

ACADEMIC REGULATIONS, COURSE STRUCTURE

AND DETAILED SYLLABUS

UNDER

CHOICE BASED CREDIT SYSTEM (CBCS)

Effective from the Academic Year 2015-16

MINING ENGINEERING

(MinE)



For
B. Tech. Four Year Degree Course
(MR-15 Regulations)



MALLAREDDY ENGINEERING COLLEGE (Autonomous)

(An Autonomous Institution approved by UGC and affiliated to JNTUH, Approved by AICTE & Accredited by NAAC with 'A' Grade and NBA & Recipient of World Bank Assistance under TEQIP Phase – II, S.C 1.1)

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MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

MR 15 – ACADEMIC REGULATIONS (CBCS) FOR B.Tech. (REGULAR) DEGREE PROGRAMME

Applicable for the students of B.Tech. (Regular) programme from the Academic Year **2015-16** and onwards

The B.Tech. Degree of Jawaharlal Nehru Technological University 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 postgraduate programmes 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)

1	Ability to Perform standard analysis and design of structural systems following codes and modern practices.
2	Apply basic technical concepts to identify, analyze and solve technical problems involving structural material behavior under forces
3	Plan and prepare design and construction documents, such as specifications, contracts, change orders, engineering drawings, and construction schedules as per the client requirements considering economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
4	An ability to work effectively on multidisciplinary teams
5	Determine deformations and stresses in structural systems under the action forces: gravity, wind, fire, earth pressure and flood.
6	Engage in lifelong learning, Understand professional, ethical and social responsibilities, Will be committed to quality, timeliness, and continuous improvement
7	An ability to Communicate effectively,
8	Estimate material quantities for technical projects & Select appropriate engineering materials and practices Conduct standardized field and laboratory testing on civil engineering materials
9	Utilize modern surveying methods for land measurement and/or construction layout Employ productivity software to solve technical problems
10	Respect diversity and possess a knowledge of contemporary professional, societal and global issues; and
11	Perform economic analyses and cost estimates related to design, construction, operations and maintenance of systems in the civil technical specialties

1. Under-Graduate Degree Programme in Engineering & Technology (UGP in E&T)

MREC (Autonomous) offers 4 Year (8 Semesters) **Bachelor of Technology (B.Tech.)** Degree Programme, under Choice Based Credit System (CBCS) with effect from the Academic Year 2015 - 16 onwards, in the following branches of Engineering

Serial Number	Branch Code	Branch
1	01	CIVIL ENGINEERING (CE)
2	02	ELECTRICAL AND ELECTRONICS ENGINEERING (EEE)
3	03	MECHANICAL ENGINEERING (ME)
4	04	ELECTRONICS AND COMMUNICATION ENGINEERING (ECE)
5	05	COMPUTER SCIENCE AND ENGINEERING (CSE)
6	25	MINING ENGINEERING (MinE)

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 at an 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 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

3.1 The B.Tech. Programmes of MREC (A) are of Semester Pattern, with 8 Semesters. Each Semester shall be of 22 Weeks duration (inclusive of Examinations), with a minimum of 90 Instructional Days per Semester.

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 8 Semesters, with the academic year being divided into two Semesters of 22 weeks 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 denoted 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).

Other student activities like NCC, NSS, Study Tour, Guest Lecture etc., and identified Mandatory / Audit Courses will not carry Credits.

3.2.3 Subject/ Course Classification:

All Subjects/ Courses offered for the UGP are broadly classified as :

- (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 the 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	8.15	5- 10 %
2	BS		Basic Sciences (BS) including Mathematics, Physics, Chemistry.	13.58	15- 20%
3	ES		Engineering sciences (ES), including Engineering Workshop, Engineering Graphics, Basics of Electrical Electronics / Mechanical / Computer Engineering	17.93	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.	37.5	30 – 40%
5	PR	Project Related	Minor and Major Projects, Technical Seminar and comprehensive viva-voce.	9.78	10 – 15%
6	PE	Professional Electives	Professional Electives are relevant to the chosen specialization/ branch;	8.15	10– 15 %
7	OE	Open Electives	Open Electives are the courses from other technical and/or emerging subject areas	4.89	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.)					184 (100%)

4. Course Work

- 4.1 A student, after securing admission, shall pursue the B.Tech. UGP in a minimum period of 4 Academic Years, and a maximum period of 8 Academic Years (starting from the Date of Commencement of I year course work). Further 2 years of extension is allowed for appearing examinations.
- 4.2 Each student shall Register for and Secure the specified number of Credits required for the completion of the UGP and Award of the B.Tech. Degree in respective Branch of Engineering.
- 4.3 Total number of credits to be secured are 184 out of 184 for the entire B.Tech. Programme.

5.0 Course Registration

- 5.1 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.
- 5.2 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'.
- 5.3 A Student can apply for ON-LINE Registration, ONLY AFTER obtaining the 'WRITTEN APPROVAL' from the Faculty Advisor, 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 and the Student).
- 5.4 A Student may be permitted to Register for his Subjects/ Course of CHOICE with a typical deviation of ± 3 credits of the semester with minimum credits of 19 and maximum credits of 27, 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.
- 5.5 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.
- 5.6 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.
- 5.7 For Audit Courses like Sports and NSS, Computational Mathematics Lab etc, a 'Satisfactory Participation Certificate' from the concerned authorities for the relevant Semester is essential. No Marks or Credits shall be awarded for these activities.
- 5.8 For Mandatory Courses, a 'Satisfactory / Not Satisfactory' grade is awarded based on the performance in both CIE and SEE.

6. Subjects/ Courses to be offered

- 6.1 A typical Section (or Class) Strength for each Semesters shall be 60.
- 6.2 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.

- 6.3** 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).
- 6.4** If more entries for Registration of a Subject come into picture, then the concerned Head of the Department shall take necessary action, whether to offer such a Subject/ Course for TWO (or multiple) SECTIONS or NOT .
- 6.5** In case of options coming from Students of other Departments/ Branches/ Disciplines (not considering OPNELECTIVES), PRIORITY shall be given to the student of the ‘Parent Department’ first.

7. Attendance Requirements

- 7.1** A student shall be eligible to appear for the Semester End Examinations, if he acquires a minimum of 75% of attendance in aggregate of all the Subjects/ Courses (excluding Non-Credit Courses) for that Semester.
- 7.2** Condoning of shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each Semester may be granted by the College Academic Committee on genuine and **valid grounds such as Medical, NSS, Sports and Games**, based on the student’s representation with supporting evidence.
- 7.3** A stipulated fee shall be payable towards condoning of shortage of attendance.
- 7.4** Shortage of Attendance below 65% in aggregate shall in NO case be condoned.
- 7.5** 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.

8. Academic Requirements

The following Academic Requirements have to be satisfied, in addition to the Attendance Requirements mentioned in Item No. 7.

- 8.1** A student shall be deemed to have satisfied the Academic Requirements and earned the Credits allotted to each Subject/ Course, if he 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.
- 8.2** 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 secures 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 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 Minor Project/ Technical Seminar/Major Project evaluations.
He may reappear once for each of the above evaluations, when they are scheduled again; if he fails in such ‘**one-reappearance**’ evaluation also, he has to reappear for the same in the next subsequent Semester, as and when it is scheduled.
- 8.3 Promotion Rules:** Every Student has to fulfil the Attendance and Academic Requirements by securing the required credits as shown below:

S.No.	Semester		Requirement
	From (Even)	To (Odd)	
1	II	III	50% of registered credits are required upto II Semester, from all the relevant regular and supplementary examinations, whether he takes those examinations or not.
2	IV	V	60% of registered credits are required upto IV Semester, from all the relevant regular and supplementary examinations, whether he takes those examinations or not.
3	VI	VII	60% of registered credits are required upto VI Semester, from all the relevant regular and supplementary examinations, whether he takes those examinations or not.

8.4A Student shall - register for all Subjects covering 184 Credits as specified and listed (with the relevant Course/ Subject Classifications as mentioned) in the Course Structure, put up all the Attendance and Academic requirements for 184 Credits securing a minimum of P Grade (Pass Grade) or above in each Subject, and 'earn all 184 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.

8.5 After securing the necessary 184 Credits as specified for the successful completion of the entire UGP, an exemption of 6 secured Credits (in terms of two of their corresponding Subjects/Courses) may be permitted for optional drop out from these 184 Credits earned; resulting in 178 Credits for UGP performance evaluation, i.e., the performance of the Student in these 178 Credits shall alone be taken into account for the calculation of 'the final CGPA (at the end of UGP, which takes the SGPA of the VIII Semester into account)', and shall be indicated in the Grade Card of VIII Semester; however, the Student's performances in the earlier individual Semesters, with the corresponding SGPA and CGPA for which already Grade Cards are given, will not be altered. **Further, optional drop out for such 6 secured Credits shall be allowed only for professional and open electives.**

8.6 If a Student registers for some more 'Extra Subjects' (in the parent Department or other Departments/Branches of Engg.) other than those listed Subjects totaling to 184 Credits as specified in the Course Structure of his Department, the performances in those 'extra Subjects' (although evaluated and graded using the same procedure as that of the required 184 Credits) will not be taken into account while calculating the SGPA and CGPA. For such 'extra Subjects' registered, % marks and 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 7 and 8.1 to 8.7 above.

8.7 When a Student is detained due to shortage of attendance in any Semester, he may be re-admitted into that Semester, as and when offered, with the Academic Regulations of that Batch into which he gets readmitted. However, no Grade Allotments or SGPA/ CGPA calculations will be done for that entire Semester in which he got detained.

8.8 When a Student is detained due to lack of Credits in any year, he may be readmitted in the next year, after fulfilment of the Academic Requirements, with the Academic Regulations of that Batch into which he gets readmitted.

8.9A A student eligible to appear in the Semester End Examination in any Subject/ Course, but absent at it or failed (thereby 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 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, forevaluating his performance in that Subject.

9. Evaluation - Distribution and Weightage of Marks

The performance of a student in each Semester shall be evaluated Subject-wise (irrespective of Credits assigned) with a maximum of 100 marks for Theory or Practicals or Seminar or Drawing/Design or Minor Project or Minor Course, etc.. For all Subjects/ Courses, the distribution shall be 40 marks for CIE, and 60 marks for the SEE inclusive of minor and mandatory courses. However, the B.Tech. Major Project will be evaluated for 200 Marks. These evaluations shall be based on 20% CIE (Continuous Internal Evaluation) and 80% SEE (Semester End Examination), and a Letter Grade corresponding to the % marks obtained shall be given. Students have to choose Open Electives from the given list. However, Students should not choose an Open Elective offered by their own (parent) Department, if it is already listed under any category of the courses offered by parent Department in any Semester.

9.1 Theory Courses:

9.1.1 Continuous Internal Evaluation (CIE):

During the Semester, there shall be **2 mid-term examinations** for 40 marks each. Each mid-term examination consists of an **online objective paper** for 10 marks with a duration of **20 minutes** and **subjective paper** for 20 marks with a duration of **90 minutes**. Further, there will be an allocation of 5 marks each for Assignment and Attendance. Objective paper may be set with multiple choice questions. Subjective paper shall contain 6 questions, out of which the Student has to answer 4 questions, each for 5 marks.

The allotment of 5 marks for attendance is as given below:

S.No.	% of Attendance Range	Marks
1	> 90 and \leq 100	5
2	> 85 and \leq 90	4
3	> 80 and \leq 85	3
4	> 75 and \leq 80	2
5	\geq 70 and \leq 75	1

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 and relative attendance marks shall make one set of CIE Marks, and the second mid-term examination Marks, second Assignment Marks and relative attendance 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 Subject.

9.1.2 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 (5 out of 8) (Minimum one from each module)	5	10	50
Grand Total				60

9.2 Practical Courses:

9.2.1 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).

9.2.2 Semester End Examination (SEE):

There will be SEE for 60 marks, shall be awarded with a distribution of 20 marks for write-up on the given experiment, 20 marks for proficiency in the exam, 10 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.

9.3 Design and/or Drawing:

For these Subjects, (such as Engineering Graphics, Machine Drawing, Production Drawing Practice, and Estimation), the distribution shall be 40 marks for CIE (20 marks for day-to-day work, 20 marks for internal test with a duration of 120 minutes (better out of two exams)). There shall be two internal tests in a Semester and the better of the two shall be considered for the award of marks for internal tests. The SEE will be evaluated for 60 marks.

9.4 Gender Sensitization:

9.4.1 Continuous Internal Evaluation (CIE):

There will be CIE for 40 marks shall be awarded with a distribution of 25 marks for day-to-day performance and 15 marks for internal practical exam in the form of assignments shall be given and evaluated by the teacher concerned.

9.4.2 Semester End Examination (SEE):

The SEE for 60 marks shall be conducted with an external examiner and the laboratory teacher. To reduce the burden on the students, the External Lab Exam should be conducted as an open-book system for the duration of 120 minutes. Eight questions have to be given from **Essential Reading "Towards a World of Equals: A Bilingual Textbook on Gender"**, out of which students should answer only 5. Each question carries 12 marks. So, each answer will take nearly 24 minutes.

9.5 Projects:

9.5.1 Minor Project:

Minor Project has to be taken up for about eight weeks including summer vacation after VI semester. **CIE** of 40 marks are awarded based on the performance in two presentations and **SEE** of 60 marks will be evaluated by a committee consisting of Head of the Department, supervisor and an external examiner. 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. The Minor Project shall be evaluated in the VII Semester.

9.5.2 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 200 marks allotted for the Major Project, 40 marks shall be for **CIE** (Continuous Internal Evaluation) and 160 marks for the **SEE** (Semester End Viva-voce Examination). **CIE** 40 marks shall be awarded by a Departmental Committee consisting of Head of the Department, a senior faculty member and Project Supervisor, based on the work carried out and the presentation made by the Student during the Major Project. The Major Project Viva-voce shall be conducted by a Committee comprising of an External Examiner, Head of the Department and Project Supervisor. 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.

9.6 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 Head of the Department and Two Faculty Members for 100 marks. There shall be no external evaluation.

9.7 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 of study 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.

9.8 Non-Credit Courses:

9.8.1 Audit Courses:

For 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.

9.8.2 Mandatory Courses:

For 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**

10. Grading Procedure

10.1 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 9 above, and a corresponding Letter Grade shall be given.

10.2 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
≥80	10	O (Out Standing)
≥70 to < 80	9	A ⁺ (Excellent)
≥60 to < 70	8	A (Very Good)
≥55 to < 60	7	B ⁺ (Good)
≥50 to < 55	6	B (Above Average)
≥45 to < 50	5	C (Average)
≥40 to < 45	4	P (Pass)
< 40	0	F (Fail)
Absent	Ab	Ab

10.3 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 Internal Marks (CIE Marks) in those Subject(s) will remain same as those he obtained earlier.

10.4 A Letter Grade does not imply any specific % of Marks.

10.5 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 has to repeat all the Subjects/ Courses pertaining to that Semester, when he is detained (as listed in Items 8.10- 8.11).

10.6 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

10.7 The Student passes the Subject/ Course only when he gets $GP \geq 4$ (P Grade or above).

10.8 The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points ($\sum CP$) 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

$$SGPA = \frac{\sum_{i=1}^N C_i G_i}{\sum_{i=1}^N C_i} \dots \text{for each Semester}$$

where 'i' is the Subject indicator index (takes into account all Subjects in a Semester), 'N' is the no. of Subjects 'REGISTERED' for the Semester (as specifically required and listed under the Course Structure of the parent Department), is the no. of Credits allotted to the ith Subject, and represents the Grade Points (GP) corresponding to the Letter Grade awarded for that ith Subject.

10.9 The Cumulative Grade Point Average (CGPA) is a measure of the overall 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

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

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

where 'M' is the TOTAL no. of Subjects (as specifically required and listed under the Course Structure of the parent Department) the Student has 'REGISTERED' 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 no. of Credits allotted to the jth Subject, and represents the Grade Points (GP) corresponding to the Letter Grade awarded for that jth 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.

10.10 For Merit Ranking or Comparison Purposes or any other listing, ONLY the 'ROUNDED OFF' values of the CGPAs will be used.

10.11 For Calculations listed in Item 10.6 – 10.10, performance in failed 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.

10.12 Passing Standards:

10.12.1 A student shall be declared successful or 'passed' in a Semester, only when he gets a SGPA ≥ 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 gets a CGPA ≥ 5.00 ; subject to the condition that he secures a GP ≥ 4 (P Grade or above) in every registered Subject/ Course in each Semester (during the entire UGP) for the Degree Award, as required.

10.12.2 In spite 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 '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 7&8); (ii) to 'improve his 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 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 Internal Marks (CIE Marks) in those Subject(s) will remain same as those he 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.

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

10.13 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.

11. Declaration of Results

11.1 Computation of SGPA and CGPA are done using the procedure listed in 10.6 – 10.10.

11.2 For Final % of Marks equivalent to the computed final CGPA, the following formula may be used ...

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

12. Award of Degree

12.1 A Student who registers 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 184 Credits (with CGPA ≥ 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.

12.2 A Student who qualifies for the Award of the Degree as listed in Item 12.1, shall be placed in the following Classes:

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

12.3A student with final CGPA (at the end of the UGP) <5.00 will not be eligible for the Award of the Degree.

13. Withholding of Results

If the student has not paid fees to College at any stage, or has pending dues against his name due to any reason whatsoever, or if any case of indiscipline is pending against him, the result of the student may be withheld, and he will not be allowed to go into the next higher Semester. The Award or issue of the Degree may also be withheld in such cases.

14. Transitory Regulations

Student who has discontinued for any reason, or has been detained for want of attendance or lack of required credits as specified, or who has failed after having undergone the Degree Programme, may be considered eligible for readmission to the same Subjects/ Courses (or equivalent Subjects/Courses, as the case may be), and same Professional Electives/ Open Electives (or from set/category of Electives or equivalents suggested, as the case may be) as and when they are offered (within the time-frame of 8 years from the Date of Commencement of his I Semester).

15. Student Transfers

There shall be no Branch transfers after the completion of Admission Process.

16. 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 Principal is final.

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	Punishment
	<i>If the candidate:</i>	
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 he 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 SEE)	Expulsion from the examination hall and cancellation of the performance in that course only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the candidates involved. In case of an outsider, he 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 candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester. The Hall Ticket of the candidate shall be cancelled.
3	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the courses of the examination (including practicals and project work) already appeared and shall not be allowed to appear

		for examinations of the remaining courses of that semester. 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 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.
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	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 candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police cases

	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 means or misconduct or has the tendency to disrupt the orderly conduct of the examination	registered against them.
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 candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all SEE. The continuation of the programme by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred and forfeits the seat.
9	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	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 candidate 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.

MALLAREDDY ENGINEERING COLLEGE (Autonomous)
Academic Year 2015-16 (Choice Based Credit System)
COURSE STRUCTURE – B.Tech. MINING ENGINEERING (Min.E)
(MR15 Regulations)

I SEMESTER

S. No	Category	Course Code	Name of the course	Contact hours/week			Credits	Scheme of Valuation		Total Marks
				L	T	P		Internal (CIE)	External (SEE)	
1	BS	50B01	Engineering Mathematics	3	2	-	4	40	60	100
2	BS	50B02	Applied Physics - I	2	2	-	3	40	60	100
3	BS	50B03	Applied Chemistry	2	2	-	3	40	60	100
4	ES	50501	Computer Programming	2	2	-	3	40	60	100
5	ES	50301	Engineering Graphics	1	1	3	3	40	60	100
6	BS	50B05	Applied Chemistry Lab	-	-	4	2	40	60	100
7	ES	50502	Computer Programming Lab	-	-	4	2	40	60	100
8	ES	50302	Engineering Workshop	-	-	4	2	40	60	100
9	AC	50A01	NSS ,Sports and YOGA	-	-	2	-	-	-	-
Total				10	9	17	22	Contact Hours:36		

II-SEMESTER

S. No.	Category	Course Code	Name of the course	Contact hours/week			Credits	Scheme of Valuation		Total Marks
				L	T	P		Internal (CIE)	External (SEE)	
1	HS	50H01	English	2	-	-	2	40	60	100
2	BS	50B06	Computational Mathematics	3	2	-	4	40	60	100
3	BS	50B07	Applied Physics - II	2	2	-	3	40	60	100
4	ES	50303	Engineering Mechanics	2	2	-	3	40	60	100
5	ES	50202	Basic Electrical & Electronics Engineering	3	2	-	4	40	60	100
6	HS	50H02	English language Lab	-	-	4	2	40	60	100
7	BS	50B04	Applied Physics Lab	-	-	4	2	40	60	100
8	ES	50304	Engineering Mechanics & AutoCAD Lab	-	-	4	2	40	60	100
9	AC	50A02	Computational Mathematics Lab	-	-	4	-	-	-	-
Total				12	8	16	22	Contact Hours:36		

III SEMESTER

S. No.	Category	Course Code	Name of the course	Contact hours/week			Credits	Scheme of Valuation		Total Marks
				L	T	P		Internal (CIE)	External (SEE)	
1	ES	50244	Applied Electrical & Electronics Engineering	3	1	-	4	40	60	100
2	ES	50315	Fluid Mechanics and Hydraulic Machines	2	2	-	3	40	60	100
3	PC	52501	Fundamentals of Geology	2	2	-	3	40	60	100
4	ES	50308	Machine Drawing	2	-	3	3	40	60	100
5	ES	50353	Mechanical Technology	3	-	-	3	40	60	100
6	ES	50317	Fluid Mechanics and Hydraulic Machines Lab	-	-	4	2	40	60	100
7	PC	52502	Geology Lab	-	-	4	2	40	60	100
8	PC	52503	Mine Electrical Lab	-	-	4	2	40	60	100
9	MC	50H11	Human Values and Professional Ethics	-	2	-	-	40	60	100
Total				12	7	15	22	Contact Hours:34		

IV-SEMESTER

S. No.	Category	Course Code	Name of the course	Contact hours/week			Credits	Scheme of Valuation		Total Marks
				L	T	P		Internal (CIE)	External (SEE)	
1	BS	50B09	Probability and Statistics	3	2	-	4	40	60	100
2	PC	52504	Mining Geology	3	-	-	3	40	60	100
3	PC	52505	Introduction to Mining Technology	3	2	-	4	40	60	100
4	HS	50H16	Environmental Sciences	2	-	-	2	40	60	100
5	ES	50305	Mechanics of Solids	2	2	-	3	40	60	100
6	PC	52506	Mine Surveying- I	2	1	-	2	40	60	100
7	PC	52507	MineElectronics Lab	-	-	4	2	40	60	100
8	ES	50356	Mechanics of Solids Lab	-	-	4	2	40	60	100
9	HS	50H17	Gender Sensitization	-	-	4	2	40	60	100
10	AC	50A04	Law for Engineers	-	2	-	-	-	-	-
Total				15	9	12	24	Contact Hours:36		

V SEMESTER

S. No.	Category	Course Code	Name of the course	Contact hours/week			Credits	Scheme of Valuation		Total Marks
				L	T	P		Internal (CIE)	External (SEE)	
1	PC	52508	Mining Machinery	3	-	-	3	40	60	100
2	HS	50H12	Engineering Economics and Accountancy	2	2	-	3	40	60	100
3	PC	52509	Mine Ventilation	4	-	-	4	40	60	100
4	PC	52510	Surface Mining Technology	3	-	-	3	40	60	100
5	PE-I	52511	Mine Construction Engineering	3	-	-	3	40	60	100
		52512	Rock Excavation Engineering							
		52513	Drilling and Blasting							
6	PC	52514	Underground Coal Mining Technology	3	-	-	3	40	60	100
7	PC	52515	Mine Surveying Lab- I	-	-	4	2	40	60	100
8	PC	52516	Mine Ventilation Lab	-	-	4	2	40	60	100
9	PR	50H05	Soft Skills	-	-	2	1	40	60	100
Total				19	2	10	24	Contact Hours:31		

VI-SEMESTER

S. No.	Category	Course Code	Name of the course	Contact hours/week			Credits	Scheme of Valuation		Total Marks
				L	T	P		Internal (CIE)	External (SEE)	
1	HS	50H03	Technical Communication and Presentation Skills	2	-	-	2	40	60	100
2	PC	52517	Mine Hazards And Rescue	3	-	-	3	40	60	100
3	PC	52518	Mine Surveying - II	3	-	-	3	40	60	100
4	PC	52519	Rock Mechanics	4	-	-	4	40	60	100
5	PE-II	52520	Mine Subsidence Engineering	3	-	-	3	40	60	100
		52521	Computer Application in Mining							
		52522	Mineral Economics							
6	PE-III	52523	Underground Coal Gasification	3	-	-	3	40	60	100
		52524	Mine Systems Engineering							
		52525	Strata Control Technology							
7	HS	50H04	Technical Communication and Presentation Skills Lab	-	-	4	2	-	-	-
8	PC	52526	Mine Surveying Lab – II	-	-	4	2	40	60	100
9	PC	52527	Mine Safety Engineering Lab	-	-	4	2	40	60	100
Total				18	1	12	24	Contact Hours:31		

