

Course Objectives: 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
Part A: Random variables – Discrete Probability distributions. Bernoulli, Binomial, poisson, mean, variance, moment generating function–related problems. Geometric, Negative Binomial distributions (Only mean and Variance).
Part B: Continuous probability distribution, Normal distribution, mean, variance, moment generating function–related problems. Exponential, Beta and Gamma distributions (Only mean and Variance).

MODULE IV: Sampling Distributions and Testing of hypothesis   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 toProbability 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,First edition.

E RESOURCES:

1. http://www.csie.ntu.edu.tw/~sdlin/download/Probability%20&%20Statistics.pdf
2. (Probability & Statistics for Engineers & Scientists text book)
3. http://www.stat.pitt.edu/stoffer/tsa4/intro_prob.pdf (Random variables and its distributions)
4. http://users.wfu.edu/cottrell/ecn215/sampling.pdf (Notes on Sampling and hypothesis testing)
5. http://www.pnas.org/content/93/9/3772.full.pdf (Hypothesis testing and earthquake prediction)
6. http://nsuworks.nova.edu/cgi/viewcontent.cgi?article=2373&context=tqr(Sampling Theory)
7. https://sci-hub.cc/10.1111/j.1540-6261.1996.tb05219.x (probability Distributions)
8. http://nptel.ac.in/courses/117105085/ (Introduction to theory of probability)
9. http://nptel.ac.in/courses/117105085/9 (Mean and variance of random variables)
10. http://nptel.ac.in/courses/111105041/33 (Testing of hypothesis)
11. 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.

Prerequisites: Physics of Materials and Engineering Mechanics

Course Objectives:
The objective of this subject is to provide the basic concepts of mechanical behavior of the materials under various loads, provides knowledge on shear force and bending moment diagrams of beams and knowledge about stress distribution across various cross sections of beams.

MODULE I: Simple Stresses & Strains   15 Periods
Elasticity and plasticity – Types of stresses &strains–Hooke's law – stress–strain diagram for ductile and brittle material–Working stress–Factor of safety–Lateral strain, Poisson's ratio &volumetric strain.
Elastic Module & the relationship between them–Bars of varying section–composite bars– Temperature stresses. Strain energy–Resilience–Gradual, sudden, impact and shock loadings

MODULE II: Shear Force and Bending Moment   12 Periods

Definition of beam –Types of beams–Concept of shear force and bending moment–SF and BM diagrams for cantilever, simply supported and overhanging beams subjected to point loads, UDL, UVL and combination of these loads–Point of contra flexure–Relation between SF and BM and rate of loading at section of a beam.

MODULE III: Bending Stresses & Shear Stresses   12 Periods
A: Bending Stresses: Theory of simple bending– Assumptions– Neutral axis – Derivation of bending equation: M/I=f/y=E/R –Determination bending stresses– section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections–Design of simple beam sections.
B: Shear Stresses: Derivation of formula – Shear stress distribution across various beam sections - rectangular, circular, triangular, I, T and angle sections.

MODULE IV: Deflection of Beams &Torsion   12 Periods
Deflection of Beams**:** Bending into a circular arc–slope, deflection and radius of curvature – Differential equation for the elastic line of a beam– Double integration and Macaulay's methods– Determination of slope and deflection for cantilever and simply supported beams subjected to point loads- UDL - uniformly varying load.
Torsion: Theory of pure torsion - Assumptions – Derivation of torsion equation, polar section modulus – power transmitted by shafts – combined bending and torsion.

MODULE V: Analysis of Pin Jointed Plane Frames & Thin Cylinders   12 Periods
Analysis of Pin- Jointed Plane Frames**:** Determination of forces in the members of various types of cantilever & simply supported trusses using (i) Method of Joints (ii) Method of Sections.
Thin Cylinders**:** Thin seamless cylindrical shells–Derivation of formula for longitudinal and circumferential stresses– hoop, longitudinal and volumetric strains– changes in diameter and volume of thin cylinders

TEXT BOOKS
1. S.Timshenko **"Strength of Materials",** D. Van Nostr and Company, inc., 3rd edition, 1983
2. Ramamrutham **"Strength of materials",** Dhanpat Rai Publishing Company, 18th edition, 2014

REFERENCES
1. R..K. Rajput, **"Strength of Materials"** S. Chand company Pvt, 5th edition, 2014
2. R K Bansal **"Strength of Materials"** Lakshmi – publications, 6th edition, 2015
3. Bhavikatti **"Strength of materials"** Lakshmi publications, 4th edition, 2014.
4. R S Khurmi, **"Strength of Materials"** S Chand, revised edition, 2013.
5. D S Kumar, **"Strength of Materials,** S K Kataria & Sons, Reprint 2013, 2013.

E - RESOURCES
1. nptel.ac.in/courses/112107147
2. nptel.ac.in/courses/Web course-contents/.../strength%20of%20materials/homepage.htm
3. www.springer.com › Home › Materials › Characterization & Evaluation of Materials
4. discovermagazine.com/tags/strength of materials
5. nptel.ac.in/courses/105105108/
6. nptel.ac.in/courses/105105108/30

Course Outcomes
At the end of the course, students will be able to
1. Describe the fundamentals about the simple stresses, strains and deformation in components due to external loads.
2. Draw the shear force and bending moment diagrams for various beams
3. Understand bending stress and shear stress
4. Determine the deflection of the beams and torsion
5. Solve pin joint, thin cylinder problems.

Prerequisite: fundamental activates for extraction of mineral.

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   **09Periods**
Principles of drilling: Principles of rock drilling, drillability, drillability index, factors affecting the drillability, selection of drills.
Drill Bits: Various types ofdrill bits, study of bit life, factors affecting bit life, Thrust feed and rotation

MODULE-II:Explosives   **09Periods**
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   **09Periods**
PART-A: Firing of Explosives: Safety fuse, detonating cord and accessories, detonators, Exploders, Electric firing and non-electric firing, electronic detonators, NONEL blasting.
PART-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   **09Periods**
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   **09Periods**
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/
3. Science direct

Course Outcomes:
At the end of the course, students will be able to
1. Understand Principles of drilling andvarious types ofdrill bits.
2. Understand different types of Explosives.
3. Apply different methods of Blasting according to the conditions.
4. Deal with the Explosives.
5. UnderstandMechanics of blasting and effects of blasting

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B. Tech IV Semester	
Code: 72505	SURFACE MINING TECHNOLOGY	L	T	P
Credits: 4		4	-	-

Prerequisite: Mining Geology, Mine environmental engineering, Mine surveying.

Objectives:
The objective of this course is to provide students in mining engineering with the necessary knowledge to design safe, efficient and environmentally responsible surface mining operations.

MODULE-I: Introduction 12 Periods
Status of surface mining, types of surface mines, applicability and limitations, concept of stripping ratio, stripping economics, concept of ultimate pit limits, design of haul roads, elements of surface mine planning – selection of site for box cut, selection of operating parameters like bench height, width, slope, etc.

MODULE-II: Layout and design of surface mine 12 Periods
Slopes in surface mines – Highwall and waste dumps; Working pit slope and ultimate pit slope, common modes of slope failure, factors influencing stability of slopes, development of open cast mine layouts for various shapes of deposits. Conversion of underground mine to opencast mine vis-a vis open cast mine to underground mine related problems and probable solutions.

MODULE-III: Ground preparation methods 12 Periods
Part A: Preparation of the site – ripping, drilling and blasting; types, operation, selection, applications and limitations of ground preparation equipment's-ripper, dozer,
Part B: Blast hole drills and rock breakers, determining number of drilling machines, dozers and rippers for planned production. Concept of ripability, blasting in open cast mines over developed galleries.

MODULE-IV: Excavation system in surface mines 12 Periods
Selection criteria for equipment's used in surface mines. Classification, application and limitations of different types of equipment's used in surface mining projects; Cycle time and productivity calculation for excavating and loading equipment's.Drag line - calculation of required bucket capacity for a given handling requirement, method and cycle of operations of drag lines, front end loaders, scrapers, bucket wheel and bucket chain excavators, surface miners. Determining the capacity and number of shovels and dumpers for planned production.

MODULE-V: Transport and waste dumps 12 Periods
Scope and application of different modes of transport system in surface mine-trucks, synchronization of shovel and dumper capacity for required production; locomotives; conveyers, mode of operations, applicability and limitations, scope and application of in-pit crusher in surface mines. Illumination in surface mines.
Types of waste dump- internal and extremal; dump formation methods and corresponding equipment; dump stability and stabilisation measures.

TEXT BOOKS:
1. Surface Mining Technology Samir Kumar Das, Lovely Prakashan.
2. Surface Mining – GB Misra, Dhanbad Publishers

REFERENCE BOOKS:
1. Principles and Practices & Modern Coal Ming, Singh R.D, New Age International.
2. Mine Planning For Coal, Mathur S.P., M.G. Consultants
3. Introductionary Mining Technology – H L Hartman, Wley India (p) Ltd

E-RESOURCES:
1. http://www.edumine.com/courses/online-courses/conventional-methods-of-resource-reserve-estimation/
2. http://www.springer.com/in/book/9783319477909

Course Outcomes:
At the end of the course, students will be able to
1. Understand Status of surface mining, types of surface mines and basics of surface mines.
2. Design the surface mines Layouts.
3. Understand Ground preparation methods and various equipment related to ground preparation
4. UnderstandExcavation system in surface mines
5. Understanddifferent modes of transport system in surface mines and Types of waste dumps

Prerequisite: Engineering Mechanics, Mechanical Technology,

Objectives:
To understand the electrical layouts and power distribution in mine. To study the rope haulage layouts, technical details and applications. To study the various modes of transport means and electrical circuits. To study the types of pumps, installations and design calculations.

MODULE-I: Introduction 12 Periods
Different types of motive power used in mines – their field of application, relative merits and demerits; transmission and distribution of compressed air in mines, compressed air in mines, compressed air drills. Elements of the transport system, classification and techno-economic indices. Wire ropes – classification, construction, fields of application, rope capping and splicing; deterioration of rope in use and its prevention; testing of ropes, selection and maintenance, rope calculations.

MODULE-II: Rope haulage 12 Periods
Construction of the wire ropes, rope haulages–gravity, direct, balanced direct, main & tail, endless, reversible endless. Suitability of these haulages and their limitations. Dimension of ropes, drums and pulleys, care and maintenance of ropes, changing of haulage ropes, rope splicing, safety appliances in haulage road, and signaling, statutory requirements of haulages.

MODULE-III:Other transport systems 12 Periods
Part A: Locomotives – diesel, trolley-wire, battery locomotives, constructional features and safety devices and comparison of different types; underground and surface battery charging stations and safety measures, locomotive calculations;
Part B: Shuttle cars, underground trucks, load-haul- dumpers, SDL vehicles, aerial rope ways, gravity transport, principles of hydraulic& pneumatic transportation and their fields of application, electric layouts, man-riding systems.

MODULE-IV:Pumping & Conveying 12 Periods
Different types of drives, installation and maintenance of pumps and pipes in shafts and roadways, electrical layouts, various sources of water in mines, design of sumps.
Face haulage and conveyors – Various types of conveyors, Scraper chain conveyors, AFCs, belt conveyors, cable belt conveyor, shaking and vibrating conveyors, armoured flexible conveyors, high angle conveying, electrical layouts. Numerical problems in conveyors.

MODULE-IV:Mine electrical engineering 12 Periods
Distribution of electric power in mines, types of mine cables and their fields of applications, mining switch gears and their installation in hazardous atmosphere, flame proof enclosures, intrinsically safe circuits, (examples) safety aspects and signaling. Mine telephone system and latest development in mine communications.

TEXT BOOKS:

1. Elements of Mining Technology Vol. III, D.J. Deshmukh, Denett & Company,
2. Mine Transport – N.T. Karelin, Orient Longmans,

REFERENCE BOOKS:

1. Mining and Transport – S. C. Walker, Elsevier
2. Introduction to Mining Engineers – Hartman. H.L, John Wiley & Sons.

E RESOURCES:
1. http://www.westrac.com.au/Industries/Pages/Mining.aspx
2. http://www.springer.com/in/book/9783319477909

Course Outcomes:
At the end of the course, students will be able to
1. Understand Different types of motive power used in mines and different types of wire ropes and their applications
2. Understand different types of rope haulages
3. Understand diesel, trolley-wire, battery locomotives and machinery used in underground workings
4. Understand different types of pumps and belt conveyor
5. Understandhow electricity will be supplied in mines.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech IV Semester		
Code: 72507	MINE SURVEYING-I	L	T	P
Credits: 3		3	-	-

Prerequisite: Basics of Mathematics and Surveying

Course Objectives:

Ability to apply knowledge of mathematics in surveying to calculate areas and volumes for different projects. Ability to identify, formulate and solve problems in the field of advanced surveying. Ability to analyze survey data and design mining engineering projects.Ability to engage in life- long learning with the advances in survey techniques.

MODULE – I: Introduction   09Periods
Overview of Plane Surveying (Chain, compass, and plane table), Objectives, Principles and classifications, use of Field Books.
Distance and Directions: Distance measurements using conventional methods. Use of chain and compass, meridians, Azimuths and Bearings, declination, computation of angles.

MODULE–II: Leveling   09Periods
Levelling Instruments – component parts, Temporary and Permanent adjustments – methods of levelling – Fly levelling, differential levelling, and reciprocal levelling.
Computation of Areas: Areas from field notes, computation of Areas along irregular boundaries and regular boundaries.

MODULE –III:Contouring and Theodolite Surveying   09Periods
PART A:Contouring
Characteristics and uses of contours, methods of conducting contour surveys – their plotting. L.S. and C.S. Surveying – their plotting, Calculation of volume from contours.
PART B:Theodolite Surveying
Theodolite – basic definitions, Temporary and Permanent Adjustments, Measurement of horizontal and vertical angles, Principles of Electronic Theodolite.

MODULE–IV: Traversing   12 Periods
Principles of Traversing, open traverse and closed traverse using chain /compass / theodolite, Bowditch correction.

MODULE–V: Triangulation   12 Periods
Principles of triangulation survey, triangulation using chain, campus and theodolite, basic figures used in triangulation.

TEXT BOOKS:
1. Surveying (Vol-1,2& 3) by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain-Laxmi Pubicaions (P) Ltd., NewDelhi.
2. Surveying and leveling (Vol 1 & 2) – Kanitkar, A.V.G.Prakash

REFERENCE BOOKS:
1. Elements of Plane Surveying, Arthur R. Benton and Philip J Taetly, McGrawHill-2000
2. Surveying Vol 1 & 2 & 3, Arora K R Standard Book House, Delhi,2004.
3. Plane Surveying, Chandra A M, New age International Pvt. Ltd., Publishers, New Delhi, 2002.
4. Higher Surveying, Chandra A M, New age International Pvt. Ltd., Publishers, New Delhi, 2002.