VII SEMESTER

S. No.	Category	Course Code	Name of the course	Contact hours/week			Credits	Scheme of Valuation		Total Marks
				L	T	P		Internal (CIE)	External (SEE)	
1	PC	52528	Introduction to Mineral Processing	3	-	-	3	40	60	100
2	PC	52529	Under Ground Metal Mining Technology	4	-	-	4	40	60	100
3	OE		Open Elective-1	3	-	-	3	40	60	100
4	PE-IV	52530	Planning of Surface Mining Projects	3	-	-	3	40	60	100
		52531	Planning of Underground Coal Mining Projects							
		52532	Mine Ground Control							
5	PE-V	52533	Planning of Underground Metal Mining Projects	3	-	-	3	40	60	100
		52534	Mine Health and Safety Engineering							
		52535	Advanced Mining Machinery							
6	PC	52536	Mineral Processing Lab	-	-	4	2	40	60	100
7	PC	52537	Rock Mechanics Lab	-	-	4	2	40	60	100
8	PR	52538	Minor Project	-	-	4	2	40	60	100
9	PR	52539	Technical Seminar	-	-	4	2	100	-	100
Total				16	0	16	24	Contact Hours:32		

VIII-SEMESTER

S. No.	Category	Course Code	Name of the course	Contact hours/week			Credits	Scheme of Valuation		Total Marks
				L	T	P		Internal (CIE)	External (SEE)	
1	PC	52540	Mine Legislation	3	-	-	3	40	60	100
2	OE		Open Elective-2	3	-	-	3	40	60	100
3	OE		Open Elective-3	3	-	-	3	40	60	100
4	PR	52541	Major Project	-	-	20	10	40	160	200
5	PR	52542	Comprehensive viva voce	-	4	-	2	100	-	100
6	PR	50H15	Entrepreneurship Skills	-	2	-	1	40	60	100
7	AC	50A03	Foreign Language / Fine Arts	-	2	-	-	-	-	-
Total				9	5	20	22	Contact Hours:34		

OPEN ELECTIVES

S. No.	Branch	Course Code	Course Name
1	CE	50123	Air pollution and control
2	CE	50124	Disaster Management
3	CE	50150	Green Buildings
4	EEE	50203	Network Theory
5	EEE	50208	Control Systems
6	EEE	50229	Energy Auditing & Conservation
7	EEE	50241	Principles of Electrical Engineering
8	ME	50307	Metallurgy and Materials Science
9	ME	50342	Renewable Energy Sources
10	ME	50344	Robotics
11	ME	50319	Metal Cutting & Machine Tools
12	ME	50354	Design For Manufacturing
13	ECE	50414	Micro Processors and Interfacing
14	ECE	50418	Digital Design Using Verilog Hdl
15	ECE	50448	Principles of Communication Engineering
16	ECE	50449	Embedded System Design
17	CSE	50503	Data Structures
18	CSE	50511	Database Management Systems
19	CSE	50512	Operating Systems
20	CSE	50564	Artificial Intelligence
21	CSE	50571	Computer Graphics
22	ENGLISH	50H08	Introduction To Interpretation of Literature and Analytical Writing
23	ENGLISH	50H09	Business Communication
24	ENGLISH	50H10	World Literatures
25	MATHS	50B23	Advanced Optimization Techniques
26	MATHS	50B24	Mathematical Modelling
27	MATHS	50B25	Differential Equations and Dynamical Systems
28	PHYSICS	50B20	Advanced Physics For Engineers
29	PHYSICS	50B21	Nano Materials: Synthesis and Characterization
30	PHYSICS	50B22	Ndt and Vacuum Technology
31	CHEMISTRY	50B17	Chemistry of Engineering Materials
32	CHEMISTRY	50B18	Nano Chemistry
33	CHEMISTRY	50B19	Photochemistry and Spectroscopy

2015-16

Malla Reddy Engineering College (Autonomous)

L T P
32 -
Credits: 4

Course Code: 50B01

B.Tech. – I Semester
ENGINEERING MATHEMATICS
(Common for CE, ME, EEE, ECE, CSE and Min.Engineering)

Prerequisite: Pre calculus, concepts of Trigonometry etc.,

Objectives: This course provides knowledge of Matrices, Eigen values and Eigen Vectors, which are useful in signal processing and stability theory. The concept of Differential equation is essential to the learner to write the associated mathematical model and solving real time engineering problems using Laplace Transforms.

Syllabus:

MODULE – I: Matrices and Linear systems of equations: [12 Periods]

MODULE – IA: Rank of the matrix - Elementary transformations –Echelon form – Normal form – PAQ Form - Inverse of a Matrix by applying Elementary transformations.

MODULE – IB: Solution of Linear Systems – Consistency of linear system of equations – Gauss elimination method – Gauss-Jacobi method - Gauss-seidal method- LU-Decomposition method –Solution of Tri-diagonal Systems (Thomas Algorithm).

MODULE – II: Eigen Values& Eigen Vectors [12 Periods]

MODULE – II A: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, Orthogonal Matrix.

MODULE – II B:Diagonalization of matrix-Calculation of powers of matrix, Quadratic forms – Modal and spectral matrices. Real matrices – Symmetric - skew – symmetric, Similarity Transformation, Orthogonal Transformation, Principle axis.

MODULE – III: Differential Equations of first order and first degree [12 Periods]

MODULE – III A:Formation of Differential Equations - Solutions of First order Differential Equations: Homogeneous - Non-homogeneous – Exact - Non-exact.

MODULE – III 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[12 Periods]

MODULE – IVA: 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.

MODULE – IV B: Equations reducible to constant coefficients - Cauchy - Euler and Legendre’s differential equations. Applications to simple harmonic motion and LCR Circuits.

MODULE-V: Laplace Transforms

[12 Periods]

MODULE – V A: 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.

MODULE – V B: Inverse transforms: Finding inverse 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) Advanced engineering Mathematics by Kreyszig, John Wiley & Sons Publishers, 10th Edition, Reprint 2010.
- 2) Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers, 43rd Edition, Reprint 2011.
- 3) Introduction to Matrix Analysis by Richard Bellman, Dover Publications, 2nd Edition, 1970.

REFERENCES:

- 1) Advanced Engineering Mathematics by R.K. Jain & S.R.K. Iyengar, 3rd edition, Narosa Pub. House, Delhi.
- 2) Mathematical Methods of Science and Engineering by Kanti B.Datta ,Cengage Learning
- 3) Engineering Mathematics – I by T.K. V. Iyengar, B. Krishna Gandhi & Others, S. Chand.
- 4) Mathematics for Engineers and Scientists, Alan Jeffrey, 6th Ed, 2013, Chapman & Hall/ CRC
- 5) Advanced Engineering Mathematics, Michael Greenberg, Second Edition. Pearson Education.

Outcomes:

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

1. Do operations on Matrices like Row, Column operations, Rank of the Matrix etc.
2. Able to check the Consistency and Inconsistency of the system of equations.
3. Find out Eigen values and Eigen vectors of the given Matrix.
4. Solve the first order first degree and higher order differential equations and apply them in real time environments.
5. Understand Laplace Transforms and perform various transformations and apply for linear differential equations and real-time signals.

2015-16

Malla Reddy Engineering College (Autonomous)

LTP22

Course Code: 50B02

Credits: 3

B.Tech. - I Semester APPLIED PHYSICS - I

(Common for CE, ME, EEE, ECE, CSE and Min.Engineering)

Prerequisite: NIL

Objectives: The objective is to provide clear understanding of LASER, Optical Fiber, Ultrasonic and basic concepts of Statistical Mechanics to apply for Engineering and Technology problems.

Module- I: Optics

[9 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 as monochromator.

Module II: Laser and Optical Fibers

A: Laser:

[8 Periods]

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; Semiconductor Diode LASER; Applications of LASER - drilling, welding, data storage, optical signal processing and nuclear fusion.

B: Optical Fibers

[4 Periods]

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, Application of Optical Fibers - Medical, Level sensor and Communication system.

Module III: Acoustics & Ultrasonics

A: Acoustics

[4 Periods]

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.

B: Ultrasonics

[8 Periods]

Introduction, Concept of Magnetostriction, 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 - IV: Waves and Vibrations

[9 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, logarithmic decrement; Qualitative treatment of Forced vibrations,

sharpness of resonance, analogy between mechanical and electrical oscillator.

Module -V: Elements of Statistical Mechanics

[8 Periods]

Introduction, Qualitative discussion on Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics, Properties of the Fermi-Dirac statistics, Photon Gas, Wien's displacement law, Rayleigh-Jeans Law, Planck's Law of black body radiation, Concept of Electron gas.

Text Books:

1. K Vijay Kumar, S Chandralingam, "**Modern Engineering Physics**", S. Chand and Company, 1st Edition, 2010.
2. D K Bhattacharya, Poonam Tandon, "**Engineering Physics**", Oxford University Press, 1st Edition, 2015.

Reference Books:

- 1) Eugene Hecht and A R Ganeshan, "**Optics**", Pearson Education, 4th Edition, 2015.
- 2) P K Palanisamy, "**Engineering Physics**", SciTech Publication, 4th Edition, 2014.
- 3) B K Pandey and S. Chaturvedi, "**Engineering Physics**" Cengage Learning India Revised Edition, 2014.
- 4) R K Gaur and SL Gupta, "**Engineering Physics**" Dhanpat Rai Publications, Eighth Revised Edition, 2006.

Outcomes:

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

1. Understand the concepts of Interference, diffraction, applications of LASER and Optical fibers.
2. Analyze the basic requirements of acoustically good hall, various production and Detection methods of ultrasonic besides the applications of ultrasonics.
3. Distinguish free, damped and forced vibrations.
4. Develop basic knowledge on the distribution functions and simple applications

I-B.Tech.**Applied Chemistry**

(Common for CE, ME, CSE, ECE, EEE and Mining)

Prerequisite: NIL**Objectives:**

The objective to make the learners aware of the standards and cleaning processes to maintain quality of water and to provide basic knowledge on electrochemistry, corrosion, polymers and energy science to apply for real-life situations.

Module I: Water**[10 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; 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**A: Electrochemistry****[6 Periods]**

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

B: Corrosion:**[6 Periods]**

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).

Module III: Polymers**[12 Periods]**

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

Module IV: Energy sciences & Combustion**A: Fuels****[6 Periods]**

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.

Knocking – octane and cetane rating. Bio-diesels-advantages. Gaseous fuels - constituents, characteristics and applications of natural gas, LPG and CNG.

B: Combustion

[6 Periods]

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

A: Composites:

[3 Periods]

Basics of composites, composition and characteristics-types of composites –particle and fiber reinforced composites and their applications..Concept of Bio-fuels,Bio sensors,BiSurfactants.

B: Nano Chemistry:

[3 Periods]

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

C: Green Chemistry:

[4 Periods]

Introduction, principles of green chemistry, introduction to ultrasonic and microwave assisted reactions. Concept of R4M4 (Reduce, Reuse, Recycle, Redesign; Multipurpose, Multidimensional, Multitasking and Multi-tracking).

Text Books:

1. P.C.Jain and Monica Jain, “A text Book of Engineering Chemistry”, DhanpatRai Publications, New Delhi, 12th Edition 2006.
2. Engineering chemistry by M.Thirumala Chary and E.Laxminarayana,Sci-Tech publications.
3. Engineering chemistry by R.P. Mani and B.Rama Devi by Cengage Learning India Pvt.Ltd.

Reference Books:

1. F.W. Billmeyer, “Text Book of Polymer Science”, John Wiley & Sons, 4th Edition, 1996.
2. M.G. Fontana, N. D. Greene, “Corrosion Engineering”, McGraw Hill Publications, New York, 3rd Edition, 1996.
3. B.R.Puri,L.R.Sharma&M.S.Pathania,“Principles of Physical Chemistry”, S.Nagin Chand &Co., New Delhi, 23rd Edition, 1993.
4. P.W. Atkins and de Paula Julio, “Physical Chemistry”, Oxford University Press, 8th Edition, (Indian Student Edition), 2009.
5. G.A.Ozin and A.C. Arsenault,“Nanochemistry: A Chemical Approach toNanomaterials”, RSC Publishing, 3rd Edition, 2005.

Outcomes:

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

1. Understand Water treatment, specifically hardness of water.
2. Acquire knowledge on Electrochemical cell, fuel cells, batteries and its applications.
3. Understand 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

Course Code:50501

Credits: 3

B.Tech. – I Semester

COMPUTER PROGRAMMING

(Common for CE, EEE, ME, ECE, CSE and Min.E)

Prerequisite: Nil.**Objectives:** To develop programming concepts using C language to solve engineering and technology related problems.**Module I :Fundamentals&Introduction to C Language****A: Fundamentals:** [4 Periods]

Hardware, Software, Programming languages, Translators, Introduction to Operating System, Program Development steps-Algorithm, Flow chart, Number Systems.

B: Introduction to C Language [8 Periods]

History, Simple C Program, Identifiers, 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**A: Control Statements:** [6 Periods]

Conditional statements- if and switch statements, ?operator; Loop Control Statements – while, for, do-while statements, C Programming examples, Other statements related to control statements – break, continue, goto, C Programming examples.

B: Arrays [4 Periods]

Basic concepts, One-dimensional arrays, Two-dimensional arrays, Multi-dimensional arrays, C programming examples.

Module III: Strings&Functions**A: Strings:** [5 Periods]

Basic concepts, String Input / Output functions, Arrays of strings, String handling functions, C programming examples.

B: Functions [6 Periods]

Basics, User defined functions, Interfunction communication, Standard functions, Storage Classes-auto, register, static, extern, Scope rules, Array and string manipulations using functions, Recursive functions, C programming examples.

Module IV: Derived types , Pointers & Preprocessor Directives**A: Derived types:[3 Periods]**

Structures – Basic concepts, Nested structures, Arrays of structures, Structure manipulations using functions, Unions, bit fields, C programming examples.

B: Pointers: [6 Periods]

Basic concepts, Pointer arithmetic, Pointers and functions, Pointers and strings, Pointers and arrays, Pointers and structures, Self-referential structures, Dynamic Memory Allocation, C programming examples.

C: Preprocessor Directives: [2 Periods]

include, define.

Module V: File I/O&Searching and Sorting:**A: File I/O:** [5 Periods]

Basic concepts, Text files and Binary files, File input / output operations, File status functions (errorhandling), Command-Line Arguments, C programming examples

B: Searching and Sorting: [5 Periods]

Sorting- selection sort, bubble sort, insertion sort, Searching-linear and binary search methods.

Text Books:

1. Pradip Dey, Manas Ghosh, "**Programming C**", Oxford University Press, 2nd Edition, 2011.
2. E Balagurusamy, "**Computer Programming**", 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

Outcomes:**After completion of this course, student will be able to:**

1. Write, compile and debug programs in C language.
2. Design programs involving decision structures, loops, arrays and functions.
3. Explain the difference between call-by-value and call-by-reference
4. Understand the dynamic allocation of memory by using pointers.
5. Use different file operations to create/update basic data files.
6. Use simple searching and sorting methods.

B.Tech. – I Semester
ENGINEERING GRAPHICS
(Common for CE, ME and Min.E)

Prerequisite: Mathematical Geometry.

Objectives: Ability to transform data into drawing to communicate with engineers manually and with the help of AutoCAD software.

Module I: Introduction to Engineering Drawing [Periods: 6T+12P]

Principles of Engineering Drawing – Drawing instruments – BIS Conventions - Lettering and Dimensioning practices.

Curves: Constructions of Curves used in Engineering Practice:

- a) Conic Sections- General method only
- b) Cycloid, Epicycloid and Hypocycloid
- c) Involutives

Scales: Construction of different types of Scales- Plain, Diagonal and Vernier scale.

Module II: Orthographic Projections: [Periods: 5T+10P]

Projection: Principles of Orthographic Projections – Conventions – First Angle projections.

Projection of Points- Including Points in all four quadrants.

Projection of Lines - Parallel, perpendicular, inclined to one reference plane and inclined to both reference planes. True length and true angle of a line.

Module III : Projection of Planes & Projection of Solids

A: Projection of Planes : [Periods: 3T+6P]

Plane parallel, perpendicular, inclined to one reference plane and Plane inclined to both the reference planes.

B: Projection of Solids: [Periods: 3T+6P]

Projections of regular solids, cube, prism, pyramid, tetrahedron, cylinder and cone. Axis inclined to both the reference planes.

Module IV: Development of Surfaces & Isometric Projections

A: Development of Surfaces : [Periods: 3T+6P]

Development of Surfaces of Right Regular Solids – Prism, Pyramid, Cylinder, and Cone. Frustum and Truncated solids.

B: Isometric Projections: [Periods: 3T+6P]

Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Plane Figures, Simple and Compound Solids

Module V: Transformation of Projections & Introduction to Auto CAD:

A: Transformation of Projections : [Periods: 4T+8P]

Conversion of Isometric Views to Orthographic Views. Conversion of orthographic views to isometric views – simple objects.

B: Introduction to AutoCAD: [Periods: 1T+2P]

Basic Display, Construction, Editing and dimensioning Commands.

Text Books:

1. N.D. Bhat, "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2014.
2. Basant Agrawal, "Engineering Drawing" – Tata McGraw Hill, 2nd Edition, 2013.

Reference Books:

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. Trymbaka Murthy, “**Computer Aided Engineering Drawing**”, I.K. international Publishing House, 3rd Edition, 2011.

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

1. Understand the importance of curves, Projection of lines, planes and solids in Engineering applications
2. Convert orthographic views to isometric views and vice-versa.
3. Familiarize with AutoCAD two dimensional Commands.

Malla Reddy Engineering College (Autonomous)

L T P

- - 4

Course Code: 50B05

Credits: 2

**I-B.Tech.
Applied Chemistry LAB
(Common for CE,ME,CSE,ECE,EEE and Mining)**

List of Experiments:

1. Calibration of Volumetric apparatus.
2. Estimation of Hardness of water by EDTA Method.
3. Estimation of acid by pH metry.
4. Estimation of alkalinity of water.
5. Estimation of strong acid by Conductometry.
6. Estimation of strong acid by Potentiometry.
7. Determination of ferrous iron in cement by colorimetry.
8. Determination viscosity of given liquids.
9. Preparation of Bakelite.
10. Preparation of Thiokol Rubber.
11. Determination of surface tension of given sample using stalagmeter.
12. To Study the inversion of cane sugar by polarimeter.

Course Code:50502

Credits: 2

B.Tech. – I Semester

COMPUTER PROGRAMMING LAB

(Common for CE, EEE, ME, ECE, CSE and Min.E)

1.

- a) Practice various Menu items and debugging techniques in IDE.
- b) Practicing sample C programs using Conversion specification.
- c) Implement various programs logics using algorithms and flowcharts.

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.
- c) Write a C program to implement basic arithmetic operations.

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.
- c) Write a C program to find whether the given number is palindrome, perfect, Armstrong or strong.
- d) Write a C program to generate all the prime numbers between n1 and n2, where n1 and n2 are values supplied by the user.

4.

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.

5.

- 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

6

- 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.

7.

- a) Write a C program to construct a pyramid of numbers.
- b) Write a C program to generate Pascal's triangle.

8.

Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: $1+x+x^2+x^3+\dots+x^n$

For example: if n is 3 and x is 5, then the program computes $1+5+25+125$. Print x, n, the sum. Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if $n < 0$, then go back and read in the next pair of numbers without computing the sum. Are any values of x also illegal? If so, test for them too.

9.

- a) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
- b) Write a C program to convert a Roman numeral to its decimal equivalent.

10.

- a) Write a C program that uses functions to perform the following operations:
 - i) Reading a complex number
 - ii) Writing a complex number
 - iii) Addition of two complex numbers
 - iv) Multiplication of two complex numbers(Note: represent complex number using a structure.)
- b) Write a C program to find grades of a student's using structures and unions.

11.

- a) Write a C program which copies one file to another.
- b) Write a C program to reverse the first n characters in a file.
(Note: The file name and n are specified on the command line)

12.

- 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 non-recursive function to search for a Key value in a given sorted list of integers using Binary search.

13.

- 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.

2015 – 16

Malla Reddy Engineering College (Autonomous)

L T P

- - 4

Course Code: 50302

Credits: 2

**B.Tech. – I Semester
ENGINEERING WORKSHOP
(Common for CE, ME and Min.E)**

I. Trades for Exercises:

At least two exercises from each trade:

- a) Carpentry
- b) Fitting
- c) Tin-Smithy
- d) House-wiring
- e) Foundry
- f) IT workshop – Hardware identification and connectivity, assembling, disassembling and OS Installation.

II. Trades for Demonstration

- a) Machine shop
- b) Plumbing
- c) Identification of Electronic Components.

Text Books:

1. P. Kanniah, K. L. Narayana, “**Work Shop Manual**”, SciTech Publishers, 2nd Edition, 2009.
2. K. Venkat Reddy, “**Work Shop Practice Manual**” by, B.S. Publications, 6th Edition, 2015.

Course Code: 50A01

Audit Course

B.Tech. – I Semester
NSS ,SPORTS AND YOGA
(Common for CE, EEE, ME, ECE, CSE and Min.E)

Course objectives:

To develop physical skills and fitness specific to a particular sport. It also is intended to help them appreciate the sport while being able to execute the strategies while playing the game/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:**[2 Periods]**

Introduction of physical education: Importance of physical education, Athletics (Track events and combined events), Basket ball, Throw ball, Foot ball.

Module II:**[2 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 III :**[4 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 IV:**[6 Periods]**

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

Reference books:

1. Pamela Grundy & Susan Shackelford, “**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. Christopher G. Petre, “**Social Work with Children and Their Families: Pragmatic Foundations** “, Journal Vol:24, No.3, September 18th, 2003, 2nd Edition.
8. Rashmi Bansal, “**Stay Hungry Stay Foolish**”, 1st December 2008.

9. Beverly Schwartz, “**Rippling: How Social Entrepreneurs Spread Innovation Throughout the World**”, Published by Jossey – Bass, May 27th 2012.

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

1. Develop physical fitness and will know the rules and regulations of various games.
2. emerge victorious in Inter College and inter University competitions.
3. Will build a sense of social and civic responsibility in the students.
4. Participate with confidence and leadership qualities.

2015-16

Malla Reddy Engineering College (Autonomous)

L T P

2 - -

Course Code: 50H01

Credits: 2

B.Tech – II Semester

ENGLISH

(Common for CE, ME and Min.E)

Objectives:

To facilitate for the improvement of the English language competency of the students in English with emphasis on all language components namely grammar, vocabulary, listening skills, speaking skills, reading skills and writing skills. To equip the students to study academic subjects more effectively using the theoretical and practical components of the English syllabus.

Module I:

[6 Periods]

Chapter entitled '**Going Places: Travel**' from *Resonance: English for Engineers and Technologists* published by Foundation Books

Speech : Grammar of Anarchy by Dr. B. R. Ambedkar

Vocabulary : Formation of words, prefixes, suffixes and root words

Grammar : Tense, aspect and concord

Reading : Skimming and Scanning

Writing : Introduction to writing skills, characteristics of effective writing

Module II: [6 Periods]

Chapter entitled '**Reaching Out: Mass Media**' from *Resonance: English for Engineers and Technologists* published by Foundation Books

Speech : Need of Discipline and Visionary Young India by Dr. APJ Abdul Kalam

Vocabulary : Homonyms, homophones, homographs

Grammar : Direct and Indirect Speech

Reading : Intensive Reading and Extensive Reading

Writing : Paragraph writing- use of cohesive devices; arranging jumbled sentences into paragraph

Module III: [6 Periods]

Chapter entitled '**Ushering in a New Era: Networking**' from *Resonance: English for Engineers and Technologists* published by Foundation Books

Short Story : Death of a Hero by Jai Nimbkar

Grammar : Question Tags; Degrees of Comparison

Vocabulary : Idiomatic Expressions; Phrasal Verbs

Reading : Reading for theme and gist.

Writing : Essay Writing

Module IV: [6 Periods]

Chapters entitled '**Morphed Universe: Technology as a Double-edged Sword**' from *Resonance: English for Engineers and Technologists* published by Foundation Books

Short Story : The Doctor's Word by R.K. Narayan

Grammar : Voice – exercises

Vocabulary : One word substitutions; synonyms and antonyms

Reading : Reading for interpretation

Writing : Letter writing- both formal and informal

Module V: [6 Periods]

Chapter entitled '**The Indomitable Human Spirit: Facing Disasters**' from *Resonance: English for Engineers and Technologists* published by Foundation Books

- Short story** : Once There was a King by Rabindranath Tagore
Grammar : Types of Sentences, Conditionals
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.

Textbooks:

In order to improve the proficiency of the student in the acquisition of grammar, error free language, the following text and course content, divided into Five Units, is prescribed.

1. Elango, et all , *Resonance: “English for Engineers and Technologists”*, published by Foundation Books, 2nd Edition, 2012.
2. Sudha Rani, et all, *“The Enriched Reading”*, published by Pearson Publications, New Delhi, 1st edition, 2015.

For Grammar practice

1. Sudha Rani Et all, *“A Work Book on English Grammar and Composition”*, published by Tata Mac Graw –Hill, New Delhi, 2nd Edition, 2012.

Reference Books:

1. Azar, Betty and Stacy A. Hagen: *“Understanding and Using English Grammar”*, Foundation Books, 4th Edition, 2009.
2. Chaudhuri ,Santanu Sinha: *“Learn English: A Fun Book of Functional Language, Grammar, and Vocabulary”*,Tata McGraw Hill Education,New Delhi, 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 (1975), *“A Communicative Grammar of English”*, London: Longman, 3rd Edition, 2002.
6. Murphy, Raymond: *“Intermediate English Grammar”*,Foundation Books Pvt Limited, 2nd Edition, 2013.
7. Murphy, Raymond: *“Essential English Grammar: A Self-Study Reference and Practice Bookfor Intermediate Students of English with Answers”*, Cambridge University Press, 2nd Edition, 2007.
8. Swan, Michael: *“Basic English Usage”*, Oxford University Press, 1st Edition, 1984.

Related Websites:

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>.

Outcomes:

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

1. Use of English Language, written and spoken.
2. Enrichment of language accuracy and fluency.
3. Gaining confidence in using English language and skills for writing in real life situations.
4. Ready to employ extensive and intensive reading skills

2015-16

Malla Reddy Engineering College (Autonomous)

L T P
3 2 -
Credits: 4

Course Code: 50B06

B.Tech – II Semester COMPUTATIONAL MATHEMATICS (Common for CE, ME, CSE & MINING)

Objectives: The course introduces various numerical techniques which are indispensable tools to solve many algebraic and transcendental equations. Mathematical methods are useful to reduce the global error involved in approximations.

MODULE – I: Algebraic and Transcendental Equations [12 Periods]

A: Introduction - Errors, types of errors, approximations, truncation error Solution of Algebraic and Transcendental Equations: The Bisection Method.

B: The Method of False Position - The Iteration Method – Newton-Raphson Method – Ramanujan's method to find smallest root of an equation.

MODULE – II: Interpolation: [12 Periods]

A: 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

B: Central difference interpolation Formulae – Gauss Central Difference Formulae – Interpolation with unevenly spaced points-Lagrange's Interpolation formula.

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

A: Curve fitting: Fitting a first degree (linear) and second degree (parabola), exponential, power curves for a data by the Method of least squares.

B: Numerical Differentiation & Integration: Evaluation of derivatives – Evaluation of maximum & minimum for a given data.

Numerical Integration: Trapezoidal Rule, Simpson's $1/3^{\text{rd}}$, $3/8$ Rule.

MODULE – IV: Numerical solution of Ordinary Differential Equations [12 Periods]

A: Solution by Taylor's series method -Picard's Method of successive Approximations- Euler's Method-Modified Euler's Method –

B: Runge-Kutta Methods - Predictor-Corrector Methods: Milne's method - Adams- Bashforth Method.

MODULE – V: Numerical solution of PDE [12 Periods]

A: Classification of second order equations – Finite difference approximations to derivatives - standard 5point formula – diagonal 5point formula – solution of Laplace equation.

B: Solution of poisson's equation. Solution of one dimensional heat, wave equations (by Crank-Nicolson explicit/implicit formula only).

TEXT BOOKS:

- 1) Introductory Methods of Numerical Analysis by S.S. Sastry, Prentice-Hall of India Private Limited. 2003
- 2) NUMERICAL METHODS IN ENGINEERING & SCIENCE (WITH PROGRAMS IN C, C++ & MATLAB) BY B.S. GREWAL, KHANNA PUBLISHER. 2014
- 3) Numerical Methods for Scientists and Engineers by Sankara Rao K., Prentice-Hall. 7th Edition, 2008

REFERENCES:

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

Outcomes:

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

1. Distinguish the error in exact and approximate methods and able to solve the algebraic and Transcendental equations.
2. Interpolate and predict the given data specifically using methods like Newton's , Gauss Siedal etc.
3. Fit the given data linear or Non-linear like first , second order and exponential
4. To find out the Numerical Differentiation and Integration from the given Tabular data.
5. To provide solutions to various ODE and PDE using various methods like Runge-Kutta methods, Adams- Bash forth, Method of Separation of Variables.

**B.Tech. - II Semester
APPLIED PHYSICS - II**

(Common for CE, EEE, ME, ECE, CSE and Min.E)

Prerequisites: NIL

Objectives:

The objective to provide clear understanding of magnetism and super conductivity, quantum Mechanics and nanomaterial to apply for Engineering and Technical problems

Module I: Magnetism & Superconductivity **[9 Periods]**

Magnetic field and Magnetization, magnetic susceptibility, paramagnetism in transition, rare earth elements; magnetization and total angular momentum (definition and relationship); Ferromagnetism, Anti ferromagnetism and Ferrimagnetism; Curie temperature, Hysteresis; Concept of Perfect Diamagnetism; Meissner effect ; Type I and II Superconductors; BCS theory (qualitative); Applications of Superconductors - Smart magnets, SQUIDs, transmission lines, Mag-Lev Train.

Module II: Quantum Mechanics **[8 Periods]**

Louis De-Broglie's concept of Matter Waves; Davisson and Germer's experiment; Heisenberg's Uncertainty Principle, Illustration - Why an electron cannot exist in the nucleus?; Schrödinger's Time Independent Wave Equation - Physical Significance of the Wave Function; Energy of a particle in a one dimensional infinite potential well; Concept of Potential barrier (Tunneling effect)

Module III: Band Theory of Solids & Semiconductor Physics

A: Band Theory of Solids: **[8 Periods]**

Qualitative discussion of Classical free electron theory, Fermi - Dirac distribution, Qualitative discussion of Quantum free electron theory; Electron in a periodic Potential (Bloch Theorem), Kronig-Penny Model (Qualitative Treatment), Origin of energy Band formation in solids, Classification of materials into Conductors, Semi-Conductors & Insulators, Concept of effective mass of an electron.

B: Semiconductor Physics **[9 Periods]**

Direct and Indirect band gap semiconductors, Expression for Charge carrier concentration in Intrinsic semiconductors; Fermi Level in Intrinsic Semiconductors (Derivation) and Extrinsic semiconductor (dependence on temperature and doping concentration); concept of drift and diffusion currents, Continuity equation, Hall Effect; Photo conductivity, optical response, LED materials, Construction of LED; LCD- characteristics of Liquid crystal materials; action of LCD display device; numeric displays;

Module IV: Physics of Nanomaterials **[9 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 nanotubes - properties and applications, Applications of nano materials - automobiles, electronics, medical, cosmetics, textile.

Module V: Electromagnetic Theory **[7 Periods]**

Gradient of Scalar field and its Physical Significance; Divergence and Curl of Vector field; Qualitative treatment of Gauss's Law of electrostatics and Gauss law of magnetostatics, Ampere's law, Faraday's law of electromagnetic induction, Induced E.M.F in a conductor,

Lenz's Law , Displacement current, Maxwell equations in differential form, wave equation for free space.

Text Books:

1. K Vijay Kumar, S Chandralingam, "**Modern Engineering Physics**", S. Chand and Company, 1st Edition 2010.
2. D K Bhattacharya, Poonam Tandon, "**Engineering Physics**", Oxford University Press, 1st Edition, 2015.
3. David J Griffiths "**Introduction to Electrodynamics**" Prentice Hall, 4th Edition, 2012.

Reference Books:

1. Callister W D Jr, "**Material Science and Engineering: An introduction**", John Wiley & Sons Publications, 8th Edition, 2010.
2. P K Palanisamy, "**Engineering Physics**", 4th Edition, SciTech Publications, 2014.
3. Ghatak Ajay and Lokanatham, "**Quantum Mechanics**", Springer Publications, 1st Edition, 2014.
4. G Prasad and Bhimashankaram, "**Engineering Physics**", B S Publications, 3rd Edition, 2008.
5. Sulabha K. Kulkarni, "**Nano technology - Principles and practices**", Springer Publications.3rd Edition, 2014.
6. A K Sawhney, "**Electrical and Electronic Measurements and Instrumentation**", Dhanpatrai and Sons publications, 19th revised Edition, 2014.

Outcomes:

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

1. Distinguish ferro, ferri and anti-ferro magnetic materials and understands different types of superconductors.
2. Understand the Kronig penny model after having learnt one dimensional infinite Potential well problem. This knowledge will further help them to understand the concepts related to semi conductors.
3. The various synthesis methods of nano materials and different applications.
4. Students able to get basic knowledge on electromagnetic theory.

2015-16

Malla Reddy Engineering College (Autonomous)

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2 2-

Course Code: 50303

Credits: 3

B.Tech. – II Semester ENGINEERING MECHANICS (Common for CE, ME and Min.E)

Prerequisites: Fundamental concepts of Physics

Objectives: The objective of this subject is to provide the basic concepts of effect of system of forces on rigid bodies, Geometrical Properties of Planes and Solids, problem solving in kinematics and kinetics using different methods.

Module I: Introduction & Systems of Forces

A: Introduction:

[Periods 2]

Basic Concepts, Laws of Motion, Force-types, characteristics- Principle of transmissibility.

B: Systems of Forces: [Periods 10]

Classification, Coplanar Concurrent Forces – Components of force– Resultant- Triangle law of Forces-Polygon law of Forces- Parallelogram Law of Forces-Resolution and composition of Forces– Coplanar Non-Concurrent System of Forces, Resultant of Parallel system of Forces -Moment of Force and its Application – Varignon’s theorem, Couples.

Module II: Equilibrium of Systems of Forces:

[Periods 10]

Free Body Diagrams, Types of Supports and their reactions, Internal and External Forces - Types of Equilibrium, Equations of Equilibrium, Conditions of Equilibrium, Equilibrium of bodies under Coplanar concurrent system of forces – Lami’s Theorem, Converse of the Triangle law of forces, converse of the polygon law of forces.

Module III: Centroid, Centre of Gravity, Area Moment of Inertia and Mass Moment of Inertia

A: Centroid:

[Periods 3]

Centroids of Lines and Areas (from basic principles) –simple figures– Centroid of Composite Figures- Centroid of L, T, I, Z and channel Sections.

B: Centre of Gravity:[Periods 3]

Centre of gravity of simple solids (from basic principles), centre of gravity of composite solids, Pappu’s-Guldinus theorems.

C: Area moment of Inertia :[Periods 3]

Definition –Moment of Inertia of plane areas, Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Moment of Inertia of L, T, I, and channel Sections.

D: Mass Moment of Inertia: [Periods 3]

Moment of Inertia of Simple solids, Transfer Formula for Mass Moments of Inertia, Mass Moment of Inertia of composite bodies.

Module IV:-Kinematics&Kinetics

A: Kinematics: [Periods 5]

Rectilinear motion – Motion of Rigid Body under uniform and variable accelerations – motion under gravity-curve-linear motion -Projectiles-rotary motion, kinematics of general plane motion.

B: Kinetics: [Periods 5]

Analysis as a Particle and Analysis as a Rigid Body in Translation – D’Alemberts Principle – Connected bodies- Kinetics of rotating bodies- Equations of Plane Motion– Rolling Bodies.

Module V: Work, Power and Energy & Impulse-Momentum principle

A: Work, Power and Energy: [Periods 7]

Work-energy equation for translation-connected bodies on horizontal and inclined planes-pulleys-Work done by a spring-Work-energy equation to rotary motion and general plane motion.

B: Impulse-Momentum principle: [Periods 3]

Linear impulse and momentum-connected bodies-pile & hammer.

Text Books:

1. S.Timoshenko, DH Young, JV Rao, SukumarPati, “**Engineering Mechanics**”, McGraw Hill Education Publisher, 5th Edition (Special Indian Edition), 2013.
2. S.S. Bhavikatti, “**A Textbook of Engineering Mechanics**”, New Age International publishers, 1st Edition, 2008.
3. D.S.Kumar Patil, “**Engineering Mechanics**”, SK Kataria & Sons Publishers, 2nd Edition, 2009.

References Books:

1. Ferdinand . L. Singer, “**Engineering Mechanics**”, Harper & Row Publishers, 3rd Edition, 1975.
2. K.Vijaya Kumar Reddy, J. Suresh Kumar, “**Engineering Mechanics**”, B S Publications, 3rd Edition, 2013.
3. R.S. Khurmi, “**A Text Book of Engineering Mechanics**”, S.Chand Publications, 21st Edition, 2007.
4. K L Kumar, “**Engineering Mechanics**”, TataMcGrawHillEducation, 4th Edition, 2011.

Outcomes:

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

1. Understand the basic concepts and types of forces.
2. Analyze centroid & centre of gravity, moment of inertia of different Planes and solids.
3. Apply De Alembert’s principle, work-energy method and Impulse Momentum principle to solve dynamics problems.

2015–16

Malla Reddy Engineering College (Autonomous)

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Course Code: 50202

Credits: 4

B.Tech. – II Semester

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

(Common for CE, ME and Min.E)

Prerequisites: NIL

Objectives: The objective of this Course is to provide an introductory and broad treatment of Electrical and Electronics Engineering.

Module I: Introduction to Electrical circuits [12 Periods]

Ohm's Law and Kirchhoff's Laws; Analysis of series, parallel and series-parallel circuits excited by independent voltage sources-passive elements-Electromagnetism-Faradays Laws, Lenz's Law, concepts of self- inductance, mutual inductance and coefficient of coupling Network theorems- superposition theorem, maximum power transfer theorem, Thevenin's theorem (Statement only)

Module II: Single Phase A.C. Circuits [10 Periods]

Generation of sinusoidal voltage- definition of average value, root mean square value, form factor and peak factor of sinusoidal voltage and current phasor representation of alternating quantities; series RL, RC and RLC circuits; Real power, reactive power, apparent power and power factor

Module III: Single phase transformers & 3-Phase Induction Motors [14 Periods]

A: Single phase transformers:

Principle of operation- construction details (core and shell types) - EMF equation, losses, efficiency

Alternators (or) Synchronous Generators:

Principle of operation; Types and constructional features; EMF equation-voltage regulation – EMF method

B: 3-Phase Induction Motors

Principle of operation, types- Slip - Applications of squirrel cage and slip ring motors - speed-torque characteristics, speed control of 3-phase induction motor (stator voltage control technique only).

Module IV: Electronic Devices & Rectifiers

A: Electronic Devices [6 Periods]

PN Junction diode – symbol -principle of operation – characteristics, applications of diode Transistor- types- characteristics- Input and Output characteristics of transistor- Common Base, Common Emitter, and Common collector configurations- applications of a transistor - MOSFET – types- (Enhancement and depletion mode)- characteristics.

B: Rectifiers

[5 Periods]

Half wave rectifier and full wave Rectifier with and without filter– ripple factor

Module V: Amplifiers & Basic Digital Electronics [5 Periods]

A: Amplifiers:

Principle of operation – types of amplifiers- h-parameter representation of a transistor-voltage gain, current gain, Input impedance and Output impedance-Introduction to feedback Amplifier.

B: Basic Digital Electronics

[5 Periods]

Binary Number Systems and Codes; Basic Logic Gates and Truth Tables, Boolean Algebra, De Morgan's Theorems, Logic circuits, Flip-Flops –SR, JK, D type

Text Books:

1. Nagrath I.J. and D. P. Kothari, “**Basic Electrical Engineering**”, Tata McGraw Hill, 3rd Edition, 2010.
2. R. S. Sedha, “**A Text Book of Electronic Devices and Circuits**”, S.Chand& Co., 7th Edition, 2008.
3. Thomas L. Floyd and R. P. Jain, “**Digital Fundamentals**”, Pearson Education, 10th Edition, 2011.

Reference books:

1. R.L.Boylestad & Louis Nashlesky, “**Electronic Devices & Circuit Theory**”, Pearson Education, 10th Edition, 2009.
2. P.S.Bimra, “**Electrical Machinery**”, Dhanapatrai Publications, 7th Edition, 2012.

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

1. Learn how to develop and employ circuit models for elementary electrical components, e.g., sources, resistors, inductors, capacitors.
2. Determine voltages, currents, turns-ratios and power for single-phase transformers and synchronous generators.
3. Calculate motor horsepower, speed, slip, efficiency, power factor, and torque of three phase induction motor and applications.
4. Understand different electronic devices and application .of diodes in rectifiers.
5. Design digital control circuits to suite for engineering problems.

2015–16

Malla Reddy Engineering College (Autonomous)

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Course Code: 50H02

Credits: 2

B.Tech. – II Semester ENGLISH LANGUAGE LAB (Common for CE, MEandMin.E)

The Language Lab focuses on the production and practice of sounds of language and familiarises the students with the use of English in everyday situations and contexts.

Objectives:

To sensitize the students to the intelligibility in their pronunciation of English, speech sounds, word accent, intonation and rhythm To improve the fluency in spoken English and neutralize mother tongue influence To facilitate honing of listening and speaking skills of students To train students to understand nuances of both verbal and non verbal communication during all activities To develop confidence to face the audience and participate in activities To help the students shed inhibitions and communicate with clarity.

Listening Skills:

Objectives:

1. To enable students to develop their listening skill so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language to be able to recognise them, awareness regarding stress and recognise 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 ELCS 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

Reference Books:

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 Skills**” for Adult Professionals
3. Karia , Akash: “*Public Speaking Mastery, Speak Like a Winner*“, Kindle Edition, 2013.
4. Lucas, Stephen: “*The Art of Public Speaking*” : Tata McGraw Hill, 11th Edition, 2011.

Websites:

1. <http://www.mindtools.com/CommSkill/ActiveListening.htm>
2. <http://www.slideshare.net/alisonkis/dialogue-and-roleplay-activity>
3. [http://www.hse.ru/pubs/lib/data/access/ram/ticket/2/14309868938d576a532b71360b7354268380727a22/An%20article%20for%20Monika%20\(2010\).pdf](http://www.hse.ru/pubs/lib/data/access/ram/ticket/2/14309868938d576a532b71360b7354268380727a22/An%20article%20for%20Monika%20(2010).pdf)

Outcomes:

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

1. Better Understanding of nuances of language through audio- visual experience and group activities
2. Neutralization of accent for intelligibility
3. Speaking with clarity and confidence thereby enhancing employability skills of the students
4. Good understanding of listening skills and speaking skills and their application in real life situations.
5. Good understanding of non-verbal communication and developing confidence to face audience, shed inhibitions.

2015–16

Malla Reddy Engineering College (Autonomous)

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Course Code: 50B04

Credits: 2

B.Tech. – II Semester
APPLIED PHYSICS LAB
(Common for CE, ME and Min.E)

List of Experiments:

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

2015-16

Malla Reddy Engineering College (Autonomous)

Course Code: 50304

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Credits: 2

B.Tech. –IISemester

ENGINEERING MECHANICS & AutoCAD LAB

(Common for CE, ME and Min.E)

Any six experiments from Module–A& B

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 AutoCADsoftware. Representation of dimensioning and tolerances scanning and plotting(2D Drawing).

The student must be in a position to execute the basic commands using AutoCAD package after completion of Module-B

2015-16

Malla Reddy Engineering College (Autonomous)

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Course Code: 50A02

Credits: -

**B.Tech. – IISemester
COMPUTATIONAL MATHEMATICS LAB
(Common for CE, ME, CSE & MINING)**

Following Programming is to be done in C/ Matlab Language:

MODULE – I: Find the roots of

- i. non-linear equation using Bisection method
- ii. non-linear equation using iteration method
- iii. Newton-Raphson method
- iv. Regula-falsi method

MODULE – II:

- i. Find the smallest root of non-linear equation using Ramanujam's method
- ii. Solve the system of non-homogeneous tri-diagonal equations using Thomas Algorithm
- iii. Solve the system of non-homogeneous linear equations using Gauss-iedal method
- iv. Interpolate with unevenly spaced points using Lagrangian method for 4 paired values.

MODULE - III

- i. Numerical integration using Trapezoidal rule.
- ii. Numerical integration using Simpsons' 1/3rd and 3/8th rules
- iii. Numerical solution of first order ordinary differential equation using Euler's method
- iv. Numerical solution of first order ordinary differential equation using 4th order Runge-Kutta method.

Manual:

NUMERICAL METHODS IN ENGINEERING & SCIENCE (WITH PROGRAMS IN C, C++ & MATLAB) BY
B.S. GREWAL, KHANNA PUBLISHER. 2014

References:

- 1) Introductory Methods of Numerical Analysis by S.S. Sastry, Prentice-Hall of India Private Limited.2003
- 2) Numerical Methods for Scientists and Engineers by Sankara Rao K., Prentice-Hall. 7th Edition, 2008

2015–16

Malla Reddy Engineering College (Autonomous)

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CourseCode: 50244

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Credits: 4

B.Tech. IIISemester

APPLIED ELECTRICAL & ELECTRONICS ENGINEERING

PREREQUISITES: The students should have good background on Digital Electronics.

Objectives: This course introduces microprocessor. Topics includes the architecture, assembly language programming.

Module I operation and speed control of three phase Induction motors [12 Periods]

Operation and characteristics of three-phase Induction motors; Methods of Starting & speed control of three phase induction motor; Ward-Leonard method of Speed control of dc motor; Basic principles of Thyristor controlled variable speed ac motors.

Module II Switchgear and Protection [12 Periods]

Principles of rate making of electricity and power factor improvement; Substation arrangement; Circuit breakers; Protective relays :- Inductions pattern over current relay, thermal overload relay, earth fault relay, Lightning Arrester, Fuses :- types and selection. Power Cables: - Types & selection

Module III PART:A: Industrial application & control of electrical motors [06 Periods]

Types of electric motors and their application in industry; Controllers for the speed control of dc & ac motors. Types of motor enclosure, FLP enclosures for hazardous area equipment, intrinsically safe circuit.

Diesel – Electrical oil rigs and I.E rules applied to mines & oil fields

MODULE - III: PART:B: Introduction to Microprocessors [06 Periods]

Introduction to microprocessor, Microprocessors Architecture (CISC & RISC), Advantages and Applications of Microprocessors.

MODULE - IV: 8085 Microprocessors and Instruction Set [12 Periods]

8085 microprocessor architecture, address, data and control buses, 8085 pin functions, demultiplexing of buses, generation of control signals, instruction cycle, machine cycles, t-states. Classification of instructions, addressing modes, 8085 instruction set, instruction and data formats, writing, assembling & executing a program..

MODULE - V: Assembly Language Programming [10 Periods]

Assembly Language Programming of 8085: Writing 8085 assembly language programs with decision making and looping using data transfer, arithmetic, logical and branch instructions.

TEXT BOOKS:

1. Power system protection and switchgear-Badri Ram, D.N. Vishwakarma, Tata Mc Graw-Hill education,2001
2. Theory and Performance of Electrical Machines - *JB Gupta*, SK Kataria & Sons,2009.
- 3.Ramesh Gaonkar, “**Microprocessor Architecture, Programing and Application with 8085**”, Penram, 5th Edition, 2002. (Modules III(B), IV & V)

REFERENCE BOOKS:

1. Handbook of Electrical Motor control systems-Eswar, Tata Mc Graw-Hill education,1990
2. Electric Motor Control-Stephen L Herman, Cengage Learning, 10th edition, 2015.
3. K. Uday Kumar, B.S.Umashankar, “**The 8085 Microprocessor: Architecture, programming and Interfacing**”, Pearson, 2008.

Outcomes:

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

1. Describe the basic architecture of 8085 microprocessor.
2. Write assembly language programs for 8085 microprocessor.

2015-16

Malla Reddy Engineering College (Autonomous)

Course Code: 50315

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2 2 -

Credits: 3

**B.TECH - III SEMESTER
FLUID MECHANICS AND HYDRAULIC MACHINES**

Pre-requisite: Engineering Mechanics

Objective:

The objective of this subject is to provide the basic knowledge of fluids behavior at different conditions, To provide knowledge of working principle of different turbines and pumps. To provide knowledge of calculating performance of turbines and pumps.

MODULE – I: Fluid statics

[13 Periods]

Fluid statics: 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.

MODULE – II: Fluid kinematics & Fluid dynamics

[15 Periods]

A: 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.

B: 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 **[14 Periods]**

A: 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

B: Boundary Layer Concepts: Definition, thickness, characteristics along thin plate, laminar and turbulent boundary layers (No derivation) boundary layer in transition, separation of boundary layer, submerged objects – drag and lift.

MODULE - IV: Basics of turbo machinery, Hydraulic Turbines & Performance of hydraulic turbines **[15 Periods]**

A: 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 done and efficiency, flow over radial vanes.

B: 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.

C: Performance of hydraulic turbines: 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

[13 Periods]

A: Centrifugal pumps: Classification, working, work done – manometric head- losses and efficiencies specific speed- pumps in series and parallel-performance characteristic curves, NPSH.

B: Reciprocating pumps: Working, Discharge, slip, indicator diagrams.

Text Books:

1. Victor L. Streeter, E Benjamin wylie “**Fluid Mechanics**”, McGrawhill Publications, 9th edition, 1998.
2. Dr. P.N. MODI and Dr. S. M. SETH “**Hydraulics and Fluid Mechanics Including Hydraulic Machines**”, Rajsons publication Pvt Ltd, 20th editions, 2014.