E RESOURCES:
1. http://www.ism-minesurveying.org/mine-surveying.html
2. http://www.minesurveyor.net/
3. http://www.springer.com/gp/book/9781504123679

Course Outcomes:

At the end of the course, students will be able to
1. Understand Overview of Plane Surveying and Distance and Directions
2. Understand different types of Levelling Instruments and methods of levelling
3. Understand Contouring and TheodoliteSurveying
4. ApplyPrinciples of Traversing
5. ApplyPrinciples of triangulation survey.

Course Objectives:

Student will be able to learn and understand the various basic concept and principles of properties of materials like young's modulus and rigidity modulus.

LIST OF EXPERIMENTS:

1. Tensile test by using UTM

2. Bending test on simply supported beam

3. Bending test on cantilever beam

4. Torsion test

5. Hardness test usingBrinnel hardness tester

6. Hardness test using Rockwell hardness tester

7. Test on springs a) compression spring b) tension spring

8. Impact test using Izod

9. Impact test using Charpy

10. Fatigue test

11. Hoop stress andstrain relationship for the Thin Cylinder

Course Outcomes

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

1. Find out the hardness of different engineering materials.

2. Find out the Young's modulus of materials using deflection of beams

3. Determine the toughness of materials using Charpy and Izod test.

4. Understand the working principle of heavy machines like UTM, Hardness testers etc.

5. Find out the Rigidity modulus of shafts using torsion test.

6. Find out the Young's modulus of springs made with engineering materials.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B. Tech IV Semester	
Code: 72508	**MINE SURVEYING LAB-I**	**L**	**T**	**P**
Credits: 2		**-**	**-**	**4**

Objective:
To familiarize with the various surveying instruments and methods.

LIST OF EXPERIMENTS:

1. Ranging a line, measuring the distance between two points, pacing.

2. Chain triangulation, booking, calculation of areas and plotting.

3. Traversing with compass.

4. Introduction to levels.

5. Fly leveling.

6. Profile leveling and plotting the section.

7. Contouring

8. Measurement of horizontal angle.

9. Measurement of vertical angle.

10. Theodolite Traversing

11. Finding distance between two in-accessible points.

Course Outcomes

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

1. Do the Range and to measure the distance between two points.

2. Conduct the chain triangulation survey.

3. Determine the area by using different methods.

4. Determine the elevation of a given point.

5. Use the instruments used in the surveying.

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

Prerequisites: 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)**
4. http://journals.sagepub.com/doi/abs/10.1177/1077801200006007004 **(ISSUES OF VIOLENCE)**
5. http://www.nordiclabourjournal.org/emner/likestilling **(GENDER AND BIOLOGY)**

Course Outcomes:

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

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

2. 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.

3. Attain a finer grasp of how gender discrimination works in our society and how to counter it.

4. Acquire insight into the gendered division of labour and its relation to politics and economics.

5. 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 Min.E)	**L**	**T**	**P**
Credits: Nil		**-**	**2**	**-**

Prerequisites: 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: Introduction to 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**
Part A:Introduction to Taxation: Income tax act, TDS,
Part 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:
2. H.M. Seervai - Constitutional Law of India - Tripathi Publications – 4th Edition, 1991
3. Cornish W. R. - Intellectual Property Rights, Patents, Trademarks, Copyrights & Allied Rights - Sweet & Maxwell– 2008
4. Avtarsingh - Company Law - Eastern Book Co.–2007
5. James Graham - Cyber Security Essentials - CRC Press - 1st Ed., 2011
6. 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, the student will 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.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. V Semester	
Code: 72509	MINE VENTILATION	L	T	P
Credits: 4		3	2	-

Prerequisite: Fundamentals of Fluid Mechanics

Objectives:
Students should be aware of the principles of ventilation and basic ventilation systems.

MODULE-I: Mine gases 12 Periods
Atmospheric air – its composition, mine air – its general composition, origin, physical and chemical properties of mine gases, physiological effects of breathing mine gases and its detection, sampling and analysis of mine air, methane drainage.

MODULE-II: Heat, Humidity and Air flow 12 Periods
Sources of heat in mines, effects of heat and humidity, kata thermometer and hygrometer. Laws governing the airflow in mines, resistance of airways, Equivalent orifice, Natural ventilation, determination of NVP, direction of natural ventilation

MODULE-III: Mechanical ventilation 12Periods
PART-A: Principal types of mine fans, fan characteristic curves, mine characteristic curves, operating point, reversal of mine fans, Evasee and its importance.
PART-B: Series and parallel operation of mine fans, booster fans, Face Ventilation.

MODULE-IV: Standards of ventilation and Air distribution 12 Periods
Standards of ventilation including permissible air velocities, Ascensional, Descensional, Homotropal, Antitropal ventilation, Distribution of air, ventilation stoppings, Air crossings, Measurement of air velocities and pressure.

MODULE-V: Ventilation Planning 12 Periods
Quantity and pressure requirement.Ventilation layout for coal mining and metal mining. Calculation of air quantity and total mine head required for ventilating a mine. Introduction to Network analysis: Hardy-Cross method, Ventilation survey.

TEXT BOOKS:

1. Mine Environment and Ventilation – G.B. Misra, Oxford University Press
2. Mine Ventilation and Air Condition – HL Hearlman,Wiley India (p) ltd

REFERENCE BOOKS:
1. Environmental Engineering in Mines, Vatukuri V.S. & Lama R.D,Cambridge Unversity Press.
2. Mining and Environment, Dhar B.B, APH Publishing.

E RESOURCES:
1. http://technology.infomine.com/reviews/ventilation/welcome.asp?view=full
2. https://link.springer.com/article/10.1134/S1062739116041178

Course Outcomes:

At the end of the course, students will be able to
1. Understand origin, physical and chemical properties of mine gases and their physiological effects
2. Understand Heat, Humidity and Air flow in mines
3. Understand Principal types of mine fans, Series and parallel operation of mine fans
4. UnderstandStandards of ventilation and Air distribution
5. UnderstandVentilation Planning andNetwork analysis.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B. Tech V Semester		
Code: 72510	MINE SURVEYING-II		L	T	P
Credits: 3			2	2	-

Prerequisite: Mine Surveying -I

Course Objectives:
Ability to apply knowledge of mathematics in surveying to calculate areas for different projects by using tacheometric surveying ability to identify, formulate and solve problems in the field of advanced surveying. Ability to analyze survey data and design mining engineering projects.

MODULE –I:Tachometric surveying   **13 Periods**
Use of the Theodolite for tacheometric Surveying – Principles, Stadia methods, measurements of heights and distances by tachometry, Distance and Elevation formulae for Staff vertical position.
Setting out curves: types of curves, curve ranging, design and setting out simple curves, surface and underground curves.

MODULE–II:Photogrammetric   **13 Periods**
Principles of photogrammetry, Aerial Photographs, scale of vertical photographs, Terrestrial Photogrammetry.**Geodetic astronomy:** Latitude, Longitude, Meridian Transits, satellites and cameras, Errors– Theory of errors, adjustments.

MODULE–III: Correlation survey and Global positioning system   **13 Periods**

PART:(A):Correlation survey
Basics of correlation, verticality of shafts, measurement of depth of shafts,Correlation by Weisbach triangle method, Weisbach quadrilateral method
PART:(B): Global positioning system

Introduction to Global Positioning System, Application of GPS in mining, Remote Sensing – basic Principles, Application of Remote Sensing

MODULE –IV:Total station   **13 Periods**
Advantages and disadvantages of total station, description, users, Types of Surveys by Total station, Mapping of sites by Total Station Surveys – Elementary exercises only.

MODULE–V:Miscellaneous   **12 Periods**
EDM and modern instruments, slope and open pit surveys, statutory requirements for mine plans, open pit benches.

TEXT BOOKS:
1. Surveying (Vol – 1,2& 3), by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) Ltd., NewDelhi.
2. Surveying (Vol 1,2& 3), Duggal S.K. Tata Mc.Graw Hill Publishing Co.Ltd. New Delhi, 2004

REFERENCE BOOKS:
1. Text book of surveying by C. Venkataramaiah, UniversitiesPress.
2. Higher Surveying, Chandra A M. ,New age International Pvt. Ltd. Publisher, New Delhi,2002
3. Surveying and leveling by R. Subramanian, Oxford University Press, NewDelhi

E RESOURCES:
1. http://www.pobonline.com/articles/84226-underground-surveying
2. http://www.ism-minesurveying.org/mine-surveying.html

Course Outcomes:

At the end of the course, students will be able to
1. Understand Tachometric surveying and Setting out curves
2. Understand Principles of photogrammetry and Geodetic astronomy
3. Understand Correlation survey and Global positioning system
4. Understand Advantages and disadvantages of total station and related information
5. Understand EDM and modern instruments

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech V Semester		
Code: 72511	MINING MACHINERY-II	L	T	P
Credits: 4		4	-	-

Prerequisite: Mining Machinery -I

Objectives:
To understand the functioning of winding engines and other winding accessories.To study surface and pit bottom layouts, various coal face machinery.To study the design and construction details of excavating & transporting equipment's used in surface mines. To know the various statutory aspects like CMR, MMR and the relevant DGMS circulars related to this course.

MODULE – I: Winding engines   12Periods
Winding systems, drum winders, drives, mechanical braking of winders, safety devices in winding, overwind and over speed protection, Koepe and multi-rope friction winding, electrical layouts. Duty cycles of drum winders of different drum cross-sections. Special problems of deep shaft winding.

MODULE – II: Winding accessories and layouts   12 Periods
Head gear and their design, head sheave, cages and skips, suspension gear, shaft fittings and appliances – guides, keps, etc., signalling systems, winding calculations relating to rope size & numbers, capacity & power requirement for cages, skips, drum and Koepe winding systems.
Surface and Pit-bottom layouts - Mine car circuits at the surface and pit bottom, creepers, skip winding – loading and discharge arrangements. Case studies, railway sidings and layouts.

MODULE – III: Coal face machinery   12 Periods
Part A: Construction, salient mechanical and electrical features and operations of coal drills and their control panels, coal cutters, different types of mechanical loaders coal ploughs, cutter loaders and continuous miners.
Part B: Development road headers in face mechanization, longwall mining equipment, electrical and hydraulic layouts; condition monitoring of mining machinery for underground and opencast mines and ore handling plants, modern concepts in underground mine mechanization.

MODULE – IV: Excavation and loading machinery in surface mines   12 Periods
Classification. Hydraulic system diagram. Under carriage. Design and Constructional details of Front end loaders, Hydraulic excavators and Electric Rope shovel, Backhoe, Dragline, and Bucket Wheel Excavator. Bucket Chain Excavator and Surface Miners.

MODULE – V: Other machinery in surface mines   12 Periods
Classification of transport equipment's; Understanding of construction and technical specifications of Dumpers of different types including multi-axial dumpers,, Tractors, trailers, dump trucks, Rippers (types), Motor Graders, Bull Dozers, Rock breakers, Road Compactors, Water Tankers..

TEXT BOOKS:

1. Elements of Mining Technology Vol. I & II, Deshmukh D.J., Denett & Company
2. Pumps Focus Compressors Walkar wending & Transport, Cherkasky B.M.

REFERENCE BOOKS:

1. Mine Mechanisation and Automation, Alemgren G, U.Kumar.
2. Coal Mining Series, Ernest Mason, London, 1952.

E RESOURCES:

1. https://www.generalkinematics.com/blog/a-brief-history-of-mining-and-the-advancement-of-mining-technology/
2. http://advanced-mining.com/artikel.php?id=241

Course Outcomes:

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

1. Know about Winding engines
2. Know Winding accessories and layouts
3. Know coal drills, coal ploughs, cutter loaders and continuous miners and modern concepts in underground mine mechanization
4. Select the Excavation and loading machinery in surface mines
5. Know Classification of transport equipment's, dumpers, Tractors, trailers, dump trucks, Rippers (types), Motor Graders, Bull Dozers, Rock breakers, Road Compactors, Water Tankers.

2017-18 Onwards (MR-17)	**MALLA REDDY ENGINEERING COLLEGE** (Autonomous)	**B. Tech V Semester**		
Code: 72512	**MINE CONSTRUCTION ENGINEERING** (Professional Elective-I)	**L**	**T**	**P**
Credits: 4		**3**	**2**	**-**

Prerequisite: Environmental Studies

Objectives:
This course introduces site selection procedure, Shaft sinking methods, Mechanization, Loose ground shaft lining, Design of lining, Surface layouts, Open pit mines opening out trenches.

MODULE-I: Introduction   **12 Periods**
Size of mine Environment and ecology, selection criteria for site of the openings geological investigation.

MODULE-II: Underground Mines   **12 Periods**
Underground mine shaft sinking methods through alluvium, soft and hard rock, Mechanization, consolidation of loose ground shaft lining , ground pressure, thickness of lining.

MODULE-III:Shaft Pillars and Insets   **12 Periods**
PART-A: Design and procedure of laying the lining, construction of shaft collar.
PART-B: Design and construction of insets, shaft bottom, skip loading, pit bottom lay outs, installation of main haulages, main sump size, provisions regarding manholes.

MODULE-IV: Inclines and Facilities   **12 Periods**
Surface inclines, drivage through soft and hard rock, construction and lining of inclines, lateral and vertical pressures. Underground development, drivage of roads in stone and coal, mechanization support systems opening of faces.

MODULE-V: Surface Mines   **12 Periods**
Open pit mines, opening out trenches, haul roads, construction of benches.

TEXT BOOKS:
1. Design of Underground hard coal mine, J. Pazdziora, Elsevier.
2. Opencast Mining: Module Operations, V. V. Rzhevsky- Mir Publications.

REFERENCE BOOKS:
1. Working of Mineral Deposits—G. Popov, International Law & Taxation Publishers
2. Bokey ―Mining.

E RESOURCES:
1. https://link.springer.com/chapter/10.1007%2F978-3-319-25005-2_2
2. https://link.springer.com/chapter/10.1007%2F978-3-319-25005-2_2

Course Outcomes:

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

1. Choose the site forshaft sinking
2. Choosethe method of shaft sinking according to the ground conditions.
3. KnowShaft Pillars and Insets
4. Know Inclines and Facilities
5. Know Open pit mines, opening out trenches, haul roads, construction of benches.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B. Tech V Semester	
Code: 72513	ROCK EXCAVATION ENGINEERING (Professional Elective -I)	**L**	**T**	**P**
Credits: 4		3	2	-

Prerequisite: Mining Geology, Drilling and Blasting.

Objectives:
This course introduces rock excavation engineering, physico-mechanical and geotechnical properties, selection of excavation method. Mechanics of rock drilling and rock fragmentation by explosives, selection of explosives for rock excavation. Advances in blast design for underground excavation, Tunnel boring machines.

MODULE-I: Introduction   12 Periods
Scope and importance, Rock excavation engineering in mining and construction industries; Physico-mechanical and geotechnical properties of rocks Vis-à-vis excavation method; selection of excavation method.

MODULE-II: Drilling   12 Periods
Mechanics of rock drilling, design and operating parameters of surface and underground drilling, evaluation of drill performance, drill ability of rocks, mechanism of bit Wear, bit selection, problems of drilling, economics of drilling.

MODULE-III: Blasting   12 Periods
PART-A: Mechanics of rock fragmentation by explosives advances in explosives and their selection criteria for rock excavation, blast design for surface excavations and optimization.
PART-B: Advanced blast initiation systems, cast blasting, techno economic and safety aspects of surface and underground blasting.

MODULE-IV: Design of Blasting   12 Periods
Advances in blast design for underground excavations, contour blasting, computer aided blast designs, review of tunnel blasting techniques in recent advances.

MODULE-V: Rock Cutting   12 Periods
Theories of rock tool interaction for surface excavation machinery – rippers, bucket wheel excavators, continuous surface miners; theories of rock tool interaction for underground excavation machinery- Ploughs, Shearers, road headers, continuous miners.
Tunnel boring machines, selection criteria for cutting tools; advanced rock cutting techniques – high pressure water jet assisted cutting.

TEXT BOOKS:
1. Principles of Rock fragmentation, Cark G.B—John Wiley&Sons

REFERENCE BOOKS:
1. Diamond Drilling, Chugh C.P.- Oxford Publication

E RESOURCES:
1. http://technology.infomine.com/reviews/Blasting/welcome.asp?view=full
2. https://link.springer.com/chapter/10.1007/978-981-10-1989-0_16

Course Outcomes:
At the end of the course, students will be able to
1. Understand Physico-mechanical and geotechnical properties of rocks Vis-à-vis excavation method
2. Understand Mechanics of rock drilling, problems of drilling, economics of drilling.
3. Understand Mechanics of rock fragmentation by explosives and Advanced blast initiation systems
4. Understand Design of Blasting
5. Understand Theories of rock tool interaction for surface excavation machinery.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B. Tech V Semester	
Code: 72514	MINERAL EXPLORATION (Professional Elective -I)	L	T	P
Credits: 4		3	2	-

Prerequisite: Mining Geology

Objectives:
To know the mineral resources and prospecting techniques**.** To understand exploration techniques and strategy. To study the prefeasibility and feasibility reports and its evaluation methods

MODULE-I: Mineral Resources and Prospecting   **12 Periods**

Introduction to important mineral resources in India and worldwide, surface and aerial prospecting, reconnaissance, application of geochemical, geophysical and geostatistical methods.

MODULE-II: Exploration   **12 Periods**

Preliminary and detailed exploration by boring, exploratory mining by shafts, drifts, cross-cuts, collection and compilation of data for computer processing.

MODULE-III: Exploration Strategy   **12 Periods**

Part A: Exploration investment decision, exploration techniques

Part B: Strategies and exploration targets.

MODULE-IV: Exploration Groups and their Role   **12 Periods**

Strategy and structure of the exploration group, government policies, aspects of exploration, role of exploration in the mining company.

MODULE-V: Preparation and Evaluation of Project Reports   **12 Periods**

Evaluation of exploration and development projects, study of typical pre-feasibility and feasibility reports.

TEXT BOOKS:
1. Deshmukh, R.T., Mineral and Mine Economics, Mira Publications, Nagpur, 1986.
2. Hartman, H. L. (Editor), SME Mining Engineering Handbook, 3rd edition, Vol I & II, Society of Mining Engineers, New York, 2011.

REFERENCE BOOKS:

1. Bhattacharjee, S., Frontiers in Exploration Geophysics Oxford and IBH Publishing Company, 1992.
2. A.K. Ghosh., Strategies for Exploitation of Mineral Resources in developing countries,Oxford & IBH Publishing Company, 1992.
3. Loan, D.A., Mine Management, Chapman and Hall, London, 1983.
4. Arogyaswamy, R.N.P., Courses in Mining Geology, Oxford and IBH Publishing Company Private Limited, 1994.

E RESOURCES:
1. www.doganaydal.com/.../INTRODUCTION_TO_MINERAL_EXPLORATION.PDF
2. http://www.sciencedirect.com/science/article/pii/S0360128512

Course Outcomes:
At the end of the course, students will be able to
1. Understand Mineral Resources and Prospecting
2. Understand Preliminary and detailed exploration by different methods
3. Understand Exploration Strategy
4. UnderstandExploration Groups and their Role
5. Understand Preparation and Evaluation of Project Reports

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech V Semester		
Code:	**Open Elective-I**	**L**	**T**	**P**
Credits: 4		**4**	**-**	**-**

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech V Semester		
Code: 72515	MINE VENTILATION LAB	L	T	P
Credits: 2		-	-	4

Objectives:
To determine the psychrometric properties, gas percentage in atmosphere. To study the principles and characteristics governing mine fans. To understand lamp design and perform underground illumination surveys.

LIST OF EXPERIMENTS:

1. Detection of mine gases.

2. Orsat/Haldane apparatus for gas analysis.

3. Measurement of relative humidity by hygrometer.

4. Kata thermometer.

5. Constructional features of centrifugal and axial flow fans.

6. Characteristic curves for fans.

7. Operation of fans in series and parallel.

8. Measurement of air quantity by anemometer, velometer, smoke tube

9. Study and analysis ventilation network circuit.

10. Study of mine air-conditioning plant.

11. Constructional features of a flame safety lamp and cap lamp.

Course Outcomes:
At the end of the course, students will be able to
1. Determine the psychrometric properties, gas percentage in atmosphere.

2. Determine the relative humidity by hygrometer.

3. Knowledge of principles and characteristics governing mine fans.

4. Analyses ventilation network circuit.

5. Knowledge of mine air-conditioning plant.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech V Semester		
Code: 72516	**MINE SURVEYING LAB-II**	**L**	**T**	**P**
Credits: 2		**-**	**-**	**4**

Objective:
To familiarize with the various surveying instruments and methods.

LIST OF EXPERIMENTS:

1. Correlation by two shaft co-planar methods
2. Correlation by single shaft weisbatch methods.
3. Correlation by single shaft weiss quadrilateral methods
4. Curve ranging offsets from long chord
5. Curve ranging Ranking methods
6. Curve Tacheometric methods
7. Curve ranging Tacheometric method
8. Reading mine plans
9. Finding Horizontal &Vertical distance by Techeometer

Course Outcomes:
At the end of the course, students will be able to
1. Conduct the correlation by two shaft co-planar method.
2. Conduct the correlation by shaft weisbatch methods and shaft Weiss quadrilateral methods.
3. Set a curve by ranging offsets from long chord and ranging ranking method.
4. Set a curve by Tacheometic and ranging Tacheometric methods.

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

Prerequisites: Nil

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 nonverbal 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 nonverbal 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 , Nonverbal 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.

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

Course Outcomes:
At the end 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.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech V Semester		
Code: 70A04	MOOCs/ NPTEL Online Course	L	T	P
Credits: Nil		-	-	-

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech V Semester		
Code: 70A05	Internship-II	L	T	P
Credits: Nil		-	-	-

2017-18 Onwards (MR-17)	**MALLA REDDY ENGINEERING COLLEGE** (Autonomous)		**B.Tech. VI Semester**	
Code:70H06	**INDUSTRIAL MANAGEMENT** (Common to CE, ME and Min.E)	**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   09 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   09 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   09 Periods
Part 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.
Part 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   09 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   09 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. http://nptel.ac.in/courses/110106044/
5. https://www.youtube.com/watch?v=obzp6biyAN0

Journals : Journal of Management, Asia Pacific Journal of research in Business management
Journal of Management Development, Journal of Management And Organization.

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 andStatistical Quality Control
5. Understand the basics of project management and also learns various contemporary management practices.

Prerequisite: Mine Environmental Engineering-II

Objectives:
This course introduces spontaneous coal heating, control measures, various methods adopted to combat fires, firefighting techniques, mine inundation, mine illumination, rescue and recovery work, principle of management.

MODULE-I: Spontaneous Combustion   **09 Periods**
Various theories, factors affecting the liability of coal seams to spontaneous heating, Experimental methods to determine relative tendencies of coal seams to spontaneous combustion, prevention of coal seam fires.
Mine Fires:
Various methods adopted to combat fires and their advantages and disadvantages.

MODULE-II: Fire Fighting and Reopening of sealed-off areas   **09 Periods**
Advances in firefighting techniques, different inert gases used for firefighting, their advantages and disadvantages, different types of fire extinguishers.
Reopening of sealed-off areas
Factors to be considered, methods, precautions to be taken to reopen the sealed off areas. Causes of fires in surface coal stocks, precautions against fire in coal stocks on surface, fighting the surface coal stock fires.

MODULE-III: Mine Explosions   **09 Periods**
PART-A: Different inflammable gases in underground coal mines and explosive triangles. Causes of fire damp explosions, different sources of ignition of fire damp, prevention of fire damp explosions, Characteristics of fire damp explosions.
PART-B: Causes of coal dust explosion, factors affecting the coal dust explosion and preventive measures against coal dust explosion. Comparison of Coal dust explosions with the Fire damp explosions.

MODULE-IV: Mine Inundation and Noise   **09 Periods**
Surface causes and underground causes of mine inundation, precautions against mine inundation, approaching of water logged areas, dewatering of water logged areas.
Noise: Causes and measurement of noise levels. Precautions, prevention and reduction of noise levels.

MODULE-V: Mine illumination   **09Periods**
Illumination standard, common types of flame safety lamps, their use and limitations, cap lamp, and organization. Illumination arrangement of opencast and underground working. Rescue and recovery work, Rescue apparatus, Rescue stations, principles of risk management. Introduction to disaster management plan.

TEXT BOOKS:
1. Mine Fires, Explosion , Rescue, Recovery and Inundation – M.A. Ramulu, Mukharjee Publishers
2. Mine Environment & Ventilation – G.B. Misra, Oxford University Press.

REFERENCE BOOKS:
1. Fires in Coal Mines – Kaku, Oriental Publishers.

E RESOURCES:
1. https://sites.google.com/site/mineventilationiitkgp/mine-hazards-and-rescue
2. http://www.edumine.com/courses/online-courses/mine-safety-and-rescue-2-underground-fire-hazards**/**

Course Outcomes:
At the end of the course, students will be able to
1. Understand Various theories, factors affecting the liability of coal seams to spontaneous heating
2. Understand Advances in firefighting techniques and Reopening of sealed-off areas
3. Understand fire damp explosionsand coal dust explosions
4. UnderstandMine Inundation and Noise
5. Understand Mine illumination.

Prerequisite: Mining Geology, Surface mining Technology.

Objectives:
To understand the details of development of a mine for exploitation of mineral deposits. To Analyze design requirements of Underground Coal and metal mining methods. To apply different support systems including backfilling techniques for underground mines for stability of workings.

MODULE-I:Introduction to Mine Planning   09 Periods
Size of mining property, reserves and production capacity.
Opening of Deposits; Developments of mine for in-seam mining and horizon mining (including shaft pillar and their comparison, advantages and disadvantages), division into levels and districts.

MODULE-II: Development   09 Periods
General principle of Bord & Pillar Development, their choice, suitability, advantages and disadvantages, layout of Bord & Pillar panel, size of panel, statutory provisions, manual and mechanized system of development: conditions suitable for application of mechanized loader and continuous miners; factor affecting the selection of equipment.

MODULE-III: Pillar Extraction   09 Periods
PART-A: Preparatory arrangement for depillaring operation, statutory provision for depillaring, principle and designing of pillar extraction, size of a district.
PART-B: Factor, affecting choice of pillar extraction, depillaring with caving, stowing, mechanized depillaring operation, organization and safety.
Layout for required outputs, types of machines, personnel and working of thick seams and blasting gallery method.

MODULE-IV: Long wall mining   09 Periods
Longwall methods of working, their choice, suitability, advantages and disadvantages. Layout of the workings for the required output, length and orientation of longwall faces, Shape & size of development roadways and gate roads and their maintenance. Mechanized longwall face organization.

MODULE-V: Special methods of working   09Periods
Problems of working thick & thin seams, multi slices, sublevel caving, gallery blasting method, contiguous seam working, working steeply inclined seams, working under surface structures and seams liable to spontaneous heating, outburst and bumps, etc. hydraulic mining, Wongawalli, shortwall, highwall mining, underground coal gasification, coal bed methane, shield mining.

TEXT BOOKS:
1. Principles and Practices & Modern Coal Mining, R.D. Singh,New Age International Publication.
2. Underground Mining & Coal, Singh, T.N. Singh – Oxford Publication.

REFERENCE BOOKS:
1. Longwall mining, Peng S.S., Chiang H/S. – John Willey Publication.
2. Mine Planning for Coal, Mathur S.P. – M.J Consultant Publications.

E RESOURCES:
1. https://www.nap.edu/read/18766/chapter/5
2. http://www.canoseco.com/general-description/technologies-and-practices/modern-underground-coal-mining-technologies.html
3. https://link.springer.com/article/10.1007/s40789-014-0043-0

Course Outcomes:
At the end of the course, students will be able to
1. Understand Various theories, factors affecting the liability of coal seams to spontaneous heating
2. Understand Advances in firefighting techniques and Reopening of sealed-off areas
3. Understand fire damp explosions and coal dust explosions
4. UnderstandMine Inundation and Noise
5. Understand Mine illumination.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech VI Semester		
Code: 72519	ROCK MECHANICS	L	T	P
Credits: 3		3	-	-

Prerequisite: Underground Coal Mining

Objectives:
To study about application of Rock Mechanics in mining and allied engineering. To study Physico-Mechanical properties of rocks, non-destructive testing methods, time dependent properties of rock. To study the theories of failure and approaches used for open pit and underground designs.

MODULE-I:Introduction   **09 Periods**
Definition of some important terms used in rock mechanics, application of rock mechanics in mining, introduction to stress analysis, stresses in two and three dimensions, Mohr's circle.

MODULE-II: Physical properties of rocks and rock indices   **09 Periods**
Physical properties of rocks — density, porosity, moisture content, permeability, water absorption various indices of rocks like swell index, slake durability index, impact strength index, protodynakov index, etc., thermal conductivity, hardness, durability, rock mass classification.

MODULE-III: Mechanical properties of rocks   **09 Periods**
Part A: Preparation of test specimens, laboratory determination of mechanical properties of rocks -compressive strength, tensile strength, flexural strength, shear and triaxial strength,
Part B: Modulus of elasticity, Poisson's ratio, Mohr's envelope, effect of various parameters on the strength of rocks, in-situ strength, post failure behavior of rocks.

MODULE-IV: Non-destructive testing methods and time dependent properties of rocks
        09 Periods
Dynamic wave velocities, dynamic elastic constants, their determination in the laboratory, application in mining, time dependent properties of rocks, creep, mechanism of creep of rocks — different stages, rheological models.