References Books:

1. D.S. Kumar “**Fluid Mechanics and Fluid Power Engineering**”, Kotaria & Sons, 1st edition, 2009.
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. R K Rajput “**Fluid Mechanics and Hydraulic Machines**”, S.Chand Publications, 12th edition.

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

1. The students shall be able to know the behavior fluids at different conditions
2. The student shall be able to apply the knowledge to access the performance of hydraulic machines.
3. The students are able to calculate the performance of pumps and turbines.

Engineering College (Autonomous)

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22 -

CourseCode: 52501

Credits: 3

**B.Tech. IIISemester
FUNDAMENTALS OF GEOLOGY****PRE-REQUISITE:** Under graduate Physics and Chemistry**Objectives:** To introduce fundamentals of geology to the student emphasizing the importance of mineralogy, structural geology, stratigraphy of earth, course is also aimed at explanation of seismic zones, geology and mineral resources of India.**MODULE-I:General Geology****[12 Periods]**

Origin, age, internal structure and composition of Earth.

Landforms: Origin or mode of development, characteristic features and engineering considerations of landforms developed by Rivers, Wind, Glaciers, Oceans and Volcanoes.**MODULE-II:Mineralogy:****[12 Periods]****Minerals:** Physical and chemical properties; Classification of minerals and properties of common silicate minerals (Quartz, Feldspar, Pyroxene, Amphibole, Garnet, Olivine, Mica), sulphides (Pyrite, Chalcopyrite, Galena, Sphalerite) and oxides (Haematite, Magnetite, Chromite, Pyrolusite, Psilomelane).**Petrology Igneous rocks:** Magma and lava, extrusive and intrusive forms, textures; Classification and description of some common igneous rocks (Granite, Dolerite, gabbro, Basalt, Rhyolite, Pegmatite). Sedimentary rocks: Sedimentation processes; Classification and description of some common sedimentary rocks (Conglomerate, Sandstone, Shale, Limestone).**Metamorphic rocks:** Processes of metamorphism, textures and structures of metamorphic rocks; Classification and description of some common metamorphic rocks (Slate, Phyllite, Schist, Gneiss, Quartzite, Marble).**MODULE-III: PART-****[06 Periods]****A:Structural Geology** -Strike and Dip, Fundamental types, characteristic features and mechanics of folds.**B:** Faults, joints (fractures) and unconformities. Foliation and Lineation.**[06 Periods]****MODULE-IV:Stratigraphy****[12 Periods]**

Principles of stratigraphy, geological time scale, stratigraphic succession, description and mineral wealth of archeans, proterozoic basins, Gondwanas, Deccan traps and Himalayas.

MODULE-V:Groundwater**[12 Periods]**

Hydrological cycle, vertical distribution of groundwater. Types of aquifers, geological formations as aquifers, springs, engineering considerations of groundwater and groundwater exploration.

Earthquakes: Mode of propagation of seismic energy, causes, effects and distribution of earthquakes, seismic Zoning Map of India.**Text Books:**

1. A Text Book of Geology by P.K. Mukherjee/ The world press Pvt Ltd.(2005)
2. Engineering Geology by D.V Reddy, vikas publishing house pvt Ltd.,(2010),

Reference Books:

- 1 Fundamentals of Engineering Geology by F.G. Bell ; Butterworth Heinemann.(1983)
- 2 Principles of Physical Geology by Arthur Holmes/ Van Nostrand Reinhold (UK). (1978)
- 3.Engineering and General Geology, Singh, Parbin ; 6th ed.,Katson Publishing House, Ludhiana(1994)
4. Read, H.H. (1984), “Rutley’s Elements of Mineralogy”, 26th ed.,CBS, New Delhi
- 5.Text Book of Applied Engineering Geology, Maruthesh Reddy, New Age International Pvt. Ltd. Publishers, New Delhi(2008)
- 6.Principles of Petrology,-Tyrell GW, Chapman and Hall Publications, New edition
- 7.Billings, M.P. Structural Geology, Prentice Hall Ino., N. Jersey, USA, 1972.
8. Krishnan M.S. Geology of India and Burma, 3rd Edition, IBH Publishers, N. Delhi, 1984.

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

- 1.know about the geology of the ground in which miningactivity is proposed or in vogue.
2. Get acquainted with the geological conditions of the ground and helps students to plan Better and safer mining activity as an outcome of this course.

2015-16

Malla Reddy Engineering College (Autonomous)

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Credits: 3

Course Code: 50308

B.Tech. – III Semester

MACHINE DRAWING

Pre-requisite: Engineering Drawing

Objectives: The objective of this subject is to provide the basic concepts of machine components, assembling of machine parts, applications of machine parts.

Machine Drawing Conventions:

Need for drawing conventions - introduction to IS conventions

- a) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
- b) Types of sections - selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
- c) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.
- d) Title boxes, their size, location and details - common abbreviations & their liberal usage
- e) Types of Drawings - working drawings for 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, cottered joints and knuckle joint.
- c) Riveted joints for plates
- d) Shaft coupling, spigot and socket 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, feed check valve

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

Text Books:

1. K.L.Narayana, P.Kannaiah “**Machine Drawing**”, New Age Publishers, 4th edition, 2014.
2. RK Dhawan “**Machine Drawing**”, S.Chand Publications, 2nd edition, 1998

Reference Books:

1. N.D.Bhatt “**Machine Drawing**” Charotar Publishing House pvt ltd, 42nd edition, 2008.
2. P.S.Gill “**Machine Drawing**” S.K. Kataria & Sons publisher, 17th edition, 2009
3. Rajput “**Machine Drawing**” Lakshmi Publications

Course Outcomes:

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

1. Study and draw assembly drawings of machine parts.
2. Know the Importance of keys, couplings and engine parts.
3. know the importance of various important machine parts.

2015-16

Malla Reddy Engineering College (Autonomous)

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Credits: 3

Course Code: 50353

B.Tech. – III Semester MECHANICAL TECHNOLOGY

PRE-REQUISITE: Engineering Mechanics

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

[12 Periods]

Cams: Definitions of cam and followers – their uses – Types of followers and cams – Terminology – Types of 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 belt drives, 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

[15 Periods]

Toothed gears: types – law of gearing, condition for constant velocity ratio for transmission of motion, Form of teeth: cycloidal and involute 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

[14 Periods]

IC Engines: IC Engine components and basic engine nomenclature, classification of IC Engines, otto cycle, diesel cycle, two stroke and four stroke 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

[14 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 Combustion 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. PN Rao “**Manufacturing Technology**”, Vol. II, Tata McGraw-Hill.

REFERENCE BOOKS:

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

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

1. Know about the mechanism, parts involved in machinery used in mining engineering.
2. Know about the machines used in mines, mechanisms involved in machines, so that student can find out the reason of failure of components of power transmitting machines, rectifying the problems.

2015-16

Malla Reddy Engineering College (Autonomous)

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Course Code: 50317

Credits: 2

B.Tech. – III Semester

FLUID MECHANICS AND HYDRAULIC MACHINES LAB

1. 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 loss of head due to sudden contraction in a pipeline.
12. Verification of Bernoulli's Theorems.

2015-16

Malla Reddy Engineering College (Autonomous)

Course Code: 52502

**B.Tech. – III Semester
GEOLOGY LAB**

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Credits: 2**

List of Experiments:

1. Identification and physical properties of important rock-forming and ore-forming minerals.
2. Identification and distinguish characteristics of important igneous, sedimentary and metamorphic rocks.
3. Determination of strike 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.

2015-16

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Credits: 2

Course Code: 52503

**B.Tech. – III Semester
MINE ELECTRICAL LAB**

1. Verification of Superposition and Reciprocity theorems.
2. Verification of Maximum Power transfer theorem using DC excitation.
3. Experimental determination of Thevenin's Norton's theorem.
4. Experimental determination of Norton's theorem.
5. Verification of KCL and KVL.
6. Magnetization characteristics of DC Shunt generator.
7. Brake test on DC shunt motor. Determination of performance Characteristics.
8. Swinburne's test on DC Shunt motor.
9. OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).
10. Brake test on 3-phase Induction motor (performance characteristics).
11. Study of methods of earthing electrical equipment used below ground.
12. Study of flame proof electrical apparatus.

Prerequisite: NIL

Objective: To make students familiar with Human value with professional ethics.

Introduction:

The term 'ethics' is derived from the Greek word *ethos* which can mean custom, habit, character or disposition. Ethical awareness is an integral part of professional attitude and it is necessary to take time for reflection-on-action. Building professional attitude begins by understanding what it means to be a professional and how a professional should relate and react to her work environment. The Course, Professional Ethics and Human Values will be a part of Value Education leading towards sensitizing the students on Values of Life and preparing them for life. The colleges are centers of excellence for the education of students. Many of these students will be the professionals of tomorrow: Engineers, Business administrators, and so forth. Their expertise, knowledge and power will exercise a crucial influence on the quality of life of millions of citizens. The question is whether they will be sufficiently prepared to recognize the ethical aspects of their professional decisions and to understand the social consequences of their work. The institutions prepare them to become experts in a very limited field, to find technical solutions to specific problems. But often they do not learn how to resolve ethical problems or to make themselves into responsible persons. The term 'ethics' is derived from the Greek word *ethos* which can mean custom, habit, character or disposition. Ethical awareness is an integral part of professional attitude and it is necessary to take time for reflection-on-action. Building professional attitude begins by understanding what it means to be a professional and how a professional should relate and react to her work environment.

Objectives:

- To create an awareness on Professional Ethics and Human Values.
- To understand social responsibility of any profession
- To appreciate ethical dilemma while discharging duties in professional life.
- To help the students appreciate the essential complementarity between Values and Skills to ensure sustained happiness and prosperity which are the core aspirations of all human beings
- To develop Holistic Perspectives towards life
- To enable students to lead a practical life adding value to human relations
- To generate capacity for making intelligent and independent value judgments in real life situations.

MODULE –I Human Values:

[05 Periods]

Morals, Values and Ethics – Integrity – Work Ethic – Honesty – Courage –Empathy – Self-Confidence – Character.

MODULE –II Professional Ethics:

[09 Periods]

Variety of moral issues - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories.

MODULE-III Human values, Ethics, Life Skills:**[09 Periods]**

Goals in life – Goal setting – Differentiating Right and Wrong – Integrity – Adaptability – Sense of Humor - Valuing Time – Co-operation – Commitment

MODULE-IV Harmony in Human Beings Vs Harmony in self:**[05 Periods]**

Understanding self and body – Human Interactions – Human-Human relationships – Respect and Differentiation – Humanistic education, Humanistic Constitution, Humanistic Universal Order

Books for Reference:

1. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.
2. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003.
3. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.
4. Naagarazan. R.S “A Textbook on Professional Ethics and Human Values”, New Age International Publishers, 2001
5. A N Tripathy, “Human values”, New Age International Publishers, 2003
6. George Reynolds, “Ethics in Information Technology”, Cengage Learning, 2002

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

1. Define various terms related to Human value with professional ethics..
2. Understand the professional responsibilities.
3. Analyse the soft ware engineering ethics and practices.

2015-16

Malla Reddy Engineering College (Autonomous)

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32 -
Credits: 4

Course Code: 50B09

B.Tech. – IV Semester PROBABILITY AND STATISTICS (Common for CE, ME & MINING Engg.)

Prerequisite: Basics of mathematics.

Objectives: The main objective of the course probability & Statistics is to revise elementary concepts and techniques encountered in the Set theory. Extended to teach the basics of probability, axioms to familiarize the knowledge on the concept of random variables. Introduced new techniques for carrying out probability calculations and identifying probability distributions. To motivate the use of statistical inference in practical data analysis by introducing so many tests which are fit for small and large data. The process of queuing theory is also introduced to learn the concept of optimize the system service rate by reducing the idle time. By enlarge we are focused on elementary concepts and techniques in statistical methodology to solve their project work.

MODULE –I

[12 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-II

[12 Periods]

Random variables – Discrete Probability distributions. Bernoulli, Binomial, poisson, geometric, mean, variance, moment generating function–related problems. Continuous probability distribution, Normal distribution, Exponential, Rectangular, Weibull distribution, Beta and Gamma distributions, mean, variance, moment generating function–related problems.

MODULE-III

[12 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 sided test, two sided test.

Large sample tests:

- (i) Test of Equality of means of two samples equality of sample mean and population mean (cases of known variance & unknown variance, equal and unequal variances)
- (ii) Tests of significance of difference between sample S.D and population S.D.
- (iii) Tests of significance difference between sample proportion and population proportion & difference between two sample proportions.

MODULE-IV: Small sample tests:

[12 Periods]

Student t-distribution, its properties; Test of significance difference between sample mean and population mean; difference between means of two small samples, Snedecor's F

,distribution and its properties. Test of equality of two population variances, Chi-square distribution, its properties, Chi-square test of goodness of fit

MODULE-V

[12 Periods]

Correlation & Regression: Correlation, Coefficient of correlation, the rank correlation. Regression, Regression Coefficient, The lines of regression: simple regression, regression for 3 independent variables.

Queuing Theory: 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) Probability & Statistics for Engineers & Scientists –Walpole Myers Myers Ye.
- 2) Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers
- 3) Probability and Statistics for Engineers and Scientists by Sheldon M. Ross, Academic Press
- 4) Operations Research by S.D. Sarma.
- 5) Operations Research by Taha

REFERENCES:

- 1) Mathematics for Engineers by K.B. Datta and M.A. S. Srinivas, Cengage Publications
- 2) Probability and Statistics by T.K. V. Iyengar & B. Krishna Gandhi Et
- 3) Fundamentals of Mathematical Statistics by S C Gupta and V.K. Kapoor
- 4) Probability and Statistics for Engineers and Scientists by Jay I. Devore.

Course Outcomes:

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

1. Determine measure of probability, of a given problem. Introduction of random variables and construction of probability distribution function/density function.
2. Identify the distribution of a random variable (discrete or continuous) of interest in an experiment, and calculate the probability that the random variable can take on certain values.
3. Conduct hypothesis test and construct confidence intervals for the population mean, variance, or proportion (one sample and two samples).
4. Apply the principles of linear correlation and regression to predict the outcomes of certain experiment parameters.
5. Apply the queuing theory concept to reduce the long queues in the form of fast service rate.

2015-16

Malla Reddy Engineering College (Autonomous)

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Credits: 3

Course Code: 52504

B.Tech. – IV Semester MINING GEOLOGY

Pre-Requisite: Under graduate Physics and Chemistry

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

MODULE-I: Engineering Properties of rocks & Soils [12 Periods]

Physical and Mechanical properties, methods of determination, numerical values and engineering uses of important rocks.

MODULE-II: Genesis of Mineral Deposits [12 Periods]

Definition of ore, gangue, tenor and grade of ore, processes and formation of ore deposits including coal, petroleum and atomic minerals.

Mineral Resources of India: Major and Minor mineral resources of India, origin, environment and distribution of mineral deposits of India. Geology and Mineral Resources of Telangana.

MODULE-III: PART-A: Mineral Exploration [06 Periods]

Geological, Geophysical and Geochemical exploration of mineral deposits.

Mineral Reserves: Estimation and determination of mineral reserves by different methods.

PART-B: Rock and soil slopes [06 Periods]

Models of slope failure, causes and effects of slope failures, methods of slope stabilizations.

MODULE-IV: Geology of Tunnels [12 Periods]

Engineering geological investigations to drive tunnels in soft ground and hard ground, stand up time and geology of some well known Indian Tunnels, Gases in tunnels.

MODULE-V: Geology of Bore-hole drilling and Excavation [12 Periods]

Ease of drillability, importance of geology in drilling soft rocks, hard and deformed rocks. Ease of excavation of different earth materials and rocks.

TEXT BOOKS:

- a) Mining Geology by Arogya Swamy, Oxford & IBH Publishing Company ,(1996)
- b) 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).

Outcomes:

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

1. Understand properties of soils, rocks, mineral deposits, the exploration of minerals.
2. Estimate different mineral reserves, investigations to drive tunnels in soft ground and hard grounds.
3. Know importance of geology in drilling rocks.

2015-16

Malla Reddy Engineering College (Autonomous)

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32 -

Credits: 4

Course Code: 52505

B.Tech. – IV Semester

INTRODUCTION TO MINING TECHNOLOGY

Pre-Requisite: Under graduate Physics and Chemistry & Maths.

Objectives: To teach fundamental activates for extraction of mineral.

MODULE-I

[12 Periods]

Distribution of mineral deposits in India and other countries, mining contributions to civilization, mining terminology, stages in the life of the mine, introduction to underground and surface mining methods.

MODULE-II

[12 Periods]

Introduction to drilling and drilling equipment.Fundamentals of Explosive and blasting techniques.

MODULE-III:

[6 Periods]

A:Objectives and limitations of mine supports, materials used for supports. Friction and hydraulic props, Roof bolts, chock supports

[6 Periods]

B:Roadway support, face supports, side supports, junction supports, supports in special conditions, setting and withdrawal of supports, systematic supporting

MODULE-IV

[12 Periods]

Modes of entry into deposits for underground mining- shafts, inclines, adits etc – their fields of applications.Drivage of drifts, organization and cycle of operations, modern methods of drifting and tunneling, roadheaders, tunnel boring.Location of shaft, shape and size, incline and vertical shafts. Surface arrangements for sinking shafts, tools and equipments, ordinary methods of sinking, drilling, blasting, removal of debris and water, ventilation and lighting, temporary and permanent lining.

MODULE-V

[12 Periods]

Widening and deepening of shafts, special methods of shaft sinking : piling, caisson, freezing and cementation method of shaft sinking. Modern techniques of shaft sinking.

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 Pijush 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.

Outcomes:

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

- 1.Plandeferent types of openings
- 2.Plan basic technical operations.

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Malla Reddy Engineering College (Autonomous)

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Credits: 2

Course Code:50H16

B.Tech. – IV Semester ENVIRONMENTAL SCIENCES

Prerequisites: Environment

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 problems of environment.

MODULE - I: Ecosystems

[07 Periods]

Definition, Scope and Importance of ecosystem, Concept of ecosystem, Classification of ecosystems, 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

[09 Periods]

Natural resources: Classification of Resources: Living and Non-Living resources, Renewable and non-renewable resources. Water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources – case studies. Growing energy needs-Energy resources: renewable and non renewable energy sources.

Biodiversity and biotic resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and intrinsic values.

MODULE - III: Environmental pollution and control

[09 Periods]

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 pollutants of water and their sources, drinking water quality standards, 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.

MODULE - IV: Global environmental problems and global efforts

[06 Periods]

Greenhouse 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

[08 Periods]

Concept of Sustainable Development, Threats to Sustainability, Population and its explosion, Crazy Consumerism, Over-exploitation of resources, Strategies for Achieving Sustainable development, Environmental Education, Conservation of Resources, Urban Sprawl, Sustainable Cities and Sustainable Communities, Human health, Role of IT in Environment, Environmental Ethics, Environmental Economics, Concept of Green Building, Clean Development Mechanism (CDM).

TEXT BOOKS:

1. R.Rajagopalan, “**Environmental studies From crisis to cure**”, Oxford University Press, 2nd Edition, 2005. (Modules I, II, III, IV)
2. Anubha Kaushik, C.P.Kaushik, “**Environmental studies**” New age International Publishers, 4th Edition, 2012. (Modules I, II, III, IV & V)
3. Erach Bharucha, “**Environmental studies**” University Grants Commission, and University Press, 1st Edition, 2005. (Modules I, II, III, IV & V)

REFERENCE BOOKS:

1. M.Anji Reddy “**Textbook of Environmental Science and Technology**” 3rd Edition, 2007.
2. Richard T. Wright,
“**Environmental Science: towards a sustainable future**” PHI Learning,
Private Ltd. New Delhi, 2nd Edition, 2008.
3. Gilbert McMasters and Wendell P. Ela, “**Environmental Engineering and science**”, 3rd Edition, PHI Learning Pvt.Ltd., 2008.

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

1. Enable the students to realize the importance of the sustainable use of natural resources.
2. Make the students aware of the impacts of human actions on environment and measures to minimize and mitigate them.
3. Enable the students to become aware of the current issues and problems pertaining to the environment.

2015-16

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CourseCode: 50305

Credits: 3

B.Tech. IV Semester

MECHANICS OF SOLIDS

Pre-requisite: Engineering Mechanics, Material Science

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

MODULE – I: Simple Stresses & Strains

[15 Periods]

Simple Stresses & Strains : 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 moduli & 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]

Shear Force and Bending Moment: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, U.D.L., uniformly varying loads and combination of these loads – Point of contraflexure – Relation between S.F., B.M and rate of loading at a section of a beam.

MODULE - III: Bending Stresses & Shear Stresses

[14 Periods]

A: Bending Stresses: Theory of simple bending – Assumptions – Derivation of bending equation: $M/I = f/y = E/R$ - Neutral axis – Determination of bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections – Design of simple beam sections.

B: Shear Stresses: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T and angle sections.

MODULE - IV: Deflection of Beams & Torsion

[17 Periods]

A: Deflection of Beams: Bending into a circular arc – slope, deflection and radius of curvature – Differentiate equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, -U.D.L - uniformly varying load.

B: 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]

A: Analysis of Pin-Jointed Plane Frames: Determination of forces in the members of various types of cantilever & simply-supported trusses - by (i) Method of Joints (ii) Method of Sections.

B: 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 “**StrengthofMaterials**”, D. Van Nostrand Company, inc., 3rd edition, 1983.
2. Ramamrutham “**Strengthofmaterials**”Dhanpat Rai Publishing Company, 17th edition, 2013

REFERENCE BOOKS:

- 1.R..K. Rajput, “**StrengthofMaterials**”S. Chand company Pvt, 5th edition, 2014,
- 2.R K Bansal “**StrengthofMaterials**”Lakshmi – publication, 6th edition, 2015
- 3.Bhavikatti “**Strengthofmaterials**”Lakshmi publications, 4th edition, 2014.
4. Sadhu Sing, “**StrengthofMaterials**”, khanna bool publication, 1st edition, 2012
5. Popov “**StrengthofMaterials**”PRENTICE Hall Publisher.
6. D S Kumar, “**StrengthofMaterials**, S K Kataria & Sons, Reprint 2013, 2013.

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

1. The student shall be able to know various stress and strains.
2. Students shall know how to calculate shear force and bending moment
3. Students can utilize knowledge acquired in this subject in day –to -day life for designing of machine elements.

2015-16

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21 -
Credits: 2

Course Code: 52506

B.Tech. – IV Semester
MINE SURVEYING – I

Pre-requisite: Basics of mathematics.

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[12 Periods]

Overview of Plane Surveying (Chain, compass, and plane table), Objectives, Principles and classifications, use of Field Books.

Distance and Directions: Distance measurements conventions and methods. Use of chain and compass, electronic distance measurements, meridians, Azimuths and Bearings, declination, computation of angles.

MODULE –II:Leveling [12 Periods]

Levelling Instruments – component parts, Temporary and Permanent adjustments – methods of levelling – Fly levelling, Differential levelling, Reciprocal levelling.

Computation of Areas and Volumes: Areas from field notes, computation of Areas along irregular boundaries and regular boundaries. Embankments and cuttings, determination of capacity of reservoir, volume of borrow pits.

MODULE –III : PART:(A):Contouring [6 Periods]

Characteristics and uses of contours, methods of conducting contour surveys – their plotting. L.S. and C.S. Surveying – their plotting.

PART:(B):Theodolite Surveying [6 Periods]

Theodolite – description – parts, Temporary and Permanent Adjustments, Measurement of horizontal and vertical angles, Principles of Electronic Theodolite, Trigonometric levelling

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.

TEXT BOOKS:

1. Surveying (Vol-1,2& 3) by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain- Laxmi Publications (P) Ltd., New Delhi.
2. Surveying and leveling (Vol 1 & 2) – Kanitkar, A.V.G. Prakashan
3. DUGGAL S K “Surveying (Vol-1 &2), S.K.Das, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2004
4. Text book of surveying by C. Venkataramaiah , Universities Press.

REFERENCE BOOKS:

1. Elements of Plane Surveying, Arthur R. Benton and Philip J Taetly, McGraw Hill-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.
5. Surveying and Levelling by R Subramanian, Oxford University Press, New Delhi.

Course Outcomes:

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

1. Apply surveying techniques that will remain correctness of plans for long periods of time.
2. Calculate the coordinates of points, RL appoints and bearing of surveying lines.
3. Draw the plans.

2015-16

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Course Code: 52507

**B.Tech. – IV Semester
MINE ELECTRONICS LAB**

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Credits: 2**

List of Experiments:

1. PN Junction Diode Characteristics (Forward bias, Reverse bias)
2. Zener Diode Characteristics
3. Transistor CE Characteristics (Input and Output)
4. Rectifier without Filters (Full wave & half wave)
5. Rectifier with Filters (Full wave & half wave)
6. RC Phase Shift Oscillator.
7. Introduction to 8086 Microprocessor.
8. Addition of 2 - 8 bit numbers
9. Subtraction of 2 - 8 bit numbers
10. Multiplication of 2 - 8 bit numbers
11. Division of 2 - 8 bit numbers
12. Study of application of electronic devices in mining industry.