MODULE-V:Theories of failure of rocks &Design of underground workings   **09 Periods**
Different theories of failure of rocks, modes of failure - Griffith, Coulumb-Navier, Mohr's, Hoek-Brown, empirical criteria, etc. and their field of applications. Stress distribution in underground workings

TEXT BOOKS:
1. Vutukuri, V.S., and Lama, R.D., Handbook on Mechanical Properties of Rocks, Vol. I, II, III and IV, Transtech Publication, Berlin, 1974/78.
2. Peng, S.S., Ground Control, Wiley Interscience, New York, 1987.

REFERENCES:

1. Obert, L. and Duvall, W.I., Rock Mechanics and Design of Structure in Rock John Wiley and Sons Inc., New York, 1967.
2. Brady, B.H.G. and Brown, S.T., Rock Mechanics, Wiley Interscience, 1985.
3. Hoek, E., and Brown, S.T., Underground Excavations in Rocks, Institute of Mining
4. Metallurgy, London, 1980.

E RESOURCES:

1. https://rocscience.com/documents/hoek/references/H1966a.pdf
2. http://www.brighthubengineering.com/geotechnical-engineering/96483-rock-mechanics-defined/

Course Outcome:

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

1. Understand important terms used in rock mechanics, application of rock mechanics in mining, introduction to stress analysis
2. Understand Physical properties of rocks and rock indices.
3. Understand Mechanical properties of rocks
4. UnderstandNon-destructive testing methods and time dependent properties of rocks
5. UnderstandTheories of failure of rocks &Design of underground workings.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech VI Semester		
Code: 72520	ROCK SLOPE ENGINEERING (Professional Elective -II)	L	T	P
Credits: 4		3	2	-

Prerequisite: Surface mining technology

Objectives:
To introduce the basic mechanics of rock slope failure to learn the types of rock failure and its influencing parameters

MODULE-I: Basic mechanics of rock slope failure   **12Periods**
Rock slope economics, slope parameters, effect of water pressure, factor of safety of slopes, slope height vs slope angle, design of slopes.

MODULE-II: Geological and strength properties   **12Periods**
Geological parameters affecting slope stability; physico-mechanical properties affecting slope stability, shearing on incline plane, determination of shear strength of rock and rock discontinuities; Ground water flow in rock masses; field measurement of permeability; measurement of water pressure.

MODULE-III: Plane failure   **12Periods**
PART-A: Plane failure analysis; graphical analysis of stability; influence of ground water on stability
PART-B: Influence of tension crack; rock reinforcement; analysis of failure on a rough plane; case studies.

MODULE-IV: Wedge failure   **12 Periods**

Analysis of wedge failure; wedge analysis including cohesion and water pressure; case studies.

MODULE-V: Circular and toppling failure   **12Periods**
Conditions for circular failure; derivation of circular failure analysis; effect of ground water; Types of toppling failure; analysis of toppling failure; Influence of slope curvature on stability; slope depressurization: protection of slopes: control of rock falls.

TEXT BOOKS:

1) Hoek, E and Bray, J.W., Rock Slope Engineering, Institution of Mining and Metallurgy, 1991.
2) Goodman, R.E., Rock Mechanics, John Wiley and Sons, 1989.

REFERENCE BOOKS:

1) Singh, R.N. and Ghose, A.K., Engineered Rock Structures in Mining and Civil Construction, A.A. Balkema, Netherlands, 2006.

E RESOURCES:

1. Technology.infomine.com/reviews/rock slope stability/

Course Outcomes:

At the end of the course, students will be able to
   1. Understand Basic mechanics of rock slope failure
   2. Understand Geological parameters and physico-mechanical properties affecting slope stability
   3. Understand basics of Plane failure
   4. Understand basics of Wedge failure
   5. Understand basics of Circular and toppling failure.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech VI Semester		
Code: 72521	**UNDERGROUND COAL GASSIFICATION**	**L**	**T**	**P**
Credits: 4	**(Professional Elective -II)**	3	2	-

Prerequisite: Planning of underground coal mining.

Objectives:
This course introduces coal Gasification concept, Technology of UCG, Mining methods of UCG, Linkage techniques, Future scope of UCG.

MODULE-I: Underground Coal Gasification (UCG)Concept   **12 Periods**

Chemistry, conditions suitable for UCG, Principles of UCG. UCG Process Component factors: Technology of UCG, opening up of coal seam for UCG.

MODULE-II: Mining methods of UCG   **12Periods**
Chamber method, Stream method, Borehole procedure method, Blind bore hole method. Non-Mining methods of UCG: Level seams, inclined seams.

MODULE-III: Linkage Techniques   **12 Periods**
PART-A: Precolation linkage, Electro linkage, Boring linkage.
PART-B: Compressed-air-linkage, Hydraulic fracture linkage

MODULE-IV   **12Periods**
Underground Coal Gasification at Great Depth, Merits and Demerits of Underground coal gasification.

MODULE-V: Future Scope and Development   **12Periods**
Innovations, Blind long-Borehole method, long-Borehole procedure method, Pre- shattering method.

TEXT BOOKS:

1. Principles and Practices of Modern Coal Mining – R.D. Singh, New Age International
2. Winning and Working Coal in India Vol.II- R.T. Deshmukh and D.J.Deshmukh., Dhanbad Publishers

REFERENCE BOOKS:
1. Underground Coal Mining Methods – J.G. Singh, Braj-Kalpa Publishers.

E- RESOURCES:
1. http://www.gasification-syngas.org/technology/underground-coal-gasification
2. http://www.sciencedirect.com/science/article/pii/S0360128512000573

Course Outcomes:

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

1. Understand Basic concept of Underground Coal Gasification(UCG)
2. Know Mining methods of UCG
3. Understand Linkage Techniques
4. Understand Merits and Demerits of Underground coal gasification.
5. Understand Future Scope of UCG.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech VI Semester		
Code: 72522	**MINE SAFETY ENGINEERING** (Professional Elective -II)	**L**	**T**	**P**
Credits: 4		3	2	-

Prerequisite: Mine Environmental Engineering-II

Objectives:
This course introduces health, safety, preventive measures in mining industry. Techniques used in safetyanalysis, safety polices, accidents in opencast mines, accidents due to explosives, electricity and Inundations.

MODULE-I: 12 Periods
Introduction to accidents prevention, health and safety in industry
Terminology, reason for preventing accidents – moral, cost, legal. Safety scenario in Indian mines, Accidents in Indian mines, Measurement of safety performance, Statistical analysis of mine accidents.
Causes of Accidents, accident report, accident analysis and control.

MODULE-II: Risk management   12 Periods
System engineering approach to safety, Techniques used in safety analysis, Generic approach to loss control with in mining operations.
Safety management and organization, Risk management, Risk identification, Risk estimation and evaluation, Risk minimization techniques in mines. Risk analysis using FTA, HAZOP, and ETA etc.

MODULE-III: Safety and Disaster management   12 Periods
PART-A: Training, Human Behavioral approach in Safety, safety polices, safety audit and safety management.
PART-B: Mines emergency organization for disaster management.

MODULE-IV: Accidents in opencast mines   12 Periods
Common causes and measures for prevention of accidents due to ground movement, falls of roof and sides in underground coal mines, Accidents due to rope haulage: Common causes and measures for prevention.

MODULE-V: Accidents due to explosives   12 Periods
Common causes and measures for prevention.
Accidents due to electricity:
Common causes and measures for prevention.
Inundations:
Dangers from surface and underground water

TEXT BOOKS:

1. Mine Safety and Legislation, Samir Kumar Das, Lovely Prakashan.

REFERENCE BOOKS:
1. DGMS circulars: Mines Act
2. Occupational Safety and Health in Industries and Mines by C.P. Singh, Black Diamond Publishers
3. Indian Mining Legislation – A Critical Appraisal by Rakesh & Prasad, Tara Book Agency.

E RESOURCES:
1. http://www.smenet.org/about-sme/government-affairs/advocacy/technical-briefing-papers/mine-health-and-safety
2. https://link.springer.com/book/10.1007%2F978-94-007-2039-8

Course Outcomes:
At the end of the course, students will be able to
1. Understand Introduction to accidents prevention, health and safety in industry
2. Understand basics of Risk management
3. Understand basics of Safety and Disaster management
4. Understand Common causes and measures for prevention of accidents in underground coal mines and opencast mines.
5. Know the Accidents due to explosives, Accidents due to electricity, Dangers from surface and underground water

2017-18 Onwards (MR-17)	**MALLA REDDY ENGINEERING COLLEGE** (Autonomous)		**B. Tech VI Semester**	
Code: 72523	**MINE SYSTEMS ENGINEERING** (Professional Elective -III)	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisite: Mathematics

Objective:
The objective of this subject is to provide knowledge of solving the models for their optimal solutions.

MODULE-I: Introduction   **09 Periods**
Introduction to optimization techniques, Introduction to linear programming, problem formulations, graphical solutions, unboundedness, infusibility, unique solution, multiple solutions. Mining examples

MODULE-II: **09 Periods**
Simplex method with different combinations of constraints, Big M method, Duality of linear programming, importance of dual problems, interpretations of solutions of primal from dual

MODULE-III: Transportation Problem   **09 Periods**
Part A: Formulation–Optimal solution, unbalanced transportation problem–Degeneracy, variants in assignment problems, mining examples.
Part B: Assignment problem – Formulation – Optimal solution - Mining examples

MODULE-IV: Inventory and Waiting line   **09 Periods**
Importance of Inventory, Introduction to inventory, basic assumptions in EOQ model, EOQ (Economic Order Quantity).
Introduction to waiting line theory, basic assumptions in waiting line, determination of waiting time in quee, waiting time in system, Single channel quee systems – arrivals Poisson distributed, service time exponential distribution

MODULE-V: **09Periods**
Introduction to CPM, Importance of CPM, Determination of Early start times, Early finish times, Latest finish times, Critical path, Project duration, Crashing of a network, Importance of PERT, Probability of project completion time, Assumptions in PERT

TEXT BOOKS:
1. Introduction to O.R /Taha/PHI Publishers
2. Operations Research / S.D.Sharma/Kedarnath Publisher

REFERENCE BOOKS:
1. Operations Research /A.M.Natarajan, P.Balasubramani,A. Tamilarasi/Pearson Education.
2. Operations Research: Methods & Problems / Maurice Saseini, Arhur Yaspan & Lawrence Friedman/ Literary Licensing

3. Operations Research / R.Pannerselvam,PHI Publications.

E RESOURCES:
1. https://en.wikipedia.org/wiki/Systems_engineering
2. https://web.stanford.edu/class/archive/ee/ee392m/ee392m.1056/Lecture9_ModelSim.pdf

Course Outcomes:
At the end of the course, students will be able to
1. Understand optimization techniques, linear programming, graphical solutions
2. Understand Simplex method, Big M method, Duality of linear programming
3. Understand basics of Transportation Problem
4. Understand Inventory and Waiting line problems
5. Understand basic concepts of PERT and CPM

Prerequisite: Introduction to mining Engineering

Objectives:
To pioneer the history of longwall mining and its development stages. To understand the extraction, support and transport on a longwall face. To learn ventilation methods and strata monitoring instruments

MODULE-I: Planning   **09 Periods**
History of longwall mining and its development, techno-economic consideration of the modified longwall retreat panels, longwall advance panels with caving method and stowing method, design of gate roadways and their size disposition, layout of panels, production and manpower planning, sublevel caving systems for thick seams, caving system in thin seams, multi-slice longwall mining, application of longwall mining for steep seams, longwall caving in metal mines**.**

MODULE-II: Supports   **09 Periods**
Types of supports used in longwall mining in the past and present, design of powered supports for different situations, longwall face end problems, supports in longwall gate roadways during drivage and extraction, pressure distribution around a moving longwall face, caving of thick seams and thin seams. Main roof fall, local fall and induced roof wall, floor heaving, precautions during main fall and surface subsidence.

MODULE-III: Extraction and Transportation on a Longwall Face   **09 Periods**
PART A: Methods of mining coal on longwall faces, machines – shearers, ploughs etc., methods of cutting and face advancement, stables and Sumping, gate road pillar extension.
PART B: Mode of transporting coal or ore in longwall face and machinery used. Shortwall Mining – a modified longwall mining. Remotely operated longwall faces. Shifting of longwall equipment.

MODULE-IV: Development and Working of Longwall Faces   **09 Periods**
Methods of driving gate roadways, choice of selection of machinery, road headers and dinters, special problems associated with working of longwall faces - faults, roof caving, face spalling, overburden movement, subsidence control, hydraulic stowing, dealing with spontaneous heating while working thick seams in coal.

MODULE-V: Environment and Ancillary   **09 Periods**
Methods of ventilating longwall faces and gate roadways. Methane control, dust control and noise control, monitoring at longwall faces. Assessment of cost of ventilation. Electric and hydraulic circuits. Surface and ground water effects. Strata monitoring with instruments

TEXT BOOKS:

1. Peng , S.S., Longwall Mining, 2rd Edition, John Willey and Sons, New York, 2006
2. Singh, R.D., Principles and Practices of Modern Coal Mining, New Age International, 1997.

REFERENCE BOOKS:
1. Mathur, S.P., Mining Planning for Coal, M.G. Consultants, Bilaspur, 1999
2. Singh T.N., Dhar, B.B. Thick Seam Mining, problems and Issues, Oxford & IBH Publishers, 1992.
3. Das S.K., Modern Coal Mining Technology, Lovely Prakashan, Dhanbad, 1994. 4 Longwall Mining in Company Seminar – Proceedings – The Singareni Collieries Co. Ltd., 1990.

E RESOURCES:
1. www.coaleducation.org/technology/Underground/Longwall_Mining.htm
2. www.undergroundcoal.com.au/pdf/longwall_mitchell.pdf
3. webapp1.dlib.indiana.edu/virtual_disk_library/index.cgi/.../pdf/coal.../tr0588.pdf
4. www.miningmagazine.com/tag/longwall/

Course Outcomes:
At the end of the course, students will be able to
1. Understand Planning of Long wall Mining
2. Understand design of powered supports for different situations
3. Understand Extraction and Transportation on a Longwall Face
4. Understand Development and Working of Longwall Faces
5. Understand Methods of ventilating longwall faces and gate roadways.

Prerequisite: Surface Mining Technology

Objectives:
To introduce the various techniques for mine planning, geotechnical investigation and equipment management. To appreciate the modern trends in opencast mines, safety and environment

MODULE-I: Pit Planning   **09 Periods**
Development of economic block model; Pit cut-off grade and its estimation; Ultimate pit configuration and its determination – hand method, floating cone technique, Lerchs-Grossmann algorithm, and computer assisted hand method. Addition of haul road on pit plan; Pit layouts. Open-pit optimization techniques for mine geometry and output, mine development phases, quality control Output and manpower planning; calendar planning, mine scheduling, production scheduling, truck dispatch system; Feasibility Report, DPR-contents and preparation.

MODULE-II: Geotechnical Parameters   **09 Periods**
Influence of pit slope on mine economics; High wall slope stability analysis and design methodology; stability analysis and design methodology for waste dumps; Application of geotechnical investigation for design of ultimate pit slope and other design parameters. Numerical problems on slope stability analysis including mine waste rock dumps and tailing dumps.

MODULE-III: Production and Equipment Planning   **10 Periods**
Part A: Determination of mine size and sequencing by nested pits; Cash flow calculations; mine and mill plant sizing; Production scheduling. Stockpiling and blending, Spreaders and Reclaimers; computerized truck dispatch.
Part B: Selection of mining system vis-à-vis equipment system; Computations for the capacity and number of machines vis-à-vis mine production. Machine availability, productivity, maintenance scheduling, preventive maintenance, control and monitoring inventory. Workshops for HEMM. Power supply arrangements in opencast mines.

MODULE-IV: Health, Safety and Environmental Management   **10 Periods**
Occupational health hazards due to mine dust, poor lighting and ventilation, noise and vibration, radioactive emission; Impact of surface subsidence; Accidents in Surface mining and their prevention; Sources of water, assessment of drainage requirements, sump design and drainage patterns - pumping systems. Pre-drainage through diversion channels and boreholes; Water pollution, Methods of reclamation of mined out areas, dumps and tailing ponds, environmental audit. Socio-economic factors in surface mines.

MODULE-V: Modern Trends in Opencast Mines   **10 Periods**
Recent developments in mining methods and layouts. In pit crushing & conveying, continuous surface mining. Selective extraction and dumping. Extraction of seams developed/extracted by

underground methods. Deep Open pit Mining; Placer mining and solution mining – scope of applicability, sequence of development and machinery; Closure of surface mines.

TEXT BOOKS:
1. Hartman, H. L. (Editor), SME Mining Engineering Handbook, 3rd edition, Vol I & II, Society of Mining Engineers, New York, 2011.
2. Hustrulid, W. and Kuchta, M., (eds)., Fundamentals of Open Pit Mine Planning & Design, Elsevier, 1995

REFERENCE BOOKS:
1. Proceedings of National Seminar on Surface Mining, IME Publications/ Calcutta, 1995
2. Das, S.K., Surface Mining Technology, Lovely Prakashan, Dhanbad, 1994
3. Das, S.K., Modern Coal Mining Technology, Lovely Prakashan, Dhanbad, 1994
4. Kennedy, B.A., Surface Mining – 2nd Edition, SME, New York, 1990

E RESOURCES:
1. www.eolss.net/sample-chapters/c05/e6-37-06-01.
2. https://link.springer.com/book/10.10

Course Outcomes:
At the end of the course, students will be able to
1. Understand Pit Planning and related concepts
2. Understand Influence of pit slope on mine economics and related concepts
3. Understand Production and Equipment Planning
4. Understand Health, Safety and Environmental Management
5. Understand Modern Trends in Opencast Mines.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech VI Semester		
Code: 72526	**MINE SAFETY AND RESCUE ENGINEERING LAB**	**L**	**T**	**P**
Credits: 2		**-**	**-**	**4**

Objectives:

To understand the temporary and permanent stoppings, preventive measures for mine explosions and rescue apparatus.

LIST OF EXPERIMENTS:

1. Fire extinguishers used in mines.

2. Study of Temporary fire stopping's.

3. Study of Permanent fire stopping's.

4. Study of cowards Diagram.

5. Study of stone dust barrier.

6. Study of water Barrier.

7. Oxygen self-rescuer

8. Self-contained breathing apparatus.

9. Reviving apparatus.

10. Study of brick and concrete dam.

11. Study of crossing point temperature.

12. Study of main sumps.

Course Outcomes:

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

1. Know the temporary and permanent stoppings.

2. Take a preventive measures for mine explosions.

3. Know the rescue apparatus.

4. Construct the brick and concrete dams.

5. Know about the mine sumps.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech VI Semester		
Code: 72527	ROCK MECHANICS LAB	L	T	P
Credits: 2		-	-	4

OBJECTIVES:
To study the various of methods to determine the properties of rocks. To study the operation of various instruments and equipment.

LIST OF EXPERIMENTS:

1. Determination of RQD of rocks.

2. Determination of Protodyaknov index of a given rock sample

3. Determination of point load index strength of a given rock sample

4. Determination of porosity of rocks.

5. Determination of hardness of rocks

6. Determination of uniaxial compressive strength of a given rock sample

7. Determination of tensile strength of a given rock sample using Brazilian method

8. Determination of shear strength of rocks

9. Determination of modulus of elasticity of given rock sample using strain gauge.

10. Determination of triaxial strength of rock and drawing of Mohr's envelope

11. Study of different types of supports used in mines

12. Study of design of mine pillars.

Course Outcomes:
At the end of the course, students will be able to
1. Determine the properties of rocks

2. Knowledge of various instruments and equipment.

3. Design the supports for mine openings.

4. Design mine pillars.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech VI Semester		
Code: 70P01	**TECHNICAL SEMINAR**	**L**	**T**	**P**
Credits: 2		-	-	4

2017-18 Onwards (MR-17)	**MALLA REDDY ENGINEERING COLLEGE** (Autonomous)		B.Tech. VI Semester	
Code:70M04	**PROFESSIONAL ETHICS** (Common to CE, EEE, ME,ECE, CSE, IT and Min.E)	**L**	**T**	**P**
Credits: Nil		**-**	**2**	**-**

Prerequisites: Nil

Course Objectives

The objective is to make students familiar with professional ethics. It molds 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**
Part A: Collegiality and Loyalty- Respect for Authority- Professional Rights- Sexual
Harassment at   Workplace.
Part 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/

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 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.

Prerequisite: Development of Mineral Deposits

Objectives: This course introduces Objectives of mineral processing, characteristics of minerals and coal, crushingmethods, separation methods, methods of concentration, fields of application and limitations.

MODULE-I: Introduction   09 Periods
Scope, objectives and limitations of mineral processing, liberation and beneficiation.
Comminution:
Theory and practices of crushing and grinding; different types of crushing and grinding equipment's – their applications and limitations.

MODULE-II: Size Separation   09Periods
Laboratory size analysis and interpretation; settling of solids in fluids; industrial screens, mechanical classifiers and hydro cyclones.
Gravity Concentration Methods:
Jigging, Heavy media separation, flowing film concentrators–theory, applications and limitations.

MODULE-III: Froth Floatation   09Periods
Part A: Physico-chemical principles, reagents.
Part B: Machines, floatation of sulphides, oxides and coal.

MODULE-IV: Applications and Limitations of Concentrating techniques   09 Periods
Applications and limitations of magnetic concentration, high tension concentration**,** Ore sorters
Dewatering: Thickeners, filters, thermal drying.

MODULE-V: Flow Sheets   09 Periods
Simplified flow sheets for coal, zinc, iron, and manganese ores.
Magnetic methods of concentration Principles, Fields of Application and Limitation.

TEXT BOOKS:
   1. Introduction to Mineral Processing – V. Malleswar Rao, Indian Academy of Geoscience
   2. Mineral Processing – Barry AWills, Elsevier.

REFERENCE BOOKS:

   1. Mineral Processing – S.K. Jain, CBS Publishers & Distributors

E RESOURCES:
   1. https://www.britannica.com/technology/mineral-processing

2. http://www.sciencedirect.com/science/journal/03017516

Course Outcomes:
At the end of the course, students will be able to
1. Understand Scope, objectives and limitations of mineral processing and theory of Comminution
2. Understand basic concepts of Size Separation
3. Understand basic concepts Froth Floatation
4. Understand Applications and Limitations of Concentrating techniques
5. Understand various Flow Sheets

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech VII Semester		
Code:72529	**MINE LEGISLATION**	**L**	**T**	**P**
Credits: 3		3	-	-

Prerequisite: Industrial Management

Objectives: This course introduces laws and legislation of mines, electricity rules of India, training required, safetymeasures to be followed by workers, types of accidents, statistics, causes and prevention of accidents, labor rules, welfare organizations etc.

MODULE-I: Introduction   **09 Periods**
Introduction to mining laws and legislation, development of mining legislation of India. Workmen compensation Act, Maternity benefit Act, Crèche rules, Payment of wages Act.

MODULE-II: **10 Periods**
Mines Act, Mine Rules

MODULE-III: Rules and Regulations   **10 Periods**
Part A: Vocational Training rules, Explosives act, Rescue Rules, Environmental protection Act.
Part B: Pit head bath rules, Mines and Minerals Development and Regulation Act, Mineral concession rules.

MODULE-IV: **10Periods**
Coal Mines Regulations and Metalliferous Mine Regulations.

MODULE-V: Accidents and Health   **09 Periods**
Causes and prevention of accidents. Accidents rate in Indian mines. Accident enquiries and reports, health of workmen. Occupational diseases in mining.

TEXT BOOKS:
    1. Principle Acts & Rules CMR and MMR

REFERENCE BOOKS:
    1. Intent and Content of Mine Legislation – Prasad.
E RESOURCES:
    1. https://blog.ipleaders.in/mining-laws-in-india/
    2. http://www.dmr.gov.za/legislation.html
Course Outcomes:
At the end of the course, students will be able to
    1. Understand development of mining legislation of India
    2. Understand Mines Act, Mine Rules
    3. Understand Vocational Training rules, Explosives act, Rescue Rules, Environmental protection Act and Mines and Minerals Development and Regulation Act
    4. Understand Coal Mines Regulations and Metalliferous Mine Regulations.
    5. Understand Causes and prevention of accidents in mines.

2017-18 Onwards (MR-17)	**MALLA REDDY ENGINEERING COLLEGE** (Autonomous)	**B. Tech VII Semester**		
Code: 72530	**COMPUTER APPLICATIONS IN MINING**	**L**	**T**	**P**
Credits: 3		3	-	-

Prerequisite: Machine Drawing and Computer Aided Graphics, Rock slope Engineering.

Objectives: This course introduces algorithms, flow charts, programs, design of open pit, underground mine design, operational simulations, simulation of mining aspects, machine repairs, GPSS, SLAM, mining problems.

MODULE-I   **09Periods**
Introduction to structure terminology and peripherals, algorithms, flow charts, programs, dedicated systems. Application in mining, Exploration, rock topographic models, bore hole compositing, ore reserve calculation, interpolation and geostatical models.

MODULE-II   **09Periods**
Open pit design, Ultimate pit design, introductory process control, underground mine design, production scheduling.

MODULE-III: **09 Periods**
PART-A: Operational Simulation, Introduction, Simulation overview, objective, understand the role of modeling, Understanding the basic concept in simulation..
PART-B: Example of simulation in mining aspects, Simulation of machine repair problems, concepts of variability and prediction, example with dumping time problem, fitting distribution with chi-square test.

MODULE-IV   **09Periods**
Random number generation, properties of random number, pseudorandom number, random variates generation, Methods of random variates generation, inverse transformed method, acceptance rejection method, composition method, empirical method and rectangular approximation.

MODULE-V   **09Periods**
Simulation languages, GPSS and SLAM, Logical flow diagram of different mining activities. Coding with GPSS and SLAM of different mining problems, Computer control, Remote Control, automatic Control, application and limitations of control.

TEXT BOOKS:
1. Digital Computer Fundamentals, T.C. Bartee, Mc Graw Hill, 4th Ed.,1984
2. Digital Principles and applications, P. Malvino and D.P. Leach, Mc Graw Hill, 5th Ed., 1994

REFERENCE BOOKS:
1. Application of Computer Methods in the Mineral Industry, R.V.Ramani.
E RESOURCES:

1. https://www.shaalaa.com/question-papers/gujarat-technological-university-bachelor-be-computer-application-mining-be-mining-engineering-semester-6-te-third-year-2010_9958
2. https://www.scribd.com/document/288352821/Computer-Applications-in-Mining-Industry

Course Outcomes:

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

1. Understand structure terminology and peripherals, algorithms, flow charts, programs, dedicated systems
2. Understand Open pit design, Ultimate pit design, introductory process control, underground mine design, production scheduling
3. Understand basic concepts in simulation
4. Understand Random number generation
5. Understand Simulation languages, GPSS and SLAM, Logical flow diagram of different mining activities

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech VII Semester		
Code: 72531	UNDERGROUND METAL MINING	L	T	P
Credits: 3		3	-	-

Prerequisite: Underground coal mining Technology.

Objectives:
To understand the details of development of a mine for exploitation of mineral deposits. To analyze design requirements of Underground Coal and metal Mining Methods. To apply different support systems including backfilling techniques for underground mines for stability of workings.

MODULE-I:Development   **10 Periods**
Mine development for working veins, lodes and tabular deposits, shape, size and position of the development working in relation to the ore body, Layout of the drifts, cross-cut, raises and winze in ore body.

MODULE-II: Raising methods   **09 Periods**
Different types of raising methods and their merits and demerits. Classification of stoping methods, factors influencing the choice of stoping method.

MODULE-III: Stopping Methods   **10 Periods**
Part A: Room and Pillar, Sublevel Open Stopping, Shrinkage method of Stopping and Cut & Fill method of Stopping
Part B: Sublevel Caving, Block Caving, Special methods of working of thin deposits

MODULE-IV: Mine development   **10 Periods**
Applicability of methods, stope layout, stope development, ground breaking, mucking, ventilation, support, haulage and dumping.

MODULE-V: Leaching methods   **09 Periods**
Productivity and cost of mining of ores. Principles of in-situ leaching, scope and limitation of in-situ leaching.

TEXT BOOKS:
1. Mining Engineers handbook Vol.I & II, Peele , John Wiley & sons,
2. Working of Mineral deposits, Georgi Popov, International Law & Taxation Publishers.

REFERENCE BOOKS:
1. Underground Mining Methods handbook.
2. Underground Mining Methods and Technology – Elsevier Science publication.
3. Mine working Vol. I & II, Karmakar H. – Lovely Prakasan, Dhanbad.

E RESOURCES:

1. http://wikianswers.indianservers.com/under-ground-metal-mining-technology/
2. https://www.princeton.edu/~ota/disk3/1981/8103/810313.PDF

Course Outcomes:
At the end of the course, students will be able to
1. Understand Mine development for working veins, lodes and tabular deposits
2. Understand Different types of raising methods and their merits and demerits
3. Understand different types of Stopping Methods
4. Understand stope layout, stope development and related concepts
5. Understand different types of Leaching methods.

Prerequisite: Underground and Opencast Mining Methods

Objectives:
To understand the planning of opencast & underground mines and equipment utilization. To study project implementation and monitoring

MODULE-I:Introduction   **09 Periods**
Technical factors in mine planning, methodology of mine planning, short range & long range, Optimization Techniques in Mine Planning; mine plan preparation; Choice between surface and underground mining

MODULE-II: Opencast Mining   **10 Periods**
Development of Ultimate Pit Configuration (open pit limits) and its determination – hand method, floating cone technique, Lerchs-Grossmann algorithm and computer assisted hand method; Selection of initial mine cuts and geometrical considerations; location of surface structures, division of mining area into blocks, mine design, Impact of various parameters like depth, dip, stripping ratio, geology and strength of mineral and overburden on mine planning; Selection of Mining Systems; Determination of optimum mine size and sequencing by nested pits; Lanes algorithm for estimation of optimum mill grade and production planning; calendar plan, production scheduling, economic productivity indices. Quality Control-Ore Blending; Planning for mine closure.