Equipment Required for the Laboratory:

S. No	Equipment	Specifications
1.	Computers	- Pentium 4 , Windows Xp,1GB Ram , 500 GB HDD
2.	Development Boards	- 8085/8086
3.	Software Required	- MASM/TASM

2015-16

Malla Reddy Engineering College (Autonomous)

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Credits: 2

Course Code: 50356

**B.Tech. – IV Semester
MECHANICS OF SOLIDS LAB**

1. Tension test
2. Bending test on
 - a) Simply supported beam
 - b) Cantilever beam
3. Torsion test
4. Hardness test
 - a) Brinell's hardness test
 - b) Rockwell hardness test
5. Test on springs
 - a) Compression spring
 - b) Extension spring
- 6) Impact test
 - a) Izod
 - b) Charpy
7. To study the fatigue failure of given specimen.
8. To find the hoop stress and strain relationship for the Thin Cylinder.

Note: Any 6 Experiments to be performed from each Section

2015-16

Malla Reddy Engineering College (Autonomous)

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Course Code: 50H17

Credits: 2

B.Tech. – III Semester

**GENDER SENSITIZATION
(An Activity-based 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

[6 Periods]

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

[6 Periods]

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[6 Periods]

Housework: the Invisible Labour (*Towards a World of Equals*: Unit -3)

"My Mother doesn't Work." "Share the Load."

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[6 Periods]

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

[6 Periods]

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.

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* <http://harooreollins.co.in/BookDetail.asp?FlookCndet3732>
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.
7. Menon, Nivedita. *Seeing like a Feminist*. New Delhi: Zubaan-Penguin Books, 2012
8. Jayaprabha, A. "Chupulu (Stares)". *Women Writing in India: 6008C to the Present. Volume II: The 20th Century* Ed. Susie Tharu and K. Lalita. Delhi: Oxford University Press, 1995.596-597.
9. Javeed, Shayan and Anupam Manuhaar. "Women and Wage Discrimination in India: A Critical Analysis.' *International Journal of Humanities and Social Science Invention* 2.4(2013)

10. Gautam, I.ela and Gila Ramaswamy. 'A 'conversation' between a Daughter and a Mother.' *Broadsheet on Contemporary Politics*. Special Issue on *Sexuality and Harassment: Gender Politics on Campus Today*. Ed. Madhumeeta Sinha and Asma Rasheed. Hyderabad: Anveshi Research Center for Women's Studies, 2014.
11. Abdulali Sohaila. *I Fought For My Life...and Won.*"Availableonline at: <http://www.thealternativeinlifestylefi-fouht-for-my-lifeand-won-sohaila-abdulali>
12. Jeganathan Pradeep, Partha Chatterjee (Ed). *Community, Gender and Violence Subaltern Studies Xi* Permanent Black and Ravi Dayal Publishers, New Delhi, 2000
13. K. Kapadia. *The Violence of Development: The Politics of Identity, Gender and Social Inequalities in India*. London: Zed Books, 2002
14. S. Benhabib. *Situating the Salt Gender, Community, and Postmodernism in Contemporary Ethics*, London: Routledge, 1992
15. Virginia Woolf. *A Room of One's Own*. Oxford: Black Swan. 1992.
16. T. Banuri and M. Mahmood, *Just Development: Beyond Adjustment with a Human Fars*, Karachi: Oxford University Press 1997

OUTCOMES:

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

**B.Tech. – IV Semester
LAW FOR ENGINEERS**

Pre-requisite: Nil.

Objectives: The objective of the course is to familiarize students (Prospective engineers) with elementary knowledge of laws that would be of utility in their profession. The syllabus covers Constitution of India and new areas of law like Cyber, IPR, Human Rights, Right to Information, Corporate and Labour.

Module I

[6 Periods]

Constitutional Law covering the Preamble; Fundamental Rights, Fundamental Duties; Human Rights and Public International Law - Theoretical foundation, human rights and international law; UN Mechanism and specialized agencies, (UNICEF, UNESCO, WHO, ILO); International NGOs – Amnesty International, Human Rights Watch, Greenpeace Foundation; Enforcement of Human Rights in India including Supreme Court, High Courts, Statutory Commissions – NHRC, NCW, NCM, NC-SCST.

Module II [6 Periods]

Right to Information Act, 2005 - Evolution and concept; Practice and procedures; Labour Laws - Industrial Employment (Standing Orders) Act, 1946; Workmen's Compensation Act, 1923; (3 Lectures)
Corporate Laws - Law relating to public, private and multinational companies, collaboration agreements for technology transfer

Module III [6 Periods]

Introduction to IT laws & Cyber Crimes – Cyber Crime Investigation and Cyber Security. Intellectual property – meaning, main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets; Patentable inventions, Rights and obligations of patentee, Duration of patents – law and policy considerations, Infringement and related remedies;

Books:

1. H.M. Seervai - Constitutional Law of India - Tripathi Publications – 4th Edition, 1991
2. S.K. Kapur - Human Rights under International Law and Indian Law - Central Law Agency – 2001
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

Outcomes:

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

1. Understand Fundamental rights, duties and different organizations for human rights protection.
2. Know Labour laws, Corporate Law and Right to Information Act.
3. Learn about Intellectual property rights, cyber crimes and laws.

2015-16

Malla Reddy Engineering College (Autonomous)

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Credits: 3

Course Code: 52508

B.Tech. – V Semester MINING MACHINERY

Pre-Requisite: Engineering Mechanics, Mechanical Technology,

Objectives: This course introduces prime movers used for moving of mining machinery. Rails, joints, crossings. Plates for track laying. Locomotives used in mines, drills used for drilling mines.

MODULE-I: Prime Mover for Mining Machinery [12 Periods]

O.C. engine, hydraulic power, pneumatic power, elements of mechanical power transmission – gear, belt, chain, coupling, clutch and brake.

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, signaling, Statutory requirements of haulages.

MODULE-III: PART-A: Track Laying [6 Periods]

Rail, joints, crossings, plates, turn tables on curves, track extension

PART-B: Aerial Ropeways: [6 Periods]

Types, construction, Application and operation.

MODULE-IV: Mine Locomotives [12 Periods]

Types, constructional features of compressed air, diesel, battery and electric trolley-wire locomotives, comparison of various locomotive haulages. Comparison of rope and locomotive haulages.

Conveyors: Principle types and their operations, installation, shifting, maintenance and applicability, shuttle cars, stage loaders, bridge conveyors, capacity.

MODULE-V: Drills for Coal and Stone [12 Periods]

Various types, their construction and maintenance, Jumbo drills.

Outcomes:

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

1. Analyse mechanism involved in heavy machinery, locomotives used in mines, 2. Plan
2. Track laying with different techniques.
3. Decide application of Different types of drills used in mines.

TEXT BOOKS:

1. Elements of Mining Technology Vol. III, D.J. Deshmukh, Denett & Company,
2. Coal Mining Services Vol. 1 & II, Ernest Mason, Virtue
3. 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..

2015-16

Malla Reddy Engineering College (Autonomous)

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Credits: 3

Course Code: 50H12

B.Tech. – V Semester

ENGINEERING ECONOMICS AND ACCOUNTANCY

PREREQUISITES: Nil

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

MODULE – I: Managerial Economics and Demand [12

Periods] **Introduction to Managerial Economics:** Definition, Nature and Scope of Managerial Economics–Demand Analysis: Demand Determinants, Law of Demand and its exceptions.

Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

MODULE – II: Theory of Production and Cost Analysis [11 Periods]

Theory of Production: Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.

Cost Analysis: Cost concepts, Opportunity cost, fixed vs. Variable costs, explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEA.

MODULE – III: Market structures and Pricing Policies [11 Periods]

Introduction to Markets & Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.

Pricing Policies & Methods: Cost Plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Two-Part Pricing, Block Pricing, Bundling Pricing, Peak Load Pricing, Cross Subsidization.

MODULE – IV: Business Environment and Capital Budgeting [11 Periods]

Business & New Economic Environment: Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario.

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

MODULE – V: Financial Accounting and Ratios [11 Periods]

Introduction to Financial Accounting: Double-Entry Book Keeping, Journal, Ledger, Trial

Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

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

TEXT BOOKS:

1. Aryasri, “**Managerial Economics and Financial Analysis**”, TMH, 2nd Edition, 2005. (Modules I, II, III, IV & V)
2. Varshney & Maheswari, “**Managerial Economics**”, Sultan Chand, 5th Edition, 2003. (Modules I, II & III)

REFERENCE BOOKS:

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

Outcomes:

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

1. Think in the terms of a managerial economist.
2. Appraise economic articles in newspapers such as Economic Times.
3. Solve quantitative problems in a business environment.
4. Acquire an ability to apply knowledge of economic concepts, accounting concepts.
5. Identify, formulate, and solve financial problems.
6. Gain knowledge of Financial Concepts as applied to Business Management.

2015-16

Malla Reddy Engineering College (Autonomous)

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4 - -

Course Code: 52509

Credits: 4

**B.Tech. – V Semester
MINE VENTILATION**

Pre-Requisite: Fundamentals of Fluid Mechanics

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

MODULE-I [12 Periods]

Atmospheric air-its composition, mine air – its composition and variation, origin, occurrence, physical, chemical and physiological properties and monitoring of mine gases, various types of damp. Sampling and analysis of mine air. Methane drainage and methane layering of gases.

Heat and humidity: Sources of heat in mines, effect of heat and humidity, psychometric, kata thermometer, methods of improving of cooling power of mine air. Air conditioning basic vapour cycle, representative layout.

MODULE-II: Air flow through mine openings [12 Periods]

Laws of air flow, resistance of airways, equivalent orifice, distribution of air, flow control devices.

Natural Ventilation: Calculation of NVP from air density, artificial aids to natural ventilation.

MODULE-III: PART-A: Mechanical ventilation [6 Periods]

Principal types of mine fans and their suitability, merits, limitation, efficiency and characteristics. Selection of mine fan, fan testing, output control in fans.

PART-B: [6 Periods]

Series and parallel operation of mine fans. Auxiliary fan, duct, matching of fan to the duct system. Reversal of air current. Fan drift, evasee, diffuser, booster fans, Face Ventilation.

MODULE-IV: Ventilation planning [12 Periods]

Standard of ventilation including permissible air velocities.

Ascensional, descensional, homotropical, anti-tropical ventilation. Central and boundary ventilation – layouts and comparison.

MODULE-V [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 University Press.
2. Mining and Environment, Dhar B.B, APH Publishing.

Outcomes:

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

1. Plan Basic ventilation systems.

2. Decide various devices and equipment required for ventilation.

2015-16

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Credits: 3

Course Code: 52510

B.Tech. – V Semester SURFACE MINING TECHNOLOGY

Pre-Requisite: Mining Geology, Mine environmental engineering, Mine surveying.

Objectives: Course introduces surface mining methods along with the associated activities such as drilling, blasting, supporting etc for mines. Opening up of deposits with Box cut, excavation for transportation, heavy earth moving machinery in the surface mines.

MODULE-I: Basic concept of Surface Mining [12 Periods]

Status of surface mining in India. Selection between surface mining and underground mining, Preliminary evaluation of surface mining prospects; stripping ratio – concepts and significance, mine life.

MODULE-II: Opening up of deposits with Box Cut [12 Periods]

Factors affecting selection of site of box-cut, Production benches – formation parameters and factors affecting their selection.

Preparation for Excavation: Working principle of ripper and Scraper—their cycle of operation, application and limitation. Drilling, types of blast hole drills, performance parameters of drills, estimation of number of drill for a given mine production. Problems associated with drilling and blasting.

MODULE-III: PART-A: Excavation and Transportation [6 Periods]

Cyclic methods—shovel-dumper, pay-loader, dragline Principle and operation of these machines, their advantages and limitations capacity calculations, maintenance.

PART-B: [6 Periods]

Continuous methods— bucket wheel excavator, bucket chain excavator, continuous surface miner, conveyors. Principle and operation of these machines, their advantages and limitations capacity calculations, maintenance.

MODULE-IV: Design and organization [12 Periods]

Other equipments—dozer, grader, loader, scraper, dumper, maintenance of open pit equipment crusher.

Basic design principle of large opencast mines and their organizational structure. Mechanical quarries over underground developed zones. Placer Mining and Sea bed Mining: Ground sluicing, Hydra licking and Dredging Exploitation systems of ocean mineral resources.

MODULE-V: Relevant provisions of coal mines and metalliferous mines regulation

[12 Periods]

Environmental problems due to surface mining and their remedial measures. Recent developments in the deployment of heavy earth moving machineries in the surface mines.

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 Mining, Singh R.D, New Age International.

2. Mine Planning For Coal, Mathur S.P., M.G. Consultants
3. Introductory Mining Technology – H L Hartman, Wley India (p) Ltd.

Outcomes:

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

1. Understand about difference of surface mining machinery required, environmental surface mining.
2. Decide the deployment of heavy earth moving machineries in the surface mines.

2015-16

Malla Reddy Engineering College (Autonomous)

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Credits: 3

Course Code: 52511

B.Tech. – V Semester MINE CONSTRUCTION ENGINEERING (PE-I)

Pre-Requisite: Environmental Studies

Objectives: This course introduces site selection procedure, Shaft sinking methods, Mechanization, Loose groundshaft lining, Design of lining, Surface layouts, Open pit mines opening out trenches, Scheduling for mine constructions PERT/CPM.

MODULE-I

[12 Periods]

Size of mine Environment and ecology, selection criteria for site of the openings geological investigation.

MODULE-II

[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: PART-A

[6 Periods]

Design and procedure of laying the lining, construction of shaft collar heapstead.

PART-B:

[6 Periods]

Design and construction of insets, shaft bottom, excavation for mechanized decking of cages, skip loading, pit bottom lay outs, installation of main haulages.

Main sump size, construction under ground substation, first aid room and office.

MODULE-IV

[12 Periods]

Surface inclines, drivage through soft and hard rock, construction and lining of inclines, lateral and vertical and vertical pressures. Under ground development, drivage of roads in stone and coal, mechanization support systems opening of faces.

Surface layouts pit top circuits and coal handling and coal preparation plant, railway sifting and weigh bridges, surface and underground coal bunkers winding house substation, lamp room. Pit head bath, crèche dispensary: office, work-shop, material handling stowing installations, bunker, water tanks, mixing chamber.

MODULE-V

[12 Periods]

Open pit mines opening out trenches, haul roads, construction of benches. Assembling and transporting of draglines, shovels etc. Scheduling for mine constructions PERT/CPM

TEXT BOOKS:

1. Design of Underground hard coal mine, J. Pazdziora, Elsevier.
2. Opencast Mining: MODULE Operations, V. V. Rzhovsky- Mir Publications.

REFERENCE BOOKS:

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

Outcomes:

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

1. Select of suitable sites for mines.
2. Apply different sinking methods.

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Credits: 3

Course Code: 52512

**B.Tech. – V Semester
ROCK EXCAVATION ENGINEERING
(PE-I)**

Pre-Requisite: 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

[6 Periods]

PART-A: Blasting

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:

[6 Periods]

Advanced blast initiation systems, blast performance evaluation, cast blasting, techno economic and safety aspects of surface and underground blasting.

MODULE-IV

[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

Outcomes:

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

1. Know about rock excavation, excavation methods, drillability to cut rocks, drill wear.
2. Optimize, Safety aspects of surface and underground blasting,
3. Use Computer aided blast designs.

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Credits: 3

Course Code: 52513

B.Tech. – V Semester DRILLING AND BLASTING (PE-I)

Pre-Requisite: fundamental activates for extraction of mineral.

Objectives: Basic principles of drilling & blasting, blasting technology, Drill machines and explosives.

MODULE-I: Exploratory Drilling [12 Periods]

Drilling for exploration and other purposes,; various types of drilling equipment – their merits, demerits and limitations; core recovery – single and double tube core barrels, wire line drilling; directional drilling, fishing tools; borehole surveying; borehole logging; novel and special drilling techniques, Horizontal and directional drilling.

MODULE-II: Production Drilling [12 Periods]

Production drilling; various methods of drilling – percussive, rotary, rotary percussive.

Drillability:

Factors affecting drilling - thrust, r.p.m., flushing, etc.; mechanics of drilling; drillability and drilling index; micro-bit drilling; physico-mechanical properties affecting drillability; design and selection of drills; bit wear; reconditioning of drill bits; drill hole economics; case studies.

MODULE-III: PART-A: Explosives [6 Periods]

Types of explosives – small diameter, large diameter. Permitted, bulk slurry, SMS, EMS, ANFO, HANFO, LOX, boosters, blasting agents. mechanics of blasting, alternatives to explosives.

PART-B: Accessories and Tools [6 Periods]

Accessories-detonators, safety fuses, detonating cords, relays, NONEL, exploders, sequential blasting machines and other shot firing tools, testing of explosives, storage, transportation and handling of explosives,

MODULE-IV: Underground Blasting [12 Periods]

Drill patterns for underground excavations, shafts, blast patterns designs, smooth blasting, induced blasting, charge ratios, rock fragmentation, dangers associated with underground blasting, blasting economics, gallery blasting, statutory requirement, computer design of underground blast, precautionary measures, misfires, solid blasting.

MODULE-V: Open Pit Blasting [12 Periods]

Methods of blasting in opencast mines, blast design, primary and secondary blasting, fragmentation studies, accidents due to blast in opencast and preventive measures, environmental impact due to blasting, ground vibrations, fly rocks, dust, fumes, water pollution, dimensional stone blasting, controlled blasting, statutory requirements, computer design of opencast blast.

Blasting for Civil Constructions and Trenches:

Blasting for road constructions, trench cutting in soft and hard rocks, demolition of building etc., underwater 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. Principles and practices of modern coal mining, R.D. Singh, New age International, 1st ed, 1977.
5. Explosive and blasting practices in mines, S.K.Das, Lovely prakashan, 1st ed, 1993.

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

1. Plan blast design for surface mines and underground mines.
2. Select the type of explosives required.
3. Select the drill machines required.

2015-16

Malla Reddy Engineering College (Autonomous)

L T P

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Credits: 3

Course Code: 52514

B.Tech. – V Semester

UNDERGROUND COAL MINING TECHNOLOGY

Pre-Requisite: Mining Geology, Surface mining Technology.

Objectives: To understand the details of development of a mine for exploitation of mineral deposits. To Analyzedesign 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 [12 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 [12 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:PART-A: Pillar Extraction [6 Periods]

Preparatory arrangement for depillaring operation, statutory provision for depillaring, principle and designing of pillar extraction, size of a district.

PART-B: [6 Periods]

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 [12 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 [12 Periods]

Mechanized extraction of long wall panel with shearer and plough trepanner; support systems of long wall face and gate roads.

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.
3. Modern Coal Mining Technology, Das S.K. – Lovely Prakasan 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.

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

1. Understand mine planning, opening of deposits, pillar development, pillar extraction, layout required for out puts, long wall mining, mechanized extraction of long wall panel.

2015-16

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Credits: 2

Course Code: 52515

B.Tech. – V Semester

MINE SURVEYING LAB-I

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 & Reduction of level.
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 inaccessible points.

2015-16

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L T P

-- 4

Credits: 2

Course Code: 52516

**B.Tech. – V Semester
MINE VENTILATION LAB**

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. Reversal of Ventilation system.
9. Measurement of air quantity by anemometer velometer and smoke tube.
10. Study and analysis ventilation network circuit.
11. Study of mine air-conditioning plant.
12. Constructional features of a flame safety lamp and cap lamp.

2015-16

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L T P

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Course Code: 50H05

Credits: 1

B.Tech. – V Semester SOFT SKILLS

Pre-Requisite: Nil

Introduction:

Today's dynamic business world seeks ways to help their work force learn as they progress through applicable information to help drive business. In keeping with the evolving need of firms and the recruiting process, this course aims at catering to the needs of the students fresh from the academic background ready to enter the world of work from the HR perspectives of any company. Perhaps it is noticed that an intelligent individual lacks the ability to work on team assignments, communicate with clients, or maintain professionalism. This course is a comprehensive preparation and a bridge course that would enable the students to be industry ready before they wind up their undergraduate course. The modules that are chosen are the ones that the industry experts from Infosys emphasize upon. Apart from the technical skills, the course intends to enhance the employability skills and make them employment ready.

Objectives:

- To broaden the perspective of job seekers and help them gain awareness on the standards and the expectations of the recruiters in the industry.
- To draw a link between the academics and the industry and emphasize the importance of the right attitude, grooming, etiquette, self motivation, empathy, commitment, responsibility, self awareness and patience while dealing with a variety of people
- Refining the communication skills of the students
- Sharpen the analytical skills for appropriate decision making
- To develop the art of communication; verbal and non verbal for effective inter and intra personal skills

Syllabus:

1. Spoken aspects of Communication
2. Work/Business etiquette- dressing and grooming, telephone etiquette, meeting etiquette, dining etiquette, small talk, dealing with people
3. Business communication-Fundamentals of effective communication, Barriers and filters
4. Work in teams-Team concept, advantages of working in teams, team players/leaders
5. Intra personal skills- handling negative emotions;attitude,self confidence, self esteem
6. Principles of goal setting
7. Effective Time management skills
8. Reading skills
9. Writing skills
10. Digital language

Reference books:

- The Power of Habit: Why We Do What We Do in Life and Business by Charles Duhigg
- The Zen of Steve Jobs (Paperback) by Caleb Melby
- Software Systems Architecture: Working with Stakeholders Using Viewpoints and Perspectives by Nick Rozanski
- The Art of Focused Conversation: 100 Ways to Access Group Wisdom in the Workplace (Paperback) by R. Brian Stanfield
- The Little Book of Talent: 52 Tips for Improving Your Skills by Daniel Coyle
- The 7 Habits of Highly Effective People: Powerful Lessons in Personal Change (Paperback) by Stephen R. Covey
- How to Win Friends and Influence People (Paperback) by Dale Carnegie
- Thinking, Fast and Slow by Daniel Kahneman
- Never Eat Alone: And Other Secrets to Success, One Relationship at a Time by Keith Ferrazzi
- Emotional Intelligence: Why It Can Matter More Than IQ by Daniel Goleman
- The Effective Executive: The Definitive Guide to Getting the Right Things Done (Paperback) by Peter F. Drucker
- How to Recruit and Hire Great Software Engineers: Building a Crack Development Team (Paperback) by Patrick McCuller
- Quiet: The Power of Introverts in a World That Can't Stop Talking by Susan Cain
- The \$100 Startup: Reinvent the Way You Make a Living, Do What You Love, and Create a New Future by Chris Guillebeau
- The Presentation Secrets of Steve Jobs by Carmine Gallo Ackoff, Ressel Lincoln. The art of Problem solving. New York: Wiley.
- The Leader's Guide to Influence: How to Use Soft Skills to Get Hard Results (Paperback) by Mike Brent.

2015-16

Malla Reddy Engineering College (Autonomous)

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3 - -

Credits: 3

Course Code: 52517

**B.Tech. – VI Semester
MINE HAZARDS AND RESCUE**

Pre-Requisite: Mine Environmental Engineering-II

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

MODULE-I: Spontaneous Combustion

[12 Periods]

Various theories, factors, various indices for determination of susceptibility of coal to spontaneous heating, control measures.

Mine Fires:

Survey of various causes of mine fires with statistical data of Indian mines, various methods adopted to combat fires and their advantages and disadvantages.

MODULE-II

[12 Periods]

Advances in fire fighting techniques and equipments, rescue operations in fire zones.

Reopening of Selected off areas:

Factors to be considered, methods, precautions.

Reopening of sealed-off areas:

Factors to be considered, methods, precautions. Mine Explosions: Causes of firedamp explosion with statistical data of Indian mines, preventive measures against firedamp explosion.

MODULE-III

[6 Periods]

PART-A:

Production, assessment and control of mine dust and associated hazards.

PART-B:

Causes of coal dust explosion with statistical data of Indian mines, preventive measures against coal dust explosion.

MODULE-IV: Mine Inundation

[6 Periods]

Causes of inundation with statistical data of Indian mines. Precaution to be taken while approaching old workings, preventive measures of inundation.

Noise and Vibrations: Causes and measurement of noise levels. Precautions, prevention and reduction of noise levels. Environmental aspects of blast induced vibration and noise.

MODULE-V: Mine illumination

[12 Periods]

Illumination standard, common types of flame safety lamps, their use and limitations, cap lamp, and organization. Illumination arrangement of open cast and underground working. Rescue and recovery work, equipment, short distance apparatus. Self contained oxygen-breathing 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.

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

1. Understand various indices for determination of susceptible of coal to spontaneous heating control measures.
2. Know various Mine illumination systems.
3. Plan rescue operations.

2015-16

Malla Reddy Engineering College (Autonomous)

L T P

3- -

Credits: 3

Course Code: 52518

B.Tech. – VI Semester

MINE SURVEYING – II

Pre-Requisite: 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

[12 Periods]

Use of the Theodolite for tacheometric Surveying – Principles, Stadia and tangential methods, measurements of heights and distances by tacheometry, Distance and Elevation formulae for Staff vertical position.

Setting out curves: types of curves, curve ranging, design and setting out, simple and compound curves, surface and underground curves.

MODULE –II: photogrammetric

[12 Periods]

Principles of photogrammetry, Aerial Photographs, scale of vertical photographs, Terrestrial Photogrammetry, Mapping.

Geodetic astronomy: Latitude, Longitude, Meridian Transits, satellites and cameras, Errors – Theory of errors, adjustments.

MODULE –III: PART :(A): Mine surveys

[6 Periods]

Verticality of shafts, measurement of depth of shafts, Surveys for connecting national grid, survey of installations of mine structures.

PART :(B): Global positioning systems

[6 Periods]

Introduction to Global Information system (GIS), Remote Sensing – basic Principles, Integration of RS and GIS.

MODULE –IV: Total station

[12 Periods]

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, GIS Software's.

TEXT BOOKS:

1. surveying (Vol – 1,2 & 3), by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) Ltd., New Delhi.
2. Surveying (Vol 1,2& 3), Duggal S.K. Tata Mc.Graw Hill Publishing Co.Ltd. New Delhi, 2004
3. Text book of surveying by C. Venkataramaiah, Universities Press.

REFERENCES BOOKS:

1. Elements of Plane Surveying, Arthur R Benton and Philip J Taety, McGraw Hill-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. Publisher, New Delhi, 2002

4. Higher Surveying , Chandra A M. ,New age International Pvt. Ltd. Publisher, New Delhi, 2002
5. Surveying and leveling by R. Subramanian, Oxford University Press, New Delhi.

COURSE OUTCOMES:

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

1. Correlating the underground workings with that of surface structures.
2. Draw plans of multi sections.

2015-16

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4 - -

Course Code: 52519

Credits: 4

B.Tech. – VI Semester

ROCK MECHANICS

Pre-Requisite: Drilling and Blasting,

Objectives: physico-mechanical properties of rocks, elastic and time dependent behavior, mass classification, Theories of rock failure, subsidence, mechanics of rock burst and bumps, numerical methods of geomechanics with applications.

MODULE-I

[12 Periods]

Physico - mechanical properties of rocks, Elastic and time dependent behavior, Rock mass classification.

MODULE-II

[12 Periods]

Theories of rock failure, Stress analysis, Insitu stress and stress distribution around mine openings. Ground failure and pressure on supports, Stability of wide openings, Design of supports in mine workings,.

MODULE-III: PART-A:Subsidence

[6 Periods]

Causes and impacts of subsidence, Mechanics of surface subsidence

PART-B:

[6 Periods]

Discontinuous and continuous subsidence. Monitoring, prediction, control and management of subsidence.

MODULE-IV

[12 Periods]

Mechanics of rock burst and bumps, Stability of slopes. Instrumentation and measurement of insitu stresses and rock strength, Photoelasticity and scale model studies.

MODULE-V

[12 Periods]

Basics of numerical methods in geomechanics with applications. (Continuous models, discontinuous models).

TEXT BOOKS:

1. Fundamental of Rock Mechanics by J.C Jaeger & N.G.W. Cook, Blackwell Publishing
2. Rock Mechanics by Alfreds R. Jumikis, Trans Tech Publications

REFERENCE BOOKS:

1. Coal Mining ground Control by Syd S. Peng, West Virginia University.
2. Rock Mechanics for underground Mining– BHG Brady & E T Brown, George Allen & Unwin Ltd, 1992.

Outcomes:

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

1. Understand mechanical properties of rock, different theories of rock failure.
2. Know Causes and impacts of subsidence, rock strength and stresses induced in rocks.

2015-16

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3- -

Course Code: 52520

Credits: 3

**B.Tech. – VI Semester
MINE SUBSIDENCE ENGINEERING
(PE-II)**

Pre-Requisite: Mining Geology, Mine Mechanization, Surface Mining Technology.

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

MODULE-I: Introduction [12 Periods]
Strata movement at the mining horizon, convergence in mine working, factors influencing convergence in mine working.

MODULE-II: Subsidence mechanism [12 Periods]
Zones of movement in the overlying beds, vertical and horizontal movement, subsidence trough, angle of draw, angle of break, sub-surface subsidence.

MODULE-III: PART-A: Subsidence prediction [6 Periods]
Different methods of surface subsidence prediction.

PART-B: [6 Periods]
Graphical, analytical, profile function, empirical and theoretical models.

MODULE-IV: Time influence and impact on structures [12 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 behaviour of soils, mining damage to buildings, industrial installations, railway lines, pipes, canals, etc.,

MODULE-V: Subsidence control, governing laws and standards [12 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 studies 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.

Outcomes:

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

1. Understand strata movement at the mining horizon, convergence in mine working.
2. Know Subsidence mechanism, subsidence prediction, types of stresses on structures, stress-strain behavior of soils, measures to reduce damage, methods to minimize damage, laws governing mining damage, Case studies of mine subsidence.

2015-16

Malla Reddy Engineering College (Autonomous)

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3- -

Course Code: 52521

Credits: 3

B.Tech. – VI Semester COMPUTER APPLICATION IN MINING (PE- II)

Pre-Requisite: Machine Drawing and Computer Aided Graphics, Rock slope Engineering.

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

MODULE-I [12 Periods]

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 [12 Periods]

Open pit design, Ultimate pit design, introductory process control, underground mine design, production scheduling.

MODULE-III: PART-A [6 Periods]

Operational Simulation, Introduction, Simulation overview, objective, understand the role of modeling, Understanding the basic concept in simulation. .

PART-B: [6 Periods]

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 [12 Periods]

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 [12 Periods]

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 BOOK:

1. Application of Computer Methods in the Mineral Industry, R.V. Ramani.

Outcomes:

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

1. Understand flow charts, programs, design of pit& underground mines, simulations computercontrol, remote control, applications and limitations of control.

2015-16

Malla Reddy Engineering College (Autonomous)

L T P

3- -

Course Code: 52522

Credits: 3

**B.Tech. – VI Semester
MINERAL ECONOMICS
(PE-II)**

Prerequisites: Basic mining operations.

Objectives: Student should be aware of methods to access economic value of minerals.

Module-I: The Mineral Industry [12 Periods]

Economic characteristics of the mineral industry in India and world , the place of minerals in the national and international Economy.

Module-II [12 Periods]

Brief survey of India's mineral resources in the world setting with special reference to its need and deficiencies.

Module-III: Part-A: Mining companies and mine Accounts [6 Periods]

Structure, formation and capitalization, principles of book keeping as applied to the mining industry

Part-B [6 Periods]

Presentation of accounts, balance sheets and profit and loss accounts, Depreciation DCF, IRR.

Module –IV: Mine Valuation [12 Periods]

Mineral reserves mining reserve and profit examination and report on mines.

Module-V [12 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. Chatterjee KK —Mineral Economics, Willey Estern.
3. Mineral Economics, GB Misra.

Reference Books:

1. Rubawsky —Mineral Economics, Elsvvier Science pub.
2. Sharma N.L. —Mineral Economics.

Outcomes:

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

1. Make decisions with regard to selection of working areas and deployment of machinery.

2015-16

Malla Reddy Engineering College (Autonomous)

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Credits: 3

Course Code: 52523

B.Tech. – VI Semester UNDERGROUND COAL GASIFICATION (PE-III)

Pre-Requisite: 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 [12 Periods]
Chamber method, Stream method, Borehole procedure method, Blind bore hole method. Non-Mining methods of UCG: Level seams, Inclined seams.

MODULE-III: PART-A: Linkage Techniques [6 Periods]
Precolation linkage, Electro linkage, Boring linkage.
PART-B: [6 Periods]
compressed-air-linkage, Hydraulic fracture linkage.

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

MODULE-V: Future Scope and Development [12 Periods]
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.

Outcomes:

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

1. Understand the concept of gasification, Technology involved in it, Non-mining methods of UCG, Gasification at great depth, merits and demerits, Future scope and Development.

2015-16

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Credits: 3

Course Code: 52524

B.Tech. – VI Semester MINE SYSTEMS ENGINEERING (PE-III)

Pre-Requisite: Mathematics

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

Codes/Tables: Nil

MODULE-I: [12 Periods]

Development – Definition– Characteristics and Phases – Types of models – operation Research models – applications.

Allocation:

Linear Programming Problem Formulation–Graphical solution–Simplex method–Artificial variable techniques -Two–phase method, Big-M method – Duality Principle.

Transportation Problem :

Formulation–Optimal solution, unbalanced transportation problem–Degeneracy. Assignment problem – Formulation – Optimal solution - Variants of Assignment Problem-Traveling Salesman problem. Mining examples.

MODULE-II: Sequencing [12 Periods]

Introduction–Flow –Shop sequencing– n jobs through two machines– n jobs through three machines–Job shop sequencing – two jobs through m machines.

Replacement:

Introduction–Replacement of items that deteriorate with time–when money value is not counted and counted – Replacement of items that fail completely, group replacement.

Theory of Games: Introduction–Minimax (maximin)–Criterion and optimal strategy– Solution of games with saddlepoints – Rectangular games without saddle points – 2×2 games – dominance principle – $m \times 2$ & $2 \times n$ games - graphical method.

MODULE-III: [6 Periods]

PART-A: Waiting Lines

Introduction–Single Channel–Poisson arrivals–exponential service times–with infinite population and finite population models.

PART-B:

[6 Periods]

Multichannel – Poisson arrivals – exponential service times with infinite population single channel Poisson arrivals, Mining examples.

MODULE-IV: Inventory [12 Periods]

Introduction–Single item–Deterministic models–Purchase inventory models with one price break and multiple price breaks – shortages are not allowed – Stochastic models – demand may be discrete variable or continuous variable – Instantaneous production. Instantaneous demand and continuous demand and no set up cost-single period model.

MODULE-V: Dynamic Programming [12 Periods]

Introduction–Terminology-Bellman's Principle of optimality –Applications of dynamic programming- shortest path problem – linear programming problem.

Application of Management Science in Mining Industry:

Application of waiting line theory to mineral transport system in open cast mines.
Application of linear programming models for resource allocation. Application of inventory principles in mining industry.

TEXT BOOKS:

1. Introduction to O.R /Taha/PHI Publishers
2. Operations Research / S.D.Sharma/Kedarnath Publisher
3. Introduction to O.R/Hiller & Libermann/McGraw Hill Publications

REFERENCES BOOKS:

1. Operations Research /A.M.Natarajan, P.Balasubramani,A. Tamilarasi/Pearson Education.
2. Operations Research: Methods & Problems / Maurice Saseini, Arthur Yaspan & Lawrence Friedman/ Literary Licensing
3. Operations Research / R.Pannerselvam,PHI Publications.
4. Operations Research / Wagner/ PHI Publications.
5. Operation Research /J.K.Sharma/MacMilan Publisher
6. O.R/Wayne L.Winston/ Thomson/Brooks/Cole Publisher.

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

1. Consider real-world problems and determine whether or not linear programming is an appropriate modeling framework.
2. Apply the models for optimal solutions and interpret the models' solutions.

Malla Reddy Engineering College (Autonomous)

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3- -

Credits: 3

Course Code: 52525

B.Tech. – VI Semester STRATA CONTROL TECHNOLOGY (PE-III)

Pre-Requisite: 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: Geo mining conditions [12 Periods]

Geological factors contributing to strata control problems in mines, Geo mechanics classification of rocks.

MODULE-II: Safety status [12 Periods]

Status of safety in coal mines vis-à-vis strata control problems, Assessing the risk from the hazards of roof & side falls.

MODULE-III: PART-A: Design of support system [6 Periods]

Design of support system for development and depillaring workings.

PART-B: [6 Periods]

Design of support system for long wall workings, application of modeling techniques to strata control problems.

MODULE-IV: Strata behavior studies [12 Periods]

Instrumentation for evaluation of strata condition in coal mines, Strata control techniques and its application to coal mining industry. Case studies on geotechnical instrumentation and strata control in coal mines. Demonstration of geotechnical instrumentation and computer softwares.

MODULE-V: Organization of strata control cell [12 Periods]

Strata control cell in mines, Training needs of the first line supervisors for effective implementation of the latest strata control technologies.

TEXT BOOKS:

1. Strata mechanics in coal mining, M L Jeremic, CRC Press.
2. 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. Rock Mechanics for Underground Mining, B.H.G. Brady and E.T. Brown, George Allen and Unwin Ltd., 1992.
3. Comprehensive Rock Engineering, J.A. Hudson, Pergamon Press, UK, 2000
4. Engineering Rock Mass Classifications, Bieniawski Z.T. 1989, Wiley, New York
5. Longwall mining, Peng S S and Chiang HS, Wiley, New York, 708p.

Outcomes:

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

1. Understand factors contributing to strata control problems, Status of safety in mines.
2. Design of support system for development and depillaring.
3. Understand Strata behavior indices.

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Course Code: 52526

Credits: 2

**B.Tech. – VI Semester
MINE SURVEYING LAB – II**

1. Correlation by two shaft methods S/T
2. Correlation by two shaft methods U/T
3. Correlation by two shaft co-plantation methods
4. Correlation by single shaft weisbatch methods.
5. Correlation by single shaft weiss quadrilateral methods
6. Curve ranging offsets from long chord
7. Curve ranging Ranking methods
8. Curve Tacheometric methods
9. Curve ranging Tacheometric method
10. Finding the height of an in accessible object
11. Reading mine plans
12. Finding Horizontal & Vertical distance by Techometry

2015-16

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-- 4

Course Code: 52527

Credits: 2

**B.Tech. – VI Semester
MINE SAFETY ENGINEERING LAB**

1. Study of 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. Study of oxygen self rescure.
8. Study of self contained breathing apparatus.
9. Study of reviving apparatus.
10. Study of flat concrete dams.
11. Study of brick and concrete dam.
12. Study of brick dams.
13. Study of crossing point temperature.
14. Study of main sumps.

2015-16

Malla Reddy Engineering College (Autonomous)

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2 - -

Course Code: 50H03

Credits: 2

B.Tech. – VI Semester

TECHNICAL COMMUNICATION AND PRESENTATION SKILLS

Prerequisites: Basic English.

Objectives: The learners need to be aware of the characteristics of technical communication. The learners are exposed different channels of technical communication. The learners should be an effective communicator.

Introduction: Identifying the importance of communication at work and the nuances of technical communication became imperative to technical graduates. This course intends to introduce the importance, characteristics and nuances of technical communication. Technical communication is all about exchange of information that helps people interact with technology and solve complex problems. Since the communication skills cannot be taught but be developed through practice the student will be competent communicator through application and the use of the concepts and activities in different units.

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

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

MODULE - I: Technical Vocabulary [6 Periods]

Building vocabulary – identify formal and informal vocabulary – identify technical vocabulary – tips to enhance technical vocabulary, Basics of English Pronunciation.

MODULE - II: Technical writing [6 Periods]

Characteristics of writing – mechanics of writing – methodology of writing – format & style-structures of writing – circular writing – memo writing – instructions writing.

MODULE - III: Technical Report writing [6 Periods] Types of

report, Abstract Writing, Project report writing, importance of pictorial presentation- graphs, diagrams etc

Instruction: The students are required to work on a project. Field work and collection of information, prepare a project report.

MODULE - IV: Oral Presentations [6 Periods]

Types of Presentations, 4Ps of Effective Presentation, Elements of effective presentations, Planning and preparing a model presentation, organizing, Barriers of making effective presentation.

Present the project in the form of Power Point Presentation and written document. This report will be given weightage during the external examination.

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

MODULE - V: Strategies of Reading Technical Text [6 Periods]

Note-making, SQ3R, Reading and answering the technical texts, Reading for Specific Purposes.

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.
6. Pease , Barbara and Pease, Allan: "**The Definitive Book on Body Language**", Manjul Publishing House Pvt Limited, 2011
7. Rizvi M Ashraf, "**Effective Technical Communication**", Tata McGraw-Hill, New Delhi, 2010.
8. Whitcomb, Susan Britton, "**Resume Magic: Trade Secrets of a Professional Resume**", JIST Works, 2010.

WEBSITES:

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>

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

1. The learner is ready to bring into play latest communication devices.
2. The learner is equipped with the nuances of technical communication

Course Code: 50H04

Credits: 2

B.Tech. – VI Semester

TECHNICAL COMMUNICATION AND PRESENTATION SKILLS LAB

Objectives:To help the students understand the requisites to successfully deliver as professionals and the challenges they need to encounter. To help them make a smooth transition from the academic world into the professional world. To refine their style of individual communication and develop a personal style.To broaden and raise awareness about the dynamics of technical communication in the work environment.To integrate the learning experience with the functional areas of communication.Helping the students to become industry ready.

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

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

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

MODULE – I: Oral Presentation

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

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

MODULE – II: 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.

MODULE – III: Group Discussion

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

MODULE – IV: Interview skills & Office etiquette

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

MODULE – V: 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 unit is purely for internal assessment/evaluation

REFERENCESBOOKS:

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.
6. Pease, Barbara and Pease, Allan: **The Definitive Book on Body Language**: Manjul Publishing House Pvt Limited, 2011
7. Rizvi M Ashraf: **Effective Technical Communication** : Tata McGraw-Hill: New Delhi, 2010.
8. Whitcomb, Susan Britton: **Resume Magic: Trade Secrets of a Professional Resume**: JIST Works, 2010.

WEBSITES:

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>

2015-16

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3- -

Credits: 3

Course Code: 52528

B.Tech. – VII Semester

INTRODUCTION TO MINERAL PROCESSING

Pre-Requisite: Development of Mineral Deposits

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

MODULE-I: Introduction

[12 Periods]

Scope, objectives and limitations of mineral processing, liberation and beneficiation characteristics of minerals and coal.

Comminution:

Theory and practices of crushing and grinding; different types of crushing and grinding equipments – their applications and limitations.

MODULE-II: Size Separation

[12 Periods]

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: PART-A: Froth Floatation

[6 Periods]

Physico-chemical principles, reagents.

PART-B:

[6 Periods]

Machines, floatation of sulphides, oxides and coal.

MODULE-IV

[12 Periods]

Principles, fields of applications and limitations.

MODULE-V: Flow Sheets

[12 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 A Wills, Elsevier.

REFERENCE BOOKS:

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

Outcomes:

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

1. Know Basic principles of mineral processing.
2. Basic principles of size separation after crushing, different methods of separation.
3. Draw flow charts for coal, zinc and iron.

2015-16

Malla Reddy Engineering College (Autonomous)

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4 - -

Course Code: 52529

Credits: 4

B.Tech. – VII Semester

UNDERGROUND METAL MINING TECHNOLOGY

Pre-Requisite: 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

[12 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

[12 Periods]

Different types of raising methods and their merits and demerits. Classification of stoping methods, factors influencing the choice of stoping method.

MODULE-III: PART-A:Stopping Methods

[6 Periods]

Room & Pillar Sublevel Open Stopping Shrinkage method of Stopping Cut & Fill method of Stopping

PART-B:

[6 Periods]

Sublevel Caving Block Caving Special methods of working of thin deposits

MODULE-IV:

[12 Periods]

Applicability of methods, stope layout stope layout, stope development, ground breaking, mucking, ventilation, support, haulage and dumping.

MODULE-V:

[12 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.
4. Methods of working Coal & Metal Mines Vol-III, Seth D Woodruff , Pergamon Press.

Outcomes:

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

1. Understand rising methods, stope methods, productivity and cost of mining of ores, layoutof drifts, cross cuts, rises and winze in ore body.

2015-16

Malla Reddy Engineering College (Autonomous)

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Course Code:

Credits: 3

**B.Tech. – VII Semester
OPEN ELECTIVE-1**

2015-16

Malla Reddy Engineering College (Autonomous)

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Course Code: 52530

Credits: 3

B.Tech. – VII Semester

**PLANNING OF SURFACE MINING PROJECTS
(PE-IV)**

Pre-Requisite: Surface Mining Technology

Objectives : This course introduces concept of comparison between mining industry and other industries, Estimation, equipment required, dust control measure, Issues and challenges of mine planning in future.

MODULE-I: [12 Periods]

Mining industry in comparison with other industries, Principles of Planning, Mater Plan, Feasibility Report.

MODULE-II: [12 Periods]

Estimation, optimal Production, Life, requirement of surface equipment, selection of mining equipment

MODULE-III: PART-A: [6 Periods]

Haul roads maintenance and dust control measures Surface facilities provision of dump yards, material handling plants.

PART-B: [6 Periods]

Surface Workshops, Mine lighting, occupational diseases remedial measures

MODULE-IV: [12 Periods]

Surface environment management planning, EIA, land reclamation methods.

MODULE-V: [12 Periods]

Issues and challenges of Mine planning in future, mine closure planning. Blast designing, applications of SME, Nonel limitation transport of Block explosive, electronic detonators.

TEXT BOOKS:

1. Open cast Mining, R.T. Deshmukh – Lovely Prakash, Dhanbad
2. Surface Mining, G.B. Misra, Dhanbad Publishers

REFERENCE BOOKS:

1. Surface Mining Technology Samir Kumar Das, Lovely Prakashan.
2. Introduction to Mining Engineering, Hartman H.L. , John Wiley & Sons.

Outcomes:

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

1. Plan large open cost mines for sustainable mining.
2. Select equipments required.

2015-16

Malla Reddy Engineering College (Autonomous)

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Course Code: 52531

Credits: 3

B.Tech. – VII Semester

PLANNING OF UNDERGROUND COAL MINING PROJECTS

(PE-IV)

Pre-Requisite: Mine Construction Engineering

Objectives: This course compares the mining industry with others, Estimation of optical prediction life, Pillar extraction methods, economics of different methods extraction, surface subsidence.

MODULE-I: [12 Periods]

Mining industry in comparison with other industries, Principles of Planning, Features and Mine Planning, Master Plan, Feasibility Report.

MODULE-II: [12 Periods]

Geological factors replacing Mine Planning, Estimation of optional prediction Life. Coal extraction, different methods applicability advantages and disadvantages

MODULE-III:

PART-A: [6 Periods]

Pillar extraction by continuous miner Pillar extraction by Blasting Gallery Methods.

PART-B: [6 Periods]

Pillar extraction by deploying LHDS/SDLS

MODULE-IV: [12 Periods]

Economics of different methods extraction. Gate Road devices and supports and extraction by longwall Advancing and retreating Methods.

MODULE-V: [12 Periods]

Surface subsidence, measures for subsidence control, subsidence monitoring, prediction of surface subsidence, numerical, analytical, empirical models.

TEXT BOOKS:

1. Longwall Mining, Syd S Peng, West Virginia University,
2. Principles and Practices of Modern Coal Mining, R.D. Singh – New Age International
3. Coal Mining in India, Mathur S.P.

REFERENCE BOOKS:

1. Modern Coal Mining Technology, Samir Kumar Das, Lovely Prakashan
2. Thick Séance Mining Problems and Issues., BB Dhar, Singh T.N.

Outcomes:

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

1. Plan large underground mines with surface subsidence control measures.

2015-16

Malla Reddy Engineering College (Autonomous)

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Course Code: 52532

Credits: 3

B.Tech. – VII Semester MINE GROUND CONTROL (PE-IV)

Pre-Requisite: Mine Construction Engineering, Strata Control Technology

Objectives: This course introduces concept of ground control in mines, modern concept of strata pressure redistribution, roof support, design of structure in rocks, subsidence.

MODULE-I: [12 Periods]

Definition and concept of ground control in Mines. Ground control practice in Mines. Constraints on ground control design; characteristics of coal measure strata.

MODULE-II: [12 Periods]

Modern concept of strata pressure redistribution. Manifestation of strata pressure, convergence, load on prop, creep, heave, roof fall and failure systems due to mining. In situ stress measurement, instrumentation.

MODULE-III

PART-A: Subsidence [6 Periods]

Theories of subsidence, factors affecting subsidence, prediction and measurement of subsidence. Damage and prevention of damage due to subsidence.

PART-B: [6 Periods]

Bumps and rock bursts-causes, occurrence and control.

MODULE-IV [12 Periods]

Design of structures in rock; design of underground openings. Design of pillars, design of open pit slopes, waste dumps and embankments. Design of stopes.

MODULE-V: Roof support [12 Periods]

Timber and steel supports, friction and hydraulic prop Arches, shotcret, roof truss, roof bolts. Powered supports stowing caving strip packing pump packing rock reinforcement.

TEXT BOOKS:

1. Rock Mechanics and Design of structures in rock , Leonard Obert, Wilbur I. Duvall, University Microfilms
2. Fundamental of Rock Mechanics, J C Jaeger, NGW Cook, Blackwell Publishing.
3. Rock Mechanics and Ground Control , V. Singh & B.P. Khare

REFERENCE BOOKS:

1. An Introduction to Rock Mechanics by Richard E. Goodman, Wiley
2. Coal Mining Ground Control, Syd S. Peng, West Virginia University.

Outcomes:

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

1. Know ground control concept, modern concepts, types of roof supports, design of complete structures, prediction, measuring and factors affecting subsidence.