MODULE-III: Underground Mining   **10 Periods**
Part A: Design of mine entries – shafts, inclines, design of stopes – size, level interval, etc.design of coal mining district, mine boundaries; design of shaft pillars and protective pillars, planning of production capacity , optimization of mine size – mine production capacity, layout of development drives / raises / winzes etc, length of faces, etc,
Part B: Planning of support systems, ventilation, layout of drainage system; Production planning & Production scheduling, selection of depillaring / stoping method, manpower management economic/ productivity indices, Productivity and quality control; Techno- economic analysis, Planning for mine closure.

MODULE-VI: Equipment Planning   **10 Periods**
Latest technological developments in increase in both types and capacities of equipment used in mining operations. Planning and selection of equipment, their capacities and population for different mining conditions. Maintenance planning and scheduling including spare management; Equipment information – performance monitoring and expert systems.

MODULE-V: Project Implementation and Monitoring   **09 Periods**
Pre-project activities – feasibility report, environmental clearance, detailed project report, sources of funds, import of technology, selection of contracts and contract administration, time

management, cost control material management system, project quality assurance, social responsibility, government orders and guidelines. Environmental impact assessment and preparation of environmental management plan.

TEXT BOOKS:
1. Jayanth Bhattacharya, Principles of Mine Planning-Allied Publishers, Delhi 2003.
2. Hustrulid, W. and Kuchta, M., (eds)., Fundamentals of Open pit Mine Planning and Design, Elsevier, 1995

REFERENCE BOOKS:
1. Ehrenburger, V and Fajkos, A., Mining Modelling, Elsevier, 1995.
2. Bawden, W.F., and Archibald., J.F., Innovative Mine Design for the 21st Century
3. Elsevier, 1993. Christoper J. Bise, Mining Engineering Analysis, 2nd Edition, Society for Mining, Metallurgy, and Exploration, 2003.
4. Pazdziora, J., Design of Underground Hard Coal Mines, Elsevier, 1988.

E RESOURCES:
1. www.core-mining.com/services/details/Mine-Planning-and-Design
2. www.tetratech.com/en/docs/mc14-028-en-mine-planning-and-design
3. www.empr.gov.bc.ca/Mining/Geoscience/Coal/CoalBC/.../Volume3-MinePlanning
4. https://journals.agh.edu.pl/mining/article/view/460

Course Outcomes:
At the end of the course, students will be able to
1. Understand Technical factors in mine planning, methodology of mine planning, Optimization Techniques in Mine Planning.
2. Understand different design concepts related to Opencast Mining
3. Understand different design concepts related to Underground Mining
4. Understand Equipment Planning
5. Understand Project Implementation and Monitoring.

2017-18 Onwards (MR-17)	**MALLA REDDY ENGINEERING COLLEGE** (Autonomous)	**B. Tech VII Semester**		
Code: 72533	**NUMERICAL METHODS IN MINING ENGINEERING** (Professional Elective -IV)	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisite: Numerical Methods

Objectives:
To study the finite element methods, finite difference methods and boundary element methods.
To understand the practical applications of numerical methods in mining field

MODULE-I: Introduction to Elastic and Plastic Models   09Periods
Fundamentals, elastic, plastic, homogeneous and isotropic, non-linear elastic and elasto- plastic models.

MODULE-II: Finite Difference Methods   09Periods
Concept, formation of mesh element, finite difference patterns, solutions, application to mining.

MODULE-III: Finite Element Methods   09 Periods
Part A: Concept, discretization, element configuration, element stiffness, assemblage and solutions, two and three dimensional solutions.
Part B: Linear and non-linear analysis, applications in geomechanics; simulation of joints in strata.

MODULE-IV: Boundary Element Method   09Periods
Concept, discretization, different methods of solution for isotropic and infinite media.

MODULE-V: Practical Applications in Mining and Rock Mechanics   09Periods
Practical Applications in stress analysis, slope stability, subsidence prediction, and pillar design, rock burst, etc.

TEXT BOOKS:
1. Desai, C.S. and Abel, J.F., Introduction to the finite Element Method, Van Nostrand Riehokl Co., New York, 1983.
2. Zienkiewicz, O.C., The Finite Element Method in Engineering Science, Tata McGraw Hill 1972

REFERENCE BOOKS:
1. Segerlind, L.J., Applied Finite Element Analysis, John Wiley and Sons, New York, 1987.
2. Mukhopadyay, M., Matrix Finite Element – Computer and Structural Analysis, Oxford and IBH Publishing co., 1984
3. Brown, E.T., (Ed) Analytical and Computational Methods in Engineering and Rock Mechanics, Allen and Unwin, London, 1987
E RESOURCES:
1. https://doaj.org/toc/2251-6565
2. http://www.citefactor.org/journal/index/13692/journal-of-analytical-and-numerical-methods-in-mining-engineering#.WYdJWBWGPIU

Course Outcomes:
At the end of the course, students will be able to
1. Understand fundamentals of Elastic and Plastic Models.
2. Understand Finite Difference Methods
3. Understand Finite Element Methods
4. Understand Boundary Element Method
5. Understand Practical Applications in Mining and Rock Mechanics

Prerequisites: Basic mining operations.

Objectives: Student should be aware of methods to access economic value of mineral**s.**

MODULE-I: The Mineral Industry   **09 Periods**
Economic characteristics of the mineral industry in India and world, the place of minerals in the national and international Economy.

MODULE-II: Mineral resources   **09 Periods**
Brief survey of India's mineral resources in the world setting with special reference to its need and deficiencies.

MODULE-III: Mining companies and mine Accounts   **10 Periods**
Part-A: Structure, formation and capitalization, principles of book keeping as applied to the mining industry
Part B: Presentation of accounts, balance sheets and profit and loss accounts, Depreciation DCF, IRR.

Module –IV: Mine Valuation   **09 Periods**
Mineral reserves, mining reserve and profit examination and report on mines.

MODULE-V: Mine project planning   **10 Periods**
Mineral property planning valuation of mines, Mine properties, mine investments. Project planning and project evaluation.

TEXT BOOKS:
1. Deshmukh RT ―Mineral Economics, Meera Publishers, Nagpur.
2. Mineral Economics, GB Misra.
REFERENCE BOOKS:
1. Rubawsky ―Mineral Economics, Elsvvier Science pub.
2. Sharma N.L. ―Mineral Economics.
E RESOURCES:
1. http://www.dmr.gov.za/publications/mineral-economics.html
2. http://ibm.nic.in/index.php?c=pages&m=index&id=73&mid=18282
Course Outcomes:
At the end of the course, students will be able to
1. Understand Economic characteristics of the mineral industry in India and world
2. Understand Brief survey of India's mineral resources in the world
3. Understand Mining companies and mine Accounts
4. Understand Mineral reserves, mining reserve and profit examination and report on mines
5. Understand Mine project planning.

Prerequisite: Mining Geology, Mine Mechanization, Surface Mining Technology.

Objectives:
This course introduces factors influencing convergence in mine working, Subsidence mechanism and different methods of subsidence prediction, Time influence and impact on structures, Control of substance and governing laws and standards.

MODULE-I: Introduction   **09 Periods**
Strata movement at the mining horizon, convergence in mine working, factors influencing convergence in mine working.

MODULE-II: Subsidence mechanism   **09 Periods**
Zones of movement in the overlaying beds, vertical and horizontal movement, subsidence trough, angle of draw, angle of break, sub-surface subsidence.

MODULE-III: Subsidence prediction   **10 Periods**
Part-A: Different methods of surface subsidence prediction**.**
Part-B: Graphical, analytical, profile function empirical and theoretical models.

MODULE-IV: Time influence and impact on structures   **10 Periods**
Influence of time on subsidence, example from long wall and bord and pillar working. Calculation of ground movement over time.
Types of stress on structures, stress-strain behavior of soils, mining damage to buildings, industrial installations, railway lines, pipes, canals, etc.,

MODULE-V: Subsidence control, governing laws and standards   **09 Periods**
Measures to reduce mining damage, mining methods to minimize damage. Laws governing mining damage, different standards suggested for mining and building ground in respect of subsidence. Case statues of Mine subsidence

TEXT BOOKS:
1. Subsidence: occurrence prediction and control, B.N Whittaker & D.J Reddish, Elsevier
2. Mine Subsidence Engineering, H. Kratzsch, Springer London

REFERENCE BOOKS:
1. Mine Subsidence, B. Singh, Parijat Mudranalaya Publications.
2. Surface subsidence Engineering, Syd S. Peng, W. M. Ma, W. L. Zhong, Society for Mining, Metallurgy & Exploration.

E RESOURCES:
1. http://www.minesubsidence.com/
2. https://www.researchgate.net/publication/236394097_Mining_Subsidence_Engineering.

Course Outcomes:

At the end of the course, students will be able to
1. Understand Strata movement, convergence in mine working, factors influencing convergence in mine working
2. Understand Subsidence mechanism
3. Understand Different methods of surface subsidence prediction
4. Understand Time influence and impact on structures
5. Understand Subsidence control, governing laws and standards

Prerequisites: Introduction to Mining Engineering, Metal Mining, Coal Mining

Objectives:
To introduce the small scale mining methods with case studies. To introduce the marine geology and its exploitation techniques

MODULE-I: Introduction to Small Scale Mining   09 Periods
Concept of small scale mining, small scale mines – world wide, Indian Policy in small scale mines – practices, policies and perspectives, problems of small scale mines – finance, legislative support, technical expertise, environmental obligations, safety, health and training, environmental impacts and protection.

MODULE-II: Small Scale Mining Methods   12 Periods
Classification and mode of occurrence of granite and other minor minerals, physical, mechanical and chemical properties, geological aspects of mining, granite and dimensional stone mining – manual, semi-mechanized and mechanized mining methods, conventional & novel techniques, recent trends, processing, finishing, quality control, marketing & export of minerals. Case studies of mining of other minerals like sandstone, marble, beach sands, alluvial mining, mica, barytes, diamond and gemstones, etc.

MODULE-III: Introduction to Marine Mining   10 Periods
Part A: Introduction to marine environment, development & status of ocean resources of mining in India and other parts of the world.
Part B: Ocean profile, ocean floor topography, economic exclusive zone & fundamentals of law of the sea, coastal zone & its characteristics.

MODULE-IV: Marine Geology and Resources   09 Periods
Physical and chemical properties of seawater, overview of marine mineral deposits, deep-sea bed mineral resources, polymetallic nodules, sulphate nodules, chemicals from the ocean, dissolved and undissolved mineral deposits, sea water as resource and beach placers.

MODULE-V: Exploitation of Marine Deposits   09 Periods
Shallow and deep sea bed, oceanographic instruments, mining of manganese nodules, deep sea drilling methods, ocean bottom samplers, drag buckets, grab buckets, coring systems, ocean bathymetry, temperature measurement systems, water samplers, ocean dynamic analysis, beach placer mining, underwater photographs, vehicles and transportation, offshore oil platforms.

TEXT BOOKS:
1. Chatterjee, S.K., An Introduction to Mineral Resources, Wiley Eastern Ltd., 1983.
2. Ghose, A.K., (Ed). Small Scale Mining – A Global Overview, Oxford - IBH Publishers, 1991

REFERENCE BOOKS:
1. Shepherd, F.P., Sub-marine Geology, Harper and Row, New York, 1963.
2. Graff, W.J., Introduction to Offshore Structures: Design, Fabrication and Installation, Gulf Publishing Company, London, 1961.
3. Herbich, J.B., Coastal and Deep Ocean Dredging, Gulf Publishing Co. Houston, 1975.
4. Murthy, T.K.S., Mining the Ocean, CSIR Golden Jubilee Series, CSIR Publications, New Delhi, 1995.

E RESOURCES:
1. http://www.sanfoundry.com/best-reference-books-small-scale-marine-mining/
2. http://ibm.nic.in/index.php?c=pages&m=index&id=73&mid=18282

Course Outcomes:
At the end of the course, students will be able to
1. Understand Concept of small scale mining, small scale mines
2. Understand Small Scale Mining Methods
3. Understand Marine Mining and related concepts
4. Understand Marine Geology and Resources
5. Understand Exploitation of Marine Deposits

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech VII Semester		
Code: 72537	GROUND CONTROL TECHNOLOGY (Professional Elective-V)	L	T	P
Credits: 3		3	-	-

Prerequisite: Underground Coal Mining Technology

Objectives:
To Identify and understand the factors contributing to strata control problems in mines, Analyze &design requirement of support system in different workings of mine, To Apply different instruments for evaluation of strata condition and organization of strata control in mines

MODULE-I: Pit slope stability & subsidence   **09 Periods**
Approach to slope stability, slope parameters, different types of slope failures, factors affecting slope stability, introduction to methods of failure, analysis, determination of factor of safety,. Introduction to different rock slope stabilization techniques.
Theories of subsidence, factors affecting subsidence, subsidence surveys, subsidence prediction techniques, subsidence control – surface and underground measures, pseudo- mining damage.

MODULE-II: Pillar design and rock burst   **09 Periods**
Strength of pillars, barrier and shaft pillar design – load estimation, factor of safety, various formulae, rock burst and bumps — phenomena, causes, prediction, monitoring and control, gas outbursts

MODULE-III: Underground supports   **09 Periods**
Part A: Various methods of roof examination, objectives and limitations of supports, ground forces and in situ stresses, pressure arch theory, evolution of supports, conventional supports — timber and steel supports, arches, yielding supports.
Part B: Rock and cable bolting, shotcreting, roof stitching, support of shaft bottoms, galleries, junctions and places of roof falls, freshly exposed roof supports, design of supports, longwall powered supports. Design of systematic support rules for B & P and longwall - development, depillaring, etc.

MODULE-IV: Instrumentation   **09 Periods**
Convergence indicators, load cells, strain gauges, flat jacks, LVDT, dial gauges, pressure cells and recorder, anchorage testing equipment, laboratory and in situ measurements, hydraulic fracturing rock mechanics instrumentation for B & P and longwall workings

MODULE-V: Stowing / filling   **09 Periods**
Selection and preparation of stowing materials, principal methods of stowing, collection, fields of application and limitations, preparation and transport of materials, surface, underground and face arrangements, design of stowing plants.

TEXT BOOKS:
1. Strata Control in Mineral Engineering, T. Bieniawski Ziti, John Wiley & Sons.

REFERENCE BOOKS:
1. Underground winning of Coal, T.N. Singh, Oxford and IBH New Delhi.
2. Engineering Rock Mass Classifications, Bieniawski Z.T. 1989, Wiley, New York
3. Longwall mining, Peng S S and Chiang HS, Wiley, New York, 708p.