2015-16

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Course Code: 52533

Credits: 3

B.Tech. – VII Semester

PLANNING OF UNDERGROUND METAL MINING PROJECTS (PE-V)

Pre-Requisite: Planning of Underground coal mining project

Objectives: This course introduces metalliferous mining industry in India, excavation and equipment, High productivity methods, division of mining areas, production planning scheduling of mining.

MODULE-I: Introduction

[12 Periods]

Status of Metalliferous Mining Industry in India, Scope and limitations of Underground Mining. Development: Classification and choice of stopping methods, Choice of level interval and block length-shape, size, position.

MODULE-II:

[12 Periods]

Excavation and equipping of shaft station, grizzly, ore/waste bin, main ore pass system, underground crushing and loading stations, underground chambers, sump and other subsidiary excavations, arrangements for dumping into main ore pass.

MODULE-III: PART-A: Methods

[6 Periods]

Techno-economic analysis on choice of stopping methods, high productivity methods, blast hole stopping vertical retreat method of mining, block caving raise stopping, underground bench blasting.

PART-B:

[6 Periods]

Stope design and production planning in the various methods of stopping Stop layouts access development, shift/hosting haulages cross cuts, inclined developments.

MODULE-IV:

[12 Periods]

Stope and development support, mining cycles, shift times, efficiency, utilization and estimating equipments requirements.

Division of Mining Area:

Division of the mining area into working units on district and level pattern. Dimensions of panels and blocks.

MODULE-V:

[12 Periods]

Production and Cycle time estimates, Production Planning and Scheduling.

TEXT BOOKS:

1. A Study of Metalliferous Mining, Methods, Y.P. Chacharkar, Lovely Prakashan, Dhanbad, 1994.
2. SME Mining Engineers Hand Book, B.C. Arthur, American Institute of Mining, Metallurgical and Petroleum Engineers, New York, 1973.
3. Elements of Mining Technology, Vol.-II, D.J. Deshmukh, Central Techno Publications, Nagapur, 2001.

REFERENCE BOOKS:

1. Meta Mines Regulations -1961, Lovely Prakashan
2. Introductory Mining Engineering, Howard L. Hartman, Wiley.

Outcomes:

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

1. Understand scope of metalliferous mining industry in India, planning of equipments, different productivity methods, production planning and control of mines.

2015-16

Malla Reddy Engineering College (Autonomous)

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Course Code: 52534

Credits: 3

B.Tech. – VII Semester

MINE HEALTH AND SAFETY ENGINEERING

(PE-V)

Pre-Requisite: Mine Environmental Engineering-II

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

MODULE-I: Introduction to accidents prevention and health and safety in industry
[12 Periods]

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, cost of accidents, statistical and economical analysis of accident data.

MODULE-II **[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, ETA etc; Risk analysis softwares; health risk assessment and epidemiological studied.

MODULE-III

PART-A: [6Periods]

Training, Human Behavioral approach in Safety, safety polices, safety audit and safety management.

PART-B:

[6 Periods]

Mines emergency organization for disaster management.

MODULE-IV:Accidents in opencast mines **[12 Periods]**

Common causes and measures for prevention 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.
2. Safety in Mines, B.K. Kejriwal, Lovely Prakashan.
3. System Safety Engineering and Risk Assessment: A Practical Approach, N.J. Bahr, Taylor and Francis, NY, 1997.

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.

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

1. Understand causes and safety measures of Mining industry, safety Policies, Emergency organization for disaster management. Dangers from surface and underground water.

2015-16

Malla Reddy Engineering College (Autonomous)

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Course Code: 52535

Credits: 3

**B.Tech. – VII Semester
ADVANCED MINING MACHINERY
(PE-V)**

Pre-Requisite: Mine Mechanization -I

Objectives: This course introduces Mine winders, winding drums, man riding systems, cutter loaders, pumps, opencast machinery for mining to improve its output.

MODULE-I: Mine Winders

[12 Periods]

Koepe and Drum winders and their applications, head gear, head gear pulley, shaft fitting – Keps, rope guides, shaft sinking and bells, capping and recapping, cage and suspension gear.

MODULE-II

[12 Periods]

Winding Drum-types and construction, Safety devices in winders-over speed and over wind preventers, slow breaking, depth indicator, Methods of counter balancing rope. Duty cycle. Mechanical and electrical braking. Winding from different levels in shaft.

MODULE-III

[6 Periods]

PART-A: Man riding system in underground mines.

PART-B: Face Machinery

[6 Periods]

SDL & LHD – their applications, capacity, operation, fitting, control and maintenance. Cutter loaders – Shearers, Coal plough and Continuous Miners – their constructional features, applications, capacity and maintenance.

MODULE-IV

[12 Periods]

Layout of faces with Power loader working under varied condition, Shuttle cars.

Pumps:

Types, Construction, operation, characteristics and application, Calculation of size, efficiencies and capacities. Layout of drainage system.

MODULE-V: Opencast Machinery

[12 Periods]

Blast Hole Drill, Ripper, Shovel, Dragline, Dumper, Bucket Wheel Excavator, Continuous Miners

– Their basic construction, applications and operation.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

Outcomes:

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

1. Understand winders applications, winding drum construction, face machinery, open cast machinery.

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Course Code: 52536

Credits: 2

**B.Tech. – VII Semester
MINERAL PROCESSING LAB**

1. Study of grab sampling and 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) average size of sample material and (c) 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 washability 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 sample.
12. Collection of sample by riffle sample technique.

2015-16

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Course Code: 52537

Credits: 2

B.Tech. – VII Semester

ROCK MECHANICS LAB

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.

2015-16

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Course Code: 52538

Credits: 2

**B.Tech. – VII Semester
MINOR PROJECT**

2015-16

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Course Code: 52529

Credits: 2

**B.Tech. – VII Semester
Technical Seminar**

2015-16

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Course Code: 52540

Credits: 3

B.Tech. – VIII Semester MINE LEGISLATION

Pre-Requisite: Industrial Management

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

MODULE-I: [12 Periods]

Introduction to mining laws and legislation, General principles of mining laws, development of mining legislation of India. Mines Act, Mines Rules.

MODULE-II: [12 Periods]

Indian electricity rules, coal mines conservation and development act, General provisions of Mines and Minerals Regulation and Development Act, Mineral Concession Rules.

MODULE-III:

PART-A: [6 Periods]

Coal and Metalliferous mines regulations introduction to bye laws, circulars.

PART-B: [6 Periods]

Vocational Training rules, Explosives act, Rescue Rules, Environmental protection Act.

MODULE-IV: Safety organization [12 Periods]

Role of management, supervisors and workers; pit safety committees; workmen's inspector; role of safety officers.

Classification of Accidents:

Statistics, causes and prevention of accidents. Accidents rate in Indian mines. Accident enquiries and reports, health of workmen. Occupational disease in mining.

MODULE-V: [12 Periods]

Mine plans, Mine schemes environmental clearance, forest clearance detailed project report preliminary feasibility report, feasibility report. Techno economic feasibility report.

Development of safety consciousness:

Interest, publicity and propaganda for safety, audio-visual aids, safety drives campaigns.

TEXT BOOKS:

1. Principle Acts & Rules CMR and MMR

REFERENCE BOOKS:

1. Intent and Content of Mine Legislation – Prasad.

Outcomes:

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

1. Know about laws applicable to mines, electricity rules of India, training rules, crèche rules, rescue rules.

2015-16

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Course Code:

Credits: 3

**B.Tech. – VIII Semester
OPEN ELECTIVE-2**

2015-16

Malla Reddy Engineering College (Autonomous)

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Course Code:

Credits: 3

**B.Tech. – VIII Semester
OPEN ELECTIVE-3**

2015-16

Malla Reddy Engineering College (Autonomous)

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Course Code: 52541

Credits: 10

**B.Tech. – VIII Semester
MAJOR PROJECT**

2015-16

Malla Reddy Engineering College (Autonomous)

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Course Code: 52542

Credits: 2

**B.Tech. – VIII Semester
COMPREHENSIVE VIVA VOCE**

**B.Tech. – VIII Semester
ENTREPRENEURSHIP SKILLS**

Pre-Requisite: Nil

Objectives: 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:**[5 Periods]**

Understanding Entrepreneurial Mindset-characteristics of an entrepreneur -The evolution of entrepreneurship-Approaches to entrepreneurship- The challenges of new venture start-ups-Critical factors for new venture development.-Twenty first century trends in entrepreneurship-Difference between entrepreneur and entrepreneurship.

Module II:[5 Periods]

The individual entrepreneurial mind-set and Personality-The entrepreneurial journey-Women entrepreneurship: growth problems in India-Entrepreneurial motivations. Corporate Entrepreneurial Mindset-the nature of corporate entrepreneur- -sustaining corporate entrepreneurship.

Module III:**[5 Periods]**

Launching Entrepreneurial Ventures-opportunities identification-entrepreneurial Imagination and Creativity-the nature of the creativity process-Innovation and entrepreneurship.Methods to initiate Ventures-Creating new ventures-Acquiring an Established entrepreneurial venture-Intellectual property protection-Patents, Copyrights-Trademarks and Trade secrets.

Text Book:

1. D F Kuratko and T V Rao “Entrepreneurship-A South-Asian Perspective “Cengage Learning, 2012. (For PPT, Case Solutions Faculty may visit : login.cengage.com)

References:

1. Vasant Desai “Small Scale industries and entrepreneurship” Himalaya publishing 2012.
2. Rajeev Roy “Entrepreneurship” 2e, Oxford, 2012.
3. B.Janakiramand M.Rizwana” Entrepreneurship Development :Text & Cases,Excel
4. Books,2011.
5. Stuart Read, Effectual Entrepreneurship, Routledge, 2013.
6. Robert Hisrich et al “Entrepreneurship” 6the, TMH, 2012.
7. Nandan H, Fundamentals of Entrepreneurship, PHI, 2013

Outcomes:

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

1. Understand the mindset of the entrepreneurs, identify ventures for launching, develop an idea on the legal framework and also understand strategic perspectives in entrepreneurship- Legal challenges of Entrepreneurship.

**B.Tech. – VIII Semester
FOREIGN LANGUAGE/FINE ARTS**

Pre-Requisite: Nil

Objectives:To introduce a new language to the students.To impart basic knowledge of foreign language to the students to be useful for everyday and Professional Purposes.

Module –I:-

- Basic introduction of the language and its importance.
- Introduction to the script, words and sentences.

Module –II

- Construction of simple sentences for everyday needs like,
 - ❖ Greeting
 - ❖ Apologies
 - ❖ Enquiry
 - ❖ Bargaining
 - ❖ Seeking directions etc.

Module –III

- Language for workplace
 - ❖ Participating in meetings.
 - ❖ Party etiquette
 - ❖ Dining etiquette
 - ❖ Self-introductions
 - ❖ Introducing others etc...

2015 – 16

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Course Code: 50123

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Credits: 3

AIR POLLUTION AND CONTROL

Pre-requisites: Environmental Studies

Objectives:

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

MODULE I: AIR POLLUTION

[12 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

[12 periods]

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

MODULE III: METEOROLOGICAL PARAMETERS AND WIND BEHAVIOUR

A: METEOROLOGY

[6 periods]

Properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagrams Lapse Rates, Pressure Systems

B: PLUME DISPERSION[6 periods]

Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion.

MODULE IV: CONTROL OF PARTICULATES

[12 periods]

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

MODULE V: GENERAL METHODS OF CONTROL OF NO_x AND SO_x EMISSIONS

[12 periods]

In-plant Control Measures, process changes, dry and wet methods of removal and recycling. Air Quality Management – Monitoring of SPM, SO₂; 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. Wark and Warner, “**Air Pollution**” Harper & Row Publications, New York, 2nd edition, 1981.
2. S.C. Bhatia, “**Textbook of Air Pollution and Its Control**”, Atlantic Publishers, 1st edition, 2007.
3. Karl B. Schnelle Jr., Charles A. Brown, “**Air Pollution Control Technology Handbook**”, Published by CRC Press, 1st edition, 2002.

Webreferences:

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

Outcomes:

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

1. To understand in general terms, the major issues and challenges in Air pollution.
2. To design air pollution control equipment keeping in mind the stringent regulations laid by Pollution control board.

Course Code: 50124

DISASTER MANAGEMENT

Prerequisites: Nil

Objectives:

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

MODULE I: CONCEPT OF HAZARDS AND DISASTERS

A: ENVIRONMENTAL HAZARDS & DISASTERS:[5 periods]

Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology – Landscape, Ecosystem and Perception approach - Human ecology & its application in geographical researches.

B: TYPES OF ENVIRONMENTAL HAZARDS & DISASTERS: [5 periods]

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

MODULE II: CLASSIFICATION OF HAZARDS

A: ENDOGENOUS HAZARDS [8 periods]

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

B: EXOGENOUS HAZARDS[12 periods]

Infrequent events: Cyclones – Lightning – Hailstorms, Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms [causes , distribution human adjustment, perception & mitigation], Cumulative atmospheric hazards/ disasters : Floods- Droughts- Cold waves- Heat waves Floods:- Causes of floods- Flood hazards India- Flood control measures [Human adjustment, perception & mitigation], Droughts:- Impacts of droughts- Drought hazards in India- Drought control measures, Extra Planetary Hazards/ Disasters-Man induced Hazards /Disasters- Physical hazards/ Disasters-Soil Erosion Soil

Erosion:-- Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion, Chemical hazards/ disasters:-- Release of toxic chemicals, nuclear explosion- Sedimentation processes, Sedimentation processes:- Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation, Biological hazards/ disasters:- Population Explosion.

MODULE III: APPROACHES AND MEASURES IN DISASTER MANAGEMENT

A: EMERGING APPROACHES [4 periods]

Three Stages: 1. Pre- disaster stage [preparedness] 2. Emergency Stage 3. Post Disaster stage- Rehabilitation

B: NATURAL DISASTER REDUCTION & MANAGEMENT [4 periods]

1] Provision of Immediate relief measures to disaster affected people 2] Prediction of Hazards & Disasters 3] Measures of adjustment to natural hazards

MODULE IV: DISASTER MANAGEMENT [12 periods]

An integrated approach for disaster preparedness, mitigation & awareness.

Mitigation- Institutions- discuss the work of following Institution.

- a. Meteorological observatory
- b. Seismological observatory
- c. Volcanological institution
- d. Hydrology Laboratory
- e. Industrial Safety inspectorate
- f. Institution of urban & regional planners
- g. Chambers of Architects
- h. Engineering Council
- i. National Standards Committee

Integrated Planning- Contingency management Preparedness –

- a] Education on disasters
- b] Community involvement
- c] The adjustment of Human Population to Natural hazards & disasters Role of Media Monitoring Management- Discuss the programme of disaster research & mitigation of disaster of following organizations.
 - a] International Council for Scientific Unions [ICSU]- Scientific committee on problems of the Environment [SCOPE], International Geosphere- Biosphere programme [IGBP]
 - b] World federation of Engineering Organizations [WFED]
 - c] National Academy of Sciences

- d] World Meteorological organizations [WMO]
- e] Geographical Information System [GIS]
- f] International Association of Seismology & Physics of Earth's Interior [IASPEI]
- g] Various U.N agencies like UNCRD, IDNDR, WHO, UNESCO, UNICEF, UNEP.

MODULE V: DISASTER MANAGEMENT IN INDIA

[10 periods]

- a. A regional survey of Land Subsidence, Coastal Disaster, Cyclonic Disaster & Disaster in Hills with particular reference to India
- b. Ecological planning for sustainability & sustainable development in India- Sustainable rural development: A Remedy to Disasters -Role of Panchayats in Disaster mitigations
- c. Environmental policies & programmes in India- Institutions & National Centers for Natural Disaster reduction, Environmental Legislations in India, Awareness, Conservation Movement, Education & training.

Text Books:

1. Jagbir singh, "**Disaster management–Future challenges and opportunities**", I.K. International publishing house, 1st edition, 2005.
2. Coppala P Damon, "**Introduction to International Disaster management**", ABD publishers, 2007.

References:

1. R.B.Singh [Ed], "**Environmental Geography**", Heritage Publishers, New Delhi, 1st edition, 1990.
2. Kates, B.I & White. G.F, "**The Environment as Hazards**", oxford publishers, 5th edition, New York, 1978.
3. R.B. Singh [Ed], "**Disaster Management**", Rawat Publication, New Delhi, 1st edition, 2000.

Weblinks:

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

Outcomes:

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

- To analyze, evaluate and manage the environmental, social, cultural, economical, legal and organizational aspects influencing vulnerabilities and capacities to face disasters.
- To assess the different public health aspects at local and global levels as a result of disaster, and can well plan to mitigate them.

GREEN BUILDINGS

Prerequisites: Nil

Objectives:

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

[10 periods]

Introduction to green buildings, green materials, sources of green materials, high-performance green buildings Impacts of building construction, operation, and disposal Methods and tools for building assessment, Green Globes.

MODULE – II

[10 periods]

The green building process, Design and construction relationships, benefits of green building , quality, healthy and safe environments , Site and landscape strategies.

MODULE – III

[10 periods]

- A.** Building energy system strategies, Water cycle strategies, Materials selection strategies, Indoor Environmental Quality [IEQ].
- B.** Analysis and strategies, Construction, team responsibilities and controls, Building commissioning strategies.

MODULE – IV

[10 periods]

Economic issues and analysis, Use of the Green Strategies cost estimating tool, Future directions in green, high performance building technologies.

MODULE – V

[10 periods]

Carbon accounting Green Building Specification

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].

WEB REFERENCES:

- <http://www.ncrec.gov/Pdfs/bicar/GreenBuilding.pdf>

Outcomes

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

- 1 .Get the benefits of green building – quality, healthy and safe environments that are cost effective – should be available to all.

Course Code: 50203 Credits: 3

NETWORK THEORY**Prerequisites:** Basic knowledge on Electrical circuits**Objectives:** This course introduces the concepts of circuit analysis which is the foundation for all courses of the Electrical and Electronics Engineering discipline.**Module I: Network Theorems (Both AC & DC Networks) [12 periods]**

Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millman's and Compensation and Tellegen's theorems- Statement of theorems and numerical problems.

Module II: Three Phase Circuits [10 periods]

Introduction to three phase circuits – types of connection - Star and delta– Relation between line and phase voltages and currents in balanced systems – Analysis of balanced and Unbalanced 3 phase circuits –Measurement of active and reactive power of balanced and Unbalanced 3 phase circuits .

Module III: Two Port Network Parameters [12 periods]Open circuit impedance (Z) network parameters, Short circuit admittance(Y) network parameters –Transmission (ABCD), Inverse transmission ($A^1B^1C^1D^1$) and hybrid parameters – Relationship between two port network parameters – Reciprocity and Symmetry concepts of two port network parameters.**Module IV: DC Transient Analysis [13 periods]**

Introduction - Initial conditions of all elements-Transient response of Series R-L, R-C and R-L-C circuits – Solution using differential equation approach and Laplace transform approach.

Module IV: AC Transient Analysis [12 periods]

Transient response of Series R-L, R-C and R-L-C circuits – Solution using differential equation approach and Laplace transform approach.

Text Books:

1. William Hayt and Jack E. Kimmerly, “**Engineering circuit analysis**”, McGrawHill Company, 6th Edition, 2005.
2. Joseph Edminister & mahmood Nahvi, “**Electric circuits**”, Schaum outline Series – Tata McGraw Hill, 3rd Edition, 1999.

References:

1. Vanvalkenburg, “**Network Analysis**”, Prentice Hall of India, 3rd Edition, 1974.
2. A. Chakrabarthy, “**Circuit Theory**” by Dhanipat Rai & Co., 6th Edition, 2010.
3. N. N. Parker smith, “**Problems in Electrical Engineering**”, 9th Edition, 1981.

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

1. Analyze electrical circuits using network theorems.
2. Apply the concepts of three phase electrical circuits to electrical machines and power systems.
3. Calculate the different parameters of a given two port electrical network.
4. Draw the transient response of a network for the given input.
5. Build the electrical circuit for the given impedance, admittance functions.

2015-16

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Credits: 3

Course Code: 50208

CONTROL SYSTEMS

Prerequisite: Basic of Mathematics, Laplace Transforms and Matrices.

Objectives: This course introduces the basics of control systems, types of control systems, mathematical modeling, block diagram representation, signal flow graph, Time domain and frequency domain specifications, stability and state space analysis.

MODULE - I: Introduction

[12 Periods]

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback, Mathematical models – Differential equations, Impulse Response and transfer functions.

Transfer Function Representation: Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

MODULE - II: Time Response Analysis

[12 Periods]

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

MODULE - III: Stability Analysis In S-Domain

[12 Periods]

The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability.

Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to $G(s)H(s)$ on the root loci.

MODULE - IV: Frequency Response Analysis

[12

Periods]Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and Phase margin and Gain margin - Stability Analysis from Bode Plots. Polar Plots - Nyquist Plots.

Compensation techniques – Lag, Lead and Lead -Lag Controllers design in frequency Domain.

MODULE - V: State Space Analysis of Continuous Systems

[12 Periods]

Concepts of state, state variables and state model, derivation of state models from block diagrams, diagonalization - Solving the Time invariant state Equations- State Transition Matrix and its Properties – Concepts of Controllability and observability.

TEXT BOOKS:

1. I. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International Publishers, 5th edition, 2007. (Modules I, II, III & IV)
2. A.Nagoor kani, "Control Systems", RBA Publications, 2nd Edition, 2006. (Modules I, II, III, IV & V)

REFERENCE BOOKS:

1. Benjamin.C.Kuo, "Automatic Control Systems", Prentice Hall of India, 7th Edition, 1995.

2. M.Gopal, “**Control System**” – Principles and Design”, Tata McGraw Hill, 2nd Edition, 2002.
3. Schaum’s Outline Series, “**Feedback and Control Systems**”Tata McGraw-Hill, 2007.
4. John J.D’azzo & Constantine H.Houpis, “**Linear control system analysis and design**”, Tata McGraw-Hill, Inc., 1995.
5. Richard C. Dorf & Robert H. Bishop, “**Modern Control Systems**”, Addidon – Wesley, 1999.
6. <http://nptel.ac.in/courses/108103007/8>

Outcomes:

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

1. Grasp the basics of open loop and closed loop control systems, concept of feedback in control systems, mathematical modeling and transfer function derivations of Synchros, AC and DC servo motors.
2. Apply the basics of Transfer function representation through block diagram, signal flow graphs, time response analysis of different order systems through their characteristic equation with time-domain specifications, stability analysis of control systems in S-domain through R-H criteria and root-locus techniques, frequency response analysis through bode diagrams, Nyquist, polar plots.
3. Apply the above conceptual things to real-world electrical and electronics problems and applications with the basics of state space analysis, design of PID controllers, lag, lead, lag-lead compensators.

Course Code: 50229

Credits: 3

ENERGY AUDITING & CONSERVATION**Prerequisite: Nil****Objective:**

To have the knowledge about the concept of energy conservation, energy management, different approaches of energy conservation in industries, economic aspects of energy conservation project and energy audit in commercial and industrial sector will be achieved by this course

MODULE I : BASIC PRINCIPLES OF ENERGY AUDIT [12 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 [12 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 [12 PERIODS]

Energy efficient motors , factors affecting efficiency, loss distribution , constructional details , characteristics - variable speed , variable duty cycle systems, RMS hp- voltage variation- voltage unbalance- over motoring- motor energy audit

MODULE IV : POWER FACTOR IMPROVEMENT, LIGHTING & ENERGY INSTRUMENTS**[14 PERIODS]**

Power factor – methods of improvement, location of capacitors, Pf with non linear loads, effect of harmonics on p.f. , p.f 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 & ITS COMPUTATION [12 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. “Energy management” by W.R. Murphy & G. Mckay Butter worth, Heinemann publications.
2. “Energy efficient electric motors” by John .C. Andreas, Marcel Dekker Inc Ltd-2nd edition, 1995-

References:

1. “Energy management” by Paul o’ Callaghan, Mc-graw Hill Book company-1st edition, 1998
2. “Energy management hand book” by W.C.Turner, John wiley and sons
3. “Energy management and good lighting practice” : fuel efficiency- booklet12-EEO

Outcome: After completion of the course student will have the awareness of

- Different types of industries which are consisted of various energy intensive processes.
- Various energy intensive processes in different industries and to find out the energy conservation opportunities.
- Various methods of energy management and energy auditing on the site.
- Energy auditing and managing the energy demand in industry.

2015-16

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Course Code: 50241

Credits: 3

PRINCIPLES OF ELECTRICAL ENGINEERING

Prerequisite:Electrical Circuits.

Objectives:This course introduces the basic concepts of transient analysis of the circuits, the basic two-port network parameters, the design analysis of filters and attenuators and their use in circuit theory. The emphasis of this course is laid on the operation of the transformers and basic Principle of operation of three phase Induction Motor and Alternators.

MODULE – I:Transient Analysis (First and Second Order Circuits) [13 Periods]

Transient Response of RL , RC Series, RLC Circuits for DC excitations, Initial Conditions, Solution using Differential Equations approach and Laplace Transform Method.