E RESOURCES:
1. http://www.undergroundcoal.com.au/fundamentals/15_general.aspx
2. http://www.icevirtuallibrary.com/doi/abs/10.1680/ijoti.1939.14545

Course Outcomes:
At the end of the course, students will be able to
1. Understand Pit slope stability & subsidence
2. Understand Pillar design and rock burst
3. Understand various types of Underground supports
4. Understand different types of Instruments used for strata monitoring
5. Understand Stowing / filling

OBJECTIVE:
To study various mineral processing technique to enrich minerals.

LIST OF EXPERIMENTS:

1. Different sample division techniques like coning and quartering, riffle sampling techniques, etc.

2. Determination of crushing characteristics of a given mineral sample using jaw crusher

3. Determination of the grinding characteristics of a given mineral sample using ball mill.

4. Sieve analysis of a given sample and to calculate (a) percentage sample retained on screens (b) to plot sizing curves.

5. Concentration of a given mineral sample using mineral jig.

6. Concentration of a given mineral using Wilfley table.

7. Concentration of a given mineral using froth flotation cell

8. Study of wash ability characteristic of a coal sample using float and sink test.

9. Study of sedimentation characteristics of a given sample.

10. Estimation moisture content by Drying of mineral sample.

11. Determining the average size of samples

12. Collection of sample by riffle sample technique.

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

1. Know different sample division techniques.

2. Determine the grinding and crushing characteristics of a given mineral sample.

3. Know the wash ability characteristic of a coal sample.

4. Determine the moisture content by Drying of mineral sample.

5. Determine the average size of samples.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech VII Semester		
Code: 72539	**COMPUTER APPLICATION IN MINING LAB**	**L**	**T**	**P**
Credits: 2		-	-	4

Objectives:
To design the mining equipment's, Blast design, Fragmentation Analysis and Mine ventilation network analysis.

LIST OF EXPERIMENTS:

1. Dumper drawing using CAD Package.

2. LHD drawing using CAD Package.

3. Road Grader drawing using CAD Package.

4. Head Gear drawing using CAD Package.

5. Cavo Drill drawing using CAD Package.

6. Shield Support drawing using CAD Package.

7. Rocker Shovel drawing using CAD Package.

8. Blast design.

9. Fragmentation Analysis.

10. Mine ventilation network analysis.

Course Outcomes:
At the end of the course, students will be able to
1. Design the Mining Equipment's
2. Design the Blast design
3. Analysis the fragmentation
4. Analysis of mine ventilation network analysis

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech VII Semester		
Code: 70P02	**MINI PROJECT**	**L**	**T**	**P**
Credits: 2		**-**	**-**	**4**

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech VIII Semester		
Code: 72540	**MATERIAL HANDLING**	**L**	**T**	**P**
Credits: 3	**(Professional Elective -VI)**	3	-	-

Prerequisite: Engineering Mechanics and strength of Materials

Objectives:
To introduce the basic principles in material handling and its equipment. To study the conveyor system and its advancement

MODULE-I: Bulk Handling Systems   10 Periods
Basic principles in material handling exclusive to mining industry and its benefits. Classification of material handling equipments. Current state of art of bulk handling materials in mining in the world and Indian scenario; Selection of suitable types of systems for application. Stacking, blending, reclaiming and wagon loading, machinery and systems used at the stack yards; stock piles, silos, bunkers – their design, reclamation from them, various types of weigh bridges. Segregation - size wise and grade wise, Railway sidings.

MODULE-II: Short Conveyors and Haulage Systems   09 Periods
Roller conveyor, overhead conveyor, screw conveyor, auger conveyor, apron feeder, bucket elevators, scraper haulage, conveyors in steep gradient, Armoured face conveyor, Off-highway Trucks, haul roads, In-pit crushers and modular conveyors, electric trolley assisted haulage, shuttle cars, skip hoist, winders, LHD's, pneumatic conveying, hydraulic transport.

MODULE-III: Belt Conveyor System   10 Periods
Part A: Design, capacity, calculations with respect to the size, speed, troughing, power requirement, tension requirement, belt selection, factor of safety.
Part B: Developments in the design, of various components of belt conveyor systems such as; structures, rollers, gear boxes and motors, drums and pulleys, belting, ancillary components and safety gadgets.

MODULE-IV: New Types of Belt Conveyor Systems   09 Periods
Curved conveyors, cable belts, pipe conveyors, rock belts – mine-run-rock conveyor, steel belt conveyors, steel slot conveyor, chain belt conveyors, etc., and other new developments, stackers and reclaimers, High Angle Conveyors (HAC); New inventions in HAC , Mobile or fixed installations; Woven wire belts, En Masse conveyor, Vibrating conveyor, gravity bucket conveyor.

MODULE-V: Material Handling in Mines, Plants and Workshops   09 Periods
Mobile cranes, derrick cranes, pillar cranes, tower cranes, radial cranes, bridge cranes, fork lifters, overhead gantry material handling in workshops. Mineral handling in dimensional stone quarries, Mineral handling plants(coal, etc.,) Locomotives, rail tracks, rail cars, railways wagons; Aerial ropeways, gravity ropeways; Containers and shipping; Rope haulage - different types.

TEXT BOOKS:
1. Allegri (Sr.), T.H., Material Handling – Principles and Practices, CBS Publishers and Distributors, Delhi, 1987.
2. Hustrulid, W., and Kuchta, M. Open Pit Mine Planning & Design, Vol. 1, Fundamentals, Balkema, Rotterdam, 1998.

REFERENCE BOOKS:
1. Kennedy, B.A., Surface Mining – 2nd Edition, SME, New York, 1990.
2. Deshmukh, D.J., Elements of Mining Technology, Vol.I, II and III, EMDEE Publishers, Nagpur, 1979.
3. Peng, S.S., and Chiang, H.S., Longwall Mining, John Wiley and Sons, New York, 1984.
4. Hartman, H.L., (Ed.), SME Mining Engg. Handbook Vol.I and II, Society for Mining,
5. Metallurgy, and Exploration, Inc., Colorado, 1992.

E RESOURCES:
1. www.bmt.org › Overview
2. www.canadianminingjournal.com/tag/material-handling/

Course Outcomes:
At the end of the course, students will be able to
1. Understand Basic principles in material handling exclusive to mining industry and its benefits
2. Understand Short Conveyors and Haulage Systems
3. Understand Belt Conveyor System
4. Understand New Types of Belt Conveyor Systems
5. Understand Material Handling in Mines, Plants and Workshops

Prerequisite: Basics of statistics, mining geology

Objectives: To make the students familiar with the basics of geostatistics

MODULE-I: Introduction to Geostatistics   10Periods
Definition, schools of geostatistics, estimation models for mine evaluation- average method, polygonal or triangular method, deterministic mathematical model, independent random model, trend with random noise, correlated random model and trend with correlated random residuals.

MODULE-II: Semi-variogram and Co-variogram   09Periods
Definitions, characteristics and computation in one, two, and three dimensions, mathematical models, associated difficulties i.e. anisotropy, non-stationaries, regularization, presence of nugget effect.

MODULE-III: Extension variance and estimation variance   10 Periods
Part-A: Calculation of estimation variance, the nugget effect and estimation variance, examples, auxiliary function.
Part-B:
Kriging: kriging and optimal valuation, kriging equations in general cases.

MODULE-IV: The Integrated geological-geostatistical system   10Periods
Statistical analysis, comparative statistical analysis, geostatistical structural analysis, trend analysis, point kriging, cross validation, block kriging, mineral inventory, tonnage relations.

MODULE-V: Geostatistical applications   09Periods
Optimization of exploration drilling, calculation of mineral inventory, establishment of grade-tonnage relations, misclassified tonnage, grade control plan

TEXT BOOKS:

1. An Introduction to Applied Geostatistics, Issacks and Srivastava Oxford, JBH, 1990

REFERENCE BOOKS:

1. An Introduction to Geostatistical methods of Mineral Exploration, Rendu J.M John Wiley and Sons, 1981
2. Geostatistical Ore Reserve Estimation, David, Michel, Mc Graw Hill, 1977

E RESOURCES:
1. http://www.springer.com/in/book/9781402093791
2. https://link.springer.com/chapter/10.1007%2F978-3-319-39264-6_17

Course Outcomes:

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

1. Understand schools of geostatistics, estimation models for mine evaluation
2. Understand Semi-variogram and Co-variogram
3. Understand Extension variance and estimation variance
4. Understand The Integrated geological-geostatistical system
5. Understand Geostatistical applications

Prerequisite: Environmental science

Objectives:
To make the student familiar with the Environmental impacts of mining and associated activities, laws related to mining environment, corporate social responsibility and mine closure.

MODULE-I: Introduction   **10 Periods**
Sustainable development, environmental carrying capacity - concepts & principles; Environmental impacts of mining and associated activities.Ecology:Introduction to ecology, ecosystem structures and functions.

MODULE-II: Air pollution, Noise and Vibration   **09 Periods**
Air pollution: Atmospheric composition and meteorology; Sources of air pollution – point and non-point; Emission factors; Control measures – extraction, suppression and consolidation of dust.
Noise and vibration: Basic concepts, sources, monitoring and control measures.

MODULE-III: Water pollution   **10 Periods**
Part-A: Water pollution: Global hydrological cycle; Self-purification mechanism, sources of water pollution
Part-B: Important parameters–pH, turbidity, oil & grease, nitrates, DO, BOD, COD; Eutrophication, de-oxygenation, acid mine drainage and heavy metal pollution– preventive and control measures

MODULE-IV: Land environment and Environmental administration   **09 Periods**
Land environment: Laws related to mining environment; EIA of mining projects.
Land Acquisition & Revenue: Concepts: Related laws and regulations.

MODULE-V: Corporate Social Responsibility and Mine closure   **09 Periods**
Corporate Social Responsibility: Concepts and principles. **Mine closure**: Concepts and principles.

TEXT BOOKS:

1. Environmental Impact of Mining Down CG and Stocks J. Applied Science Publishers, London, 1978.

2. Environmental Impacts of Mining: Monitoring, Restoration and Control. Lewis Publishers, Boca Raton, 1993.

REFERENCE BOOKS:

1. Best Practices Environmental Management in Mining" - EPA (Australia): 1997-2004.
2. Environmental Management in Mining Areas Saxena NC, Singh Gurdeep and Ghosh R, (Ed.), Scientific Publishers (India), Jodhpur 2003.

E RESOURCES:

1. https://link.springer.com/article/10.1023/A:1012083519667
2. http://www.sciencedirect.com/science/article/pii/S0301479701904347

Course Outcomes:

At the end of the course, students will be able to
1. Understand Sustainable development, environmental carrying capacity - concepts & principles and Ecology
2. Understand Air pollution, Noise and Vibration
3. Understand Water pollution
4. Understand Land environment and Environmental administration
5. Understand Corporate Social Responsibility and Mine closure

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech VIII Semester		
Code:	(Open Elective-II)	L	T	P
Credits: 3		3	-	-

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

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VIII Semester		
Code:70P03	**ENTREPRENEURSHIP**	L	T	P
Credits: 1	(Common to CE, EEE, ME, ECE, CSE, IT and Min.E)	-	2	-

pre-requisite: NIL

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**
Entrepreneurship: 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   **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**
Part 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.
Part 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: Entrepreneurship Development and Women entrepreneurship 6Periods
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:Entrepreneurship - Law and strategy   **6Periods**
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 BOOK:

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. http://nptel.ac.in/courses/122106032/Pdf/7_4.pd
4. https://www.scribd.com/doc/21516826/Entrepreneurship-Notes
5. http://freevideolectures.com/Course/3514/Economics-/-Management-/-Entrepreneurhip/50

Course Outcomes:

At the end of the course the 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: 70A03	**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	L	T	P
Credits: 4		3	2	-

Prerequisite: Nil

Course Objective:

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**
Part 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.
Part B: Plume Dispersion Winds and moisture plume behavior and plume Rise Models; Gaussian Model for Plume Dispersion.

MODULEIV: Control of Particulates   **13 periods**
Control at Sources, Process Changes, Equipment modifications, Design and operation of control equipment's – 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.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 70241	ELECTRICAL SAFETY AND ENERGY MANAGEMENT	**L**	**T**	**P**
Credits: 4		3	2	-

Prerequisites: 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 - earthling 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
Part 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.
Part 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 earthling 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.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 70355	INDUSTRIAL SAFETY	L	T	P
Credits: 4		3	2	-

Prerequisites: Nil

Course Objectives:

The purpose of this course is to teach student 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   13 Periods

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

Part 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.

Part 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. R.K. Mishra,"Safety Management", AITBS publishers, 2012.
2. Krishnan N.V., "Safety in Industry", Jaico Publisher House, 2005
3. Singh, U.K. and Dewan, J.M., "Safety, Security and risk management", APH Publishing Company, New Delhi, 2005.
4. 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. Apply 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. Apply the concept of industrial process safety

5. Apply the safety procedures for human

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech.	
Code: 70446	PRINCIPLES OF COMMUNICATION ENGINEERING (Open Elective)	L	T	P
Credits: 4		3	2	-

Prerequisites: Nil

Course Objective:
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   16Periods
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
Part A: Introduction, Pulse modulation, PCM – PCM sampling, sampling rate, signal to quantization noise rate, companding – analog and digital – percentage error,

Part B: delta modulation, adaptive delta modulation, differential pulse code modulation, pulse transmission – Inter symbol 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, PearsonEducation, 2007.
2. Simon Haykin, "Communication Systems", 4thEdition, John Wiley &Sons, 2001.

REFERENCE BOOKS:

1. H.Taub,DL Schilling,G Saha,"Principles of Communication", 3rdEdition,2007.
2. B.P.Lathi,"Modern Analog And Digital Communication systems", OxfordUniversity 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, 2ndEdition, 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/
8. 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. Understand different band-pass modulation schemes
3. Understand different base-band modulation schemes
4. Understand 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**	**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**
Part A: Software Testing Strategy and Environment Establishing **-** Testing policy, structured approach to testing, test factors, Economics of System Development Life Cycle (SDLC) Testing.
Part 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-5ybmrhKBj79VQPP0_ZQHLqcOopPDoaFWhZybCrPg_joTbBU8ZpGA
4. http://nptel.ac.in/courses/106101061/18

Course Outcomes:
At the end 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**
Part A: **Document and Term Clustering**
Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters.
Part 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:
At the end 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.

Prerequisite: Nil

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
Part A: Drivage of cross cuts, drifts, inclines and raises by conventional and mechanized methods. Calculation of OMS.
Part 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. Introductory mining engineering-, Howard L.Hartman, Jan M.Mutmansky/ wiley India (P) Ltd
2. Elements of mining technology Vol-I - D.J. Deshmukh /Denett& Company

REFERENCE BOOKS:
1. Roy Piyush Pal, Blasting in ground excavations and mines, Oxford and IBH, 1st ed 1993
2. C.P. Chugh, Drilling technology handbook, Oxford and IBH, 1sted, 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**
Part A: Introduction to methods of training: Matching methods with outcomes, lectures and demonstrations, games and simulations.
Part B: On Job 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**
Organizational development- An introduction: Organizational Development – Meaning and Definition, History of OD, Relevance of Organizational Development for Managers, Characteristics of OD, Assumptions of OD. Change Process and Models: Organizational 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 Organizational 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, Student 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.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech.	
Code: 70H07	**ENGLISH LANGUAGE SKILLS** (Open Elective)	**L**	**T**	**P**
Credits: 4		3	2	-

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, and 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. RK 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 (Conversation 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.

2017-18 Onwards (MR-17)	**MALLA REDDY ENGINEERING COLLEGE** (Autonomous)		**B. Tech.**	
Code: 70B15	**TRANSFORM TECHNIQUES** (Open Elective)	**L**	**T**	**P**
Credits: 4		3	2	-

Pre-requisite: Nil

Course Objectives
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
Part A: Introduction: Definition, Region of convergence, Linearity property, damping rule, shifting theorems multiplication theorem, initial value theorem, final value theorem.
Part 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 BOOKS:

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:

At the end 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.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech.	
Code: 70B17	**ADVANCED PHYSICS FOR ENGINEERS** (Open Elective)	**L**	**T**	**P**
Credits: 4		**3**	**2**	**-**

Prerequisites: Nil

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**
Part A: Synthesis: Introduction, Deposition techniques-Pulsed Laser Deposition (PLD), Spray Pyrolysis; Nucleation and growth of the thin films, properties (Mechanical, Electrical, Magnetic and Optical).
Part 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, Cu2S, 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:
At the end of this course, students will be able to:
1. Know 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 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 Objectives:
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.

MODULEI: 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.

MODULEII: 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.

MODULEIII: Cement and Concrete 13 Periods
PartA: Introduction-Classification of cement-natural –chemical composition of cement-Portland cement-chemical reactions involved in setting and hardening of cement.
PartB: 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.

MODULEIV: 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.

MODULEV: Polymers and CompositeMaterials 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. Bio gradable 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, 3rdEdition, 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:

At the end 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.	
Code: 70103	SURVEYING (Open Elective)	L	T	P
Credits: 3		3	-	-

Pre Requisites: Nil

Course Objective: 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   **09Periods**
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**
Part A: Linear Distances: Approximate methods, direct methods-chains – tapes, ranging- tape corrections, indirect methods- optical methods –E.D.M methods.
Part B: Prismatic Compass: Bearings Included Angles, Local Attraction, Magnetic Declination and Dip.

MODULE IV: 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, 3rdEdition 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 (Open Elective)	L	T	P
Credits: 3		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: 09Periods

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: 10Periods

Part A: Building energy system strategies, Water cycle strategies, Materials selection strategies, Indoor Environmental Quality [IEQ]

Part B: Analysis and strategies, Construction, team responsibilities and controls, Building commissioning strategies

MODULE IV: 09Periods

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. Green Building, Principles and Practices in Residential Construction, In 2012, Abe Kruger and Carl Seville publication.
2. Green Building Materials: A Guide to Product Selection and Specification, 3rd Edition, Ross Spiegel, Dru Meadows.October 2010

REFERENCES:

1. Sustainable Construction: Green Building Design and Delivery Hardcover – Import, 16 Nov 2012 by Charles J. Kibert [Author].

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. 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. Note the case study on green buildings.

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   09 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   09 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

Part A: Energy efficient motors, factors affecting efficiency, loss distribution, constructional details.
Part 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   10 Periods
                  Instruments

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, 2ndEdition, 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

Part A: Classification of EES systems, Mechanical storage systems, Pumped hydro storage (PHS), Compressed air energy storage (CAES), Flywheel energy storage (FES).
Part 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   09 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   09 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

Part A: Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria.
Part 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 Periods

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",**Khannapublishers , 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. Understand solar collectors, Solar energy storage and its applications
3. Understand the harvesting of wind energy & bio-mass energy.
4. Understand the harvesting of geothermal energy & ocean energy.
5. Understand 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

Part A: Statistical fundamentals – Measures of central Tendency and Dispersion - Population and Sample.
Part B: Control Charts for variables and attributes, Industrial Examples. Process capability. Concept of six sigma – New seven Management tools.

MODULE IV: TQM Tools   09 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   09 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.

E - RESOURCES
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. To 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 Objective:
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   **08 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**
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**
Part 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,
Part 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.

Prerequisites: Nil

Course Objective:

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

Part A: Propagation Effects:

Introduction, Atmospheric Absorption, Cloud Attenuation, Tropospheric and Ionospeheric Scintillation and Low angle fading, Rain induced attenuation, rain induced cross polarization Interference.

Part 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. Satellite Communications –Timothy Pratt, Charles Bostian, Jeremy Allnutt, 2nd Edition, 2003, John Wiley & Sons.
2. Satellite Communications Engineering – Wilbur, L. Pritchand, Robert A. Nelson and Heuri G. Suyderhoud, 2nd Ed., Pearson Publications.
3. Digital Satellite Communications-Tri.T.Ha, 2nd Edition, 1990, Mc.Graw Hill.

REFERENCES:
1. Satellite Communications-Dennis Roddy, 2nd Edition, 1996, McGraw Hill.
2. Satellite Communications: Design Principles – M. Richcharia, 2nd Ed., BSP, 2003.
3. Digital Satellite Communications – Tri. T. Ha, 2nd Ed., MGH, 1990.
4. Fundamentals of Satellite Communications – K. N. Raja Rao, 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
Part A: Android Application Design Essentials   - Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents.
Part 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 ed. (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**" Edition: I, 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

At the end 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.

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
Part A: Work Flows and Checkpoints of the Process   - Software process workflows, Iteration workflows, Major mile stones, Minor Milestones, Periodic status assessments
Part 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 Education3rd Edition, 2009
2. PankajJalote," **Software Project Management in Practice**", Addison- Wesley,2002

E-RESOURCES
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:
At the end 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.

2017-18 Onwards (MR-17)	**MALLA REDDY ENGINEERING COLLEGE** (Autonomous)	**B.Tech.**		
Code: 70605	**ADVANCED JAVA PROGRAMMING**	**L**	**T**	**P**
Credits: 3	**(Open Elective)**	**3**	**-**	**-**

Prerequisites: Nil

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
Part A: Introduction to Servlets- Tomcat web server, Introduction to Servlets: Lifecycle of a Servlet, JSDK, The Servlet API, The javax. Servlet Package.
Part 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 Brown **"Core servlets and java server pages volume 1: core technologies ",**Pearson.

REFERENCES:
1. Wang-Thomson **"An Introduction to web Design and Programming"**
2. Jon Duckett, Wrox, Wiley "**Beginning Web Programming**".

E -RESOURCES
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%20techn ologies%22,%22s%22:[],%22b%22:{%22filters%22:[]}}
5. http://nptel.ac.in/courses/106105084/

Course Outcomes:
At the end 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**
Part A: Information Theory
Information Theory – Information Content and Redundancy – Classification and Compression – Summarizing and Filtering – Inferences and Uncertainty.
Part 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   **09 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   **09 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:
At the end 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.

Prerequisite: Under graduate Physics, Chemistry and Math's

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   **09 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   **10Periods**
Part A: Firing of Explosives: Safety fuse, detonating cord and accessories, detonators, Exploders, Electric firing and non-electric firing, electronic detonators, NONEL blasting.
Part-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   **09 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

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B. Tech	
Code: 72543	TUNNELING ENGINEERING (Open Elective)	L	T	P
Credits: 3		3	-	-

OBJECTIVE:

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　　　　　　　　　　　　　　**10Periods**

Part A: Drilling - drilling principles, drilling equipment, drill selection, specific drilling, rock drillability factors; Blasting - explosives, initiators, blasting mechanics,

Part 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　　　　　　　　　　　　　　　　　　**09 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　　　　　　　　　　　　　　　　　　**09 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**
Part A: Corporate Creativity: Creative Manager- Creative Problems Solving, Techniques of Creative Problem Solving- Perpetual Creative Organizations-Creative Management Practices:
Part B: Various Management techniques: Human Resource Management, Marketing Management, Management of Operations, Management of Product Design and Growth Strategies – Collective Creativity.

MODULE – IV: Creative Organization   **09 Periods**
Creative Organization: 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   **09 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/

Journals : International Journal of Entrepreneurship, 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 creativity management.
2. Develop a creative personality and can become an extraordinary learner.
3. 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   **09 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**
Part A: Google Adwards: Navigating through Google AdWords- Understanding Google AdWords Structure- Writing Ads in Google AdWords
Part 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   **09 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/

Journals : International Journal of Marketing & Business Communication, PRIMA: Practices & Research in Marketing,Journal of Accounting & Marketing.

Course out comes:
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.

Prerequisite: Nil

Course Objectives:
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 student's 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   **09 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   09 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:

At the end 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, economic, 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 LITERATURE**	L	T	P
Credits: 3	(Open Elective)	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: 09 Periods

- Introduction to literature
- Elements of literature(Key Concepts)

MODULE - II: 09 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. **Original Short Stories of Maupassant** by Guy de Maupassant The Floating Press, 2014
2. **Unspeakable Women: Selected Short Stories Written by Italian Women during Fascism** by Robin Pickering-Iazzi :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=PLbMVogVj5nJSrNC8yTkDpzu5uRzX5re9q (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**	**-**	**-**

Prerequisite: Nil

Course Objectives:
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   09 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
Part 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).
Part 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   09 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 BOOKS:

1. Willam Feller :**"Introduction to Probability theory and its applications"**. Volume –I , Wiley 2.
2. GoonAM, Gupta MK, Das Gupta B :**"Fundamentals of Statistics"**, Vol-I, the World Press Pvt.Ltd. , Kolakota.
3. Montgomery, **"Applied statistics and probability for engineers"**.
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 Quality control)
3. http://irh.inf.unideb.hu/~jsztrik/education/16/SOR_Main_Angol.pdf   (Basic   Queuing 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:

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

1. The students will be able to perform Analysis of variance, ANCOVA and design of experiments in manufacturing firms.
2. Advanced design of experiments and their applications.
3. The students will learn the concept of quality control,Six Sigma and its importance to real life problems.
4. The student will be able to understand the concept of Correlation, regression and Application of Time-series,
5. The students would be able to find the expected queue length, the ideal time, the traffic intensity and the waiting time. These are very useful tools in many engineering and data management problems in the industry. It is useful for all branches of engineering.

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 Objectives:
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**
Part 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.
Part 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   **09 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   **09 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, 4E.
3. P.Sankara Iyer **"Operations Research"**Tata McGraw-Hill,2008
4. Taha **"Operations Research"** TMH,2010
5. A.M.Natarajan,P.Balasubramani,A.Tamilarasi **"Operations Research"**Pearson Education, 2005
6. 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:

At the end 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

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
Part A: Thermal Methods:
Thermolysisroute – spray pyrolysis and solved metal atom dispersion, sol-gel method solvothermal and hydrothermal routes, solution combustion synthesis, CVD method.
Part B: Surface Characterization
Scanning electron microscopy (SEM), Transmission electron microscopy (TEM). Photo luminescence Spectroscopy.

MODULE IV: Compositional and structural Characterization techniques 09 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).

MODULE V: Properties and Applications of Nanomaterials 09 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",** AcademicPress, First Edition, 2002.

REFERENCES:
1. Charles P Poole Jr "**Introduction to Nanotechnology",** John Willey & Sons, 1stEdition, 2003

2. C Dupas, P Houdy, M Lahmani, Nanoscience**: "NanotechnologiesandNanophysics",** Springer-Verlag Berlin Heidelberg, 1st Edition, 2007
3. T Pradeep, "**NANO: The Essentials: Understanding Nanoscience and Nanotechnology**". Tata McGraw-Hill Publishing 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 Co1st Edition, 2008.

E-RESOURCES:
1. http://nptel.ac.in/courses/103103033/module9/lecture1.pdf
2. http://courses.washington.edu/overney/NME498_Material/NME498_Lectures/Lecture4Overney-NP-Synthesis.pdf
3. https://www.ttu.ee/public/m/Mehaanikateaduskond/Instituudid/Materjalitehnika_instituut/MT X9100/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:
At the end of the course, students will be able to
1. Know the different physical methods of synthesis of Nano materials.
2. Know the 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

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

Objective:
The objective is to provide a basic level of understanding on Non-destructive testing and Vacuum technology.

MODULE I:Introduction to Nondestructive 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 Nondestructive 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
Part 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;
Part B: Flow meters
Molar flow, Mass flow and throughput; Rota meters and chokes; differential pressure Techniques;

MODULE IV: Pressure Gauges   09 Periods
Classification, Direct and indirect gauges, Indirect gauges – Pirani gauge, Thermocouple gauge, Ionization gauge, hot cathode gauge, Penning gauge

MODULE V: Vacuum Pumps   09 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_ Applications.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:
At the end of the course, student will be able to
1. Know 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 Objectives:
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 to the analysis the nonmaterial. To make aware of the learners of different applications of Nano materials.

MODULEI: Nano Chemistry-I   **08 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.

MODULEII: 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.

MODULEIII: Instrumental Analysis   **10 Periods**
Part A: Characterization techniques: Principles involved in Scanning Electron Microscopy (SEM), Electron Dispersion Spectroscopy (EDS).
Part B: Transmission Electron Microscopy (TEM), Dynamic Light Scattering (DLS) and Atomic Force Microscopy (AFM) -Illustrative examples.

MODULEIV: 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.

MODULEV: 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.

REFERENCE BOOKS:

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

At the end 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**	**L**	**T**	**P**
Credits: 3	(Open Elective)	3	-	-

Pre-requisite: Nil

Course Objectives:
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. Absorption spectra, electronic transition. Spin multiplicity, singlet and triplet of excited state.

MODULEII: **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**
Part A: Introduction and importance; Principles and instrumentation; Interferences - Chemical & Spectral methods.
Part 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.

MODULEV: 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".** New York :Mc Graw-Hill series in advanced chemistry, 1966**.**

REFERENCE BOOKS:
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, 6 th edition, 1999.
2. C.N. Banwell and E.M.Mc cash. **"Fundamentals for molecular spectroscopy"** 4 th 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) nptel.ac.in/courses/103108100/31 (Infrared spectroscopy)
5. https://www.youtube.com/watch?v=o8zELwp358A (UV-Visible spectroscopy)

Course Outcomes

At the end of the course, students will be able to
1. The Students become aware about the light matter interaction.
2. Students will learn various law's of photochemistry such as Grotthuss-Draper, Stark-Einstein and Lambert-Beer law's.
3. The learners get knowledge about qualitative and quantitative analysis of various samples by Absorption spectroscopy.
4. Students will be able identify the functional groups in organic molecules by IR spectrum.
5. Students will acquire the knowledge of structural elucidation of organic molecules by proton NMR spectroscopy.