MODULE – II:Two Port Networks [13 Periods]

Impedance Parameters, Admittance Parameters, Hybrid Parameters, Transmission (ABCD) Parameters, Conversion of one Parameter to another, Conditions for Reciprocity and Symmetry, Interconnection of Two Port networks in Series, Parallel and Cascaded configurations, Image Parameters, Illustrative problems.

MODULE – III:Filters and Symmetrical Attenuators [10

Periods]Classification of Filters, Filter Networks, Classification of Pass band and Stop band, Characteristic Impedance in the Pass and Stop Bands, Constant-k Low Pass Filter, High Pass Filter, m-derived T-Section, Band Pass filter and Band Elimination filter, Illustrative Problems. Symmetrical Attenuators – T-Type Attenuator, π -Type Attenuator, Bridged T type Attenuator, Lattice Attenuator.

MODULE – IV: Network Theorems (A.C. & D.C) [12 Periods]

Tellegen's, Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millman's and Compensation theorems for A.C & D.C excitations.

MODULE – V:Electrical Machines [12 Periods] Principle of Operation of Single Phase transformer, Types, Constructional Features, Phasor Diagram on No Load and Load, Equivalent Circuit, Losses and Efficiency of Transformer and Regulation, OC and SC Tests (Simple Problems). Principle of operation of 3 ϕ Induction Motor and Alternators.

TEXT BOOKS:

1. A. Chakrabarhty, “**Electric Circuits**”, Dhanipat Rai & Sons.
2. B.L.Theraja, A.K.Theraja, “**ELECTRICAL TECHNOLOGY**”, S.Chand Publications. Volume II
3. P. S. Subramanyam,“**Basic Concepts of Electrical Engineering**”, BS Publications.

REFERENCE BOOKS:

1. William Hayt and Jack E. Kemmerly, “**Engineering circuit analysis**”, Mc Graw Hill Company, 7th Edition.
2. S.N. Singh, “**Basic Electrical Engineering**”, PHI.
3. David A. Bell, “**Electrical Circuits**”, Oxford University Press.
4. K.S.Suresh Kumar, “**Electric Circuit Analysis**”, Pearson Education.

Outcomes:

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

1. Apply the above conceptual things to real-world electrical and electronics problems and applications with the basic transient analysis of circuits, filters, attenuators.
2. Apply their knowledge on operation of Single Phase Transformers & Basics of Induction Motors, Alternators with which, the student can be able to do the conceptual things to real-world problems and applications.

2015-16

Malla Reddy Engineering College (Autonomous)

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2 2 -

Course Code: 50307

Credits: 3

METALLURGY AND MATERIALS SCIENCE

Pre-requisite: Applied Chemistry

Objective: The objective of this subject is to provide the basic concepts of composition of different materials Provides the concepts of mechanical properties and applications, Provides the concepts of Heat treatment and composite materials.

MODULE – I: Crystallography & Constitution of Alloys [15 Periods]

A: Crystallography: Review of crystal structure, space lattice, crystal planes and crystal directions, co-ordination number, number of atoms per unit cell, atomic packing factor, Numerical related to crystallography. Imperfection in metal crystals: Crystal imperfections and their classifications, point defects, line defects, edge & screw dislocations.

B: Constitution of Alloys: Necessity of alloying, types of solid solutions, Hume Rothery's rules, intermediate alloy phases, and electron compounds.

MODULE – II: Equilibrium Diagrams [15 Periods]

Equilibrium Diagrams: Experimental methods of construction of equilibrium diagrams, Isomorphous alloys systems, equilibrium cooling and heating of alloys, Lever rule, coring miscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of important binary phase diagrams of Cu-Ni-, Al-Cu, Bi-Cd, Cu-An, Cu-Sn and Fe-Fe₃C.

MODULE - III: Cast Irons & Steels [13 Periods]

A: Cast Irons: Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheroidal graphite cast iron, Alloy cast irons.

B: Steels: Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, tool and die steels.

MODULE - IV: Heat treatment of Alloys & Non-ferrous Metals and Alloys [13 Periods]

A: Heat treatment of Alloys: Effect of alloying elements on Fe-Fe₃C system, Annealing, normalizing, Hardening, TTT diagrams, tempering, Hardenability, surface-hardening methods, Age hardening treatment, Cryogenic treatment of alloys.

B: Non-ferrous Metals and Alloys: Structure and properties of copper and its alloys, Aluminum and its alloys, Titanium and its alloys.

MODULE - V: Ceramic materials & Composite materials [12 Periods]

A: Ceramic materials: Crystalline ceramics, glasses, cermets, abrasive materials, nano materials – definition, properties and applications.

B:

Composite materials: Classification of composites, various methods of component manufacture of composites, particle-reinforced materials, fiber reinforced materials, metal ceramic mixtures, metal-

matrixcompositesandC –Ccomposites.

TEXTBOOKS:

1. SidneyH.Avener “**IntroductiontoPhysicalMetallurgy**”, Tata McGraw Hill publications, 2nd edition, 2013
2. DonaldR.Askeland “**Essential ofMaterialsscienceandengineering**”, Thomson, 3rd edition, 2013
3. V.Rahghavan“**ElementsofMaterialscience**”,PHI Publications, 6th edition, 2015.

REFERENCE BOOKS:

1. kodgire “**MaterialScience andMetallurgy**”, Everest Publishing House, 6th editions, 2011.
2. Agarwal “**ScienceofEngineeringMaterials**”, Tata McGrawHill, 8th edition, 2012.
3. Williamandcollister “**MaterialsScienceandEngineering**”, 8th edition, 2010.
4. W.g.vinas&HLMancini “**An introductionto Materialscience**”, 4th edition, 2011
5. C.D.Yesudian&harrisSamuel “**Material science& Material**”, 3rd edition, 2014
6. R.A.FlinnandP K Trojan“**EngineeringMaterialsandTheirApplications**”,JaicoBooks, 7th edition, 1999
7. R.K.Rajput “**EngineeringMaterialsandMetallurgy**” S.Chand Publisher, 3rd edition, 2012.
8. Pakirappa “**MaterialsScienceandEngineering**”, 6th edition, 2013

Outcomes:

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

1. This subject provides knowledge of Crystallography.
2. Provides knowledge of composition of various materials
3. Provides knowledge of heat treatment of different alloys

2015-16

Malla Reddy Engineering College (Autonomous)

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2 2 -

Course Code: 50342

Credits: 3

RENEWABLE ENERGY SOURCES

Pre-requisite: Thermal Engineering

Objectives: The objective of this subject is to provide knowledge about different alternative energy sources.

MODULE – I: Principles of Solar Radiation [14 Periods]

Principles of Solar Radiation : 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 tilted surface, instruments for measuring solar radiation and sun shine, solar radiation data.

MODULE – II: Solar Energy Collection & Solar Energy Storage and Applications [14 Periods]

A: Solar Energy Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

B: 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 [14 Periods]

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

B: Bio-Mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

MODULE - IV: Geothermal Energy & Ocean Energy [14 Periods]

A: Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

B: 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 [15 Periods]

Direct Energy Conversion: Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, seebeck, peltier and joul Thomson effects, Figure of 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, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

TEXT BOOKS:

1. Tiwari and Ghosal “**Renewable Energy Resources**”, Narosa Publishers
2. G.D. Rai “**Non-Conventional Energy Sources**”, Khanna Publishers

REFERENCE BOOKS:

1. Twidell & Weir “**Renewable Energy Sources**”, Taylor and Francis Group Publishers
2. Sukhatme “**Solar Energy**”, TMH Publications
3. B.S Magal Frank Kreith & J.F Kreith “**Solar Power Engineering**”, McGraw-Hill Publications
4. Frank Kreith & John F Kreider “**Principles of Solar Energy**”, CRC Press Publications.
5. Ashok V Desai “**Non-Conventional Energy**”, Wiley Eastern Publishers
6. K Mittal “**Non-Conventional Energy Systems**”, Wheeler Publishers
7. Ramesh & Kumar “**Renewable Energy Technologies**”, Narosa Publications

Outcomes:

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

1. The students shall be able know different types of energy sources which are available naturally.

2015-16

Malla Reddy Engineering College (Autonomous)

Course Code: 50344

L T P

2 2 -

Credits: 3

ROBOTICS

Pre-requisite: Kinematics and dynamics of machinery

Objectives: The objective of this subject is to provide knowledge of automation of Industries To provide knowledge of design of robot arm, kinematics and dynamics, Trajectory planning of robot and its applications.

MODULE – I: Introduction

[15 Periods]

Introduction: Automation and Robotics, CAD/CAM and Robotics – An over view of Robotics – present and future applications – classification by coordinate system and control system.

Components of the Industrial Robotics:-Degrees of freedom-End effectors: Mechanical gripper-magnetic-vacuum cup and other types of grippers-General consideration on gripper selection and design.

MODULE – II: Motion Analysis & Manipulator Kinematics

[13 Periods]

A: Motion Analysis: Homogeneous transformations as applicable to rotation and translation – problems.

B: Manipulator Kinematics: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

MODULE - III: Dynamics

[14 Periods]

Differential transformation and manipulators, Jacobians – problems.

Dynamics: Lagrange – Euler and Newton – Euler formations – Problems.

Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion – straight line motion – Robot programming, languages and software packages.

MODULE - IV: Robot actuators and Feedback components

[13 Periods]

Robot actuators and Feedback components: Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors. Feedback components: position sensors – potentiometers, resolvers, encoders – Velocity sensors.

MODULE - V:

[12 Periods]

Robot Application in Manufacturing: Material Transfer - Material handling, loading and unloading- Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.

TEXT BOOKS:

1. Groover M P “**Industrial Robotics**”, Pearson Edu.
2. Mittal R K & Nagrath I J “**Robotics and Control**”, TMH.

REFERENCE BOOKS:

1. Fu K S “**Robotics**”, McGraw Hill.
2. P. Coiffet and M. Chaironze “**An Introduction to Robot Technology**”, Kogam Page Ltd. 1983 London.
3. Richard D. Klafter “**Robotic Engineering**”, Prentice Hall Publishers
4. Asada and Slow time “**Robot Analysis and Intelligence**”, Wiley Inter-Science.
5. John J Craig “**Introduction to Robotics**”, Pearson Edu.
6. Mark W. Spong and M. Vidyasagar “**Robot Dynamics & Control**”, John Wiley & Sons (ASIA) Pvt Ltd.

Outcomes:

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

1. Uunderstand what is Robot and how it works.
2. Kinematics & dynamics and robot applications in manufacturing.

Course Code: 50319

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2 2 -

Credits: 3

METAL CUTTING & MACHINE TOOLS**Pre-requisite:** Kinematics of Machinery, Production Technology**Objectives:** The objective of this subject is to provide basic knowledge of all conventional Machine tools, To know the importance of various tools and their cutting angles, To measure cutting forces while machine, importance of cutting fluids.**MODULE – I: Elementary Treatment of Metal Cutting Theory [13 Periods]****Elementary Treatment of Metal Cutting Theory:** Element of cutting process – Geometry of single point tool and angles chip formation and types of chips – built up edge and its effects chip breakers. Mechanics of orthogonal cutting –Merchant's Force diagram, cutting forces – cutting speeds, feed, depth of cut, tool life, coolants, machinability – Tool materials. Cutting tool temperature measuring methods.**MODULE – II: Lathe Machines [14 Periods]****Lathe Machines:** Principle of working, specification of lathe – types of lathe – work holders tool holders – Box tools Taper turning thread turning – for Lathes and attachments. Turret and capstan lathes – collet chucks – other work holders – tool holding devices – box and tool layout. Principal features of automatic lathes – classification – Single spindle and multi-spindle automatic lathes..**MODULE - III: Shaping, Slotting and Planing Machines &Drilling and Boring Machines.****[14 Periods]****A: Shaping, Slotting and Planning Machines:** Principles of working – Principal parts – specification classification, operations performed. Machining time calculations.**B: Drilling and Boring Machines:** Principles of working, specifications, types, operations performed – tool holding devices – twist drill – Boring machines – Fine boring machines – Jig Boring machine. Deep hole drilling machine.**MODULE - IV: Milling machine & Grinding machine [15 Periods]****A: Milling machine** – Principles of working – specifications – classifications of milling machines – Principal features of horizontal, vertical and universal milling machines – machining operations Types geometry of milling cutters – milling cutters – methods of indexing – Accessories to milling machines milling cutters – methods of indexing.**B: Grinding machine** – Fundamentals – Theory of grinding – classification of grinding machine – cylindrical and surface grinding machine – Tool and cutter grinding machine – special types of grinding machines – Different types of abrasives – bonds specification of a grinding wheel and selection of a grinding wheel.

MODULE - V: Lapping, Honing and Broaching Machines & Principles of design of Jigs and fixtures and uses [15 Periods]

Lapping, Honing and Broaching Machines: Lapping, honing and broaching machines – principle of working, specification of broaching machines, methods of broaching, broaching tools, Classification of Broaching machines, Broaching operations. comparison to grinding – lapping and honing. Kinematics scheme of Lapping, Honing and Broaching machines. Constructional features of speed and feed Units, machining time calculations

Principles of design of Jigs and fixtures and uses. Classification of Jigs & Fixtures – Principles of location and clamping – Types of clamping & work holding devices. Typical examples of jigs and fixtures.

TEXT BOOKS:

1. **Production Technology**, H.M.T. (Hindustan Machine Tools), 5th edition, 1986
2. R.K. Jain and S.C. Gupta **Production Technology**, Khanna Publications, 2014.
3. P N RAO Vol II **Manufacturing Technology**, Tata Mc Graw Hill Education, 2nd edition, 2011

REFERENCE BOOKS:

1. C.Elanchezhian and M. Vijayan **Machine Tools**, Anuradha Agencies Publishers, 2nd edition, 2008
2. B.S.Raghu Vamshi – Vol II **Workshop Technology**, Anuradha Agencies Publishers, Dhanpat rai & company, 10th revised, 2014,
3. PC Sharma **Production Technology (Machine Tools)**, S.Chand Publishers, 7th edition, 2006

Course Outcomes:

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

1. Know the importance of various machines.
2. Measure the technique of measuring cutting forces
3. Select suitable machine for an appropriate operation.

2015-16

Malla Reddy Engineering College (Autonomous)

Course Code: 50354

L T P

2 2 -

Credits: 3

DESIGN FOR MANUFACTURING

Pre-requisite: Nil

Objectives:

MODULE - I : Introduction

[10 Periods]

Introduction: Design philosophy- Steps in Design process- General Design rules for Manufacturability- Basic principles of designing for economical production- Creativity in design.

MODULE – II: Materials & Machining Process

[13 Periods]

A: Materials: Selection of Material for Design- Development in Material Technology- Criteria for Material Selection- Material selection interrelationship with process selection- process selection chart.

B: Machining Process: Overview of various machining process- general design rules for machining- Dimensional tolerance and surface roughness- Design for Machining ease- Redesigning of components for machining ease with suitable examples, General design recommendations for machined parts.

MODULE – III: Metal Casting & Metal Joining

[13 Periods]

A: Metal Casting: Appraisal of various casting process, Selection of casting process, General design considerations for casting-casting tolerances-use of solidification simulation in casting design-product design rules for sand casting.

B: Metal Joining: Appraisal of various welding processes, Factors in design of weldments- General design guidelines-pre and post treatment of welds-Effects of thermal stresses in weld joints-design of brazed joints.

MODULE – IV: Forging & Extrusion, Sheet Metal Work & Plastics [13 Periods]

A: Forging: Design factors for forging-closed die forging design- parting lines of dies-drop forging die design-General design recommendations.

B: Extrusion, Sheet Metal Work & Plastics: Design guide lines for extruded sections- design principles for punching, blanking, bending, deep drawing-Keeler Goodman forming limit diagram-component design for blanking.

MODULE – V: Design for Assembly

[12 Periods]

Design for Assembly: General design guidelines for manual assembly-Development of systematic DFA Methodology. Assembly Efficiency-Classification system for Manual handling- Classification system for Manual Insertion and Fastening.Effect of part symmetry on handling time.

TEXT BOOKS:

1. Geoffrey Boothroyd, **“Product Design for Manufacture and Assembly”**, Marcel Dekker Inc.NY,2006
2. Kevin Otto and Kristin Wood **“Product design”**, Pearson Education Publishers.

REFERENCE BOOKS:

1. A.K Chitale and R.C.Gupta **“Product design and Manufacturing”**,Prentice-Hall Publishers

2015-16

Malla Reddy Engineering College (Autonomous)

Course Code: 50414

L T P
3 - -
Credits: 3

MICRO PROCESSORS AND INTERFACING

Prerequisites:Digital Electronics.

Objectives:This course introduces microprocessor architecture and microcomputer systems, including memory and input/output interfacing. Topics includes the architecture, assembly language programming, bus architecture, bus cycle types, I/O systems, memory systems, interrupts, and other related topics of 8085 & 8086. It also includes the architectures of advanced microprocessors like 80186, 80286, 80386 and 80486.

MODULE - I:8085 Architecture [12 Periods]

Introduction to microprocessor, 8085 microprocessor architecture, address, data and control buses, 8085 pin functions, demultiplexing of buses, generation of control signals, instruction cycle, machine cycles, t-states, memory interfacing.

Instruction Set: classification of instructions, addressing modes, 8085 instruction set, instruction and data formats, writing, assembling & executing a program.

MODULE - II:Assembly Language Programming [14 Periods]

Assembly Language Programming of 8085: Writing 8085 assembly language programs with decision making and looping using data transfer, arithmetic, logical and branch instructions. Stack & subroutines, developing counters and time delay routines.

Interfacing with 8085: Interfacing concepts, ports, interfacing of i/o devices, interrupts in 8085, programmable interrupt controller 8259a, programmable peripheral interface 8255a.

MODULE - III:8086 Architecture [10 Periods]

8086 architecture-functional diagram, register organization, memory segmentation, programming model, memory addresses, physical memory organization, architecture of 8086, signal descriptions of 8086- common function signals, timing diagrams, interrupts of 8086.

Instruction set and assembly language programming of 8086: instruction formats, addressing modes, instruction set, assembler directives, macros. Simple programs.

MODULE - IV: Interfacing [14

Periods]**I/o interface:** 8255 ppi, various modes of operation and interfacing to 8086, interfacing keyboard, display, d/a and a/d converter.

Communication interface: serial communication standards, serial data transfer schemes, 8251 USART architecture and interfacing.

Interfacing with advanced devices: memory interfacing to 8086, interrupt structure of 8086, vector interrupt table, interrupt service routine.

MODULE - V:Advanced Microprocessors [10 Periods]

80186, 80286, 80386 and 80486 microprocessors: 80186 architecture, enhancements of 80186. 80286 architecture:real and virtual addressingmodes. 80386 architecture, special registers, memory management, memory paging mechanism, 80486architecture , enhancements, cache memorytechniques, exception handling,comparison ofmicroprocessors (8086 80186 – 80286 – 80386 – 80486).

TEXT BOOKS:

1. Ramesh Gaonkar, “**Microprocessor Architecture, Programming and Application with 8085**”, Penram, 5th Edition, 2002. (Modules I & II)
2. A.K.Ray, “**Advanced Microprocessors and Peripherals**”, Tata McGraw-Hill, 2nd Edition, 2006. (Modules III, IV & V)

REFERENCE BOOKS:

1. D. V. Hall, “**Microprocessors and Interfacing**”, TMH, 2nd Edition, 2006.
2. K.Uday Kumar, B.S.Umashankar, “**The 8085 Microprocessor: Architecture, programming and Interfacing**”, Pearson, 2008.

Outcomes:

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

- 1 describe the basic architecture of 8085 & 8086 microprocessors.
- 2 Write assembly language programs for 8085 & 8086 microprocessors.
- 3 Describe a typical I/O and Memory interfacing microprocessor systems.
- 4 Know the architectures of advanced microprocessors.

2015-16

Malla Reddy Engineering College (Autonomous)

Course Code: 50418

L T P
3 - -
Credits: 3

DIGITAL DESIGN USING VERILOG HDL

Prerequisite:Digital Electronics.

Objectives:This course provides the knowledge to design Digital Circuits behavioral and RTL modeling using Verilog HDL. And also verifying these models and synthesizing RTL models to standard cell libraries and FPGAs. This course also provides different technologies related to HDLs, construct, compile and execute Verilog HDL programs using provided software tools.

MODULE - I:Introduction to Verilog HDL [12 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[12 Periods] **Gate Level Modeling:** Introduction, AND Gate Primitive, Module Structure, Other Gate Primitives, Illustrative Examples, Tristate Gates, Array of Instances of Primitives, Design of Flip –Flops with Gate Primitives, Delays, Strengths and Construction Resolution, Net Types, Design of Basic Circuit.

Modeling at Dataflow Level: Introduction, Continuous Assignment Structure, Delays and Continuous Assignments, Assignment to Vectors, Operators.

MODULE - III:Behavioral Modeling[12 Periods] 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, 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[12 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 [12 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. (Modules I, II, III, IV & V)
2. Zainalabdien Navabi, “**Verilog Digital System Design**”, TMH, 2nd Edition, 1999. (Modules I, II, III, IV & V)

REFERENCE BOOKS:

1. Stephen Brown, Zvonkoc Vranesic, “**Fundamentals 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.

Outcomes:

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

1. Understand Verilog hardware description languages (HDL) to design Digital Circuits in different Models.
2. Write Register Transfer Level (RTL) models of digital circuits.
3. Describe standard cell libraries and FPGAs.
4. Synthesize RTL models to standard cell libraries and FPGAs.
5. Test the Digital Circuits using Test benches.

2015-16

Malla Reddy Engineering College (Autonomous)

Course Code: 50448

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3 - -
Credits: 3

PRINCIPLES OF COMMUNICATION ENGINEERING

Prerequisite: Basic Electronic Circuits.

Objectives: This course introduces the need for Modulation of various analog and digital modulation and demodulation techniques. And also introduces the concepts of Digital data transmission. It also discusses the basics of satellite and optical communication.

MODULE - I: Fundamentals of Analog Communication [15

Periods]Principles of amplitude modulation, AM envelope, frequency spectrum and bandwidth, modulation index and percent modulation, AM Voltage distribution, AM power distribution, Angle modulation - FM and PM waveforms, phase deviation and modulation index, frequency deviation and percent modulation, Frequency analysis of angle modulated waves. Bandwidth requirements for Angle modulated waves.

MODULE - II: Digital Communication [9

Periods]Introduction, Shannon limit for information capacity, digital amplitude modulation, frequency shift keying, FSK bit rate and baud, FSK transmitter, BW consideration ofFSK, FSK receiver, phase shift keying – binary phase shift keying – QPSK, QuadratureAmplitude modulation, bandwidth efficiency, carrier recovery – squaring loop, Costasloop, DPSK.

MODULE - III: Digital Transmission [12 Periods]

Introduction, Pulse modulation, PCM – PCM sampling, sampling rate, signal toquantization noise rate, companding – analog and digital – percentage error, deltamodulation, adaptive delta modulation, differential pulse code modulation, pulsetransmission – Intersymbol interference, eye patterns.

MODULE - IV:Spread Spectrum and Multiple Access Techniques [16

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 [8 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. (Modules IV & V)
2. Simon Haykin, “Communication Systems”, 4th Edition, John Wiley & Sons, 2001.(Modules I, II & III)

REFERENCE BOOKS:

1. H.Taub,D L Schilling,G Saha,“**Principles of Communication**”, 3rd Edition,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, 2nd Edition, 2007.

Outcomes:

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

1. Know the concepts of various analog and digital modulation and demodulation techniques.
2. Know the concepts of Digital data transmission.
3. Understand the spread spectrum and multiple access techniques.
4. Understand Satellite and Optical communication.

2015-16

Malla Reddy Engineering College (Autonomous)

Course Code: 50449

L T P
3 - -
Credits: 3

EMBEDDED SYSTEM DESIGN (Open Elective)

Prerequisite: Microprocessors and Microcontrollers.

Objectives: This course introduces the difference between Embedded Systems and General purpose systems. This course familiarizes to compare different approaches in optimizing General purpose processors. This course provides the design tradeoffs made by different models of embedded systems.

Module - I: Introduction to Embedded Systems [08 Periods]
Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

Module - II: Typical Embedded System [14 Periods]
Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

Module - III: Embedded Firmware [12 Periods]
Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

Module - IV: RTOS Based Embedded System Design [12 Periods]
Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

Module - V: Task Communication [14 Periods]
Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS.

TEXT BOOKS:

1. Shibu K. V, "Introduction to Embedded Systems", McGraw Hill, 2013. (Modules I, II, III, IV & V)

REFERENCE BOOKS:

1. Raj Kamal, "Embedded Systems", TMH.
2. Frank Vahid, Tony Givargis, John Wiley, "Embedded System Design".
3. Lyla, "Embedded Systems", Pearson, 2013.
4. David E. Simon, "An Embedded Software Primer", Pearson Education.

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

1. Understand the basics of an embedded system.
2. Design, implement and test an embedded system.
3. Understand the design tradeoffs made by different models of embedded systems.

2015-16

Malla Reddy Engineering College (Autonomous)

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Course Code: 50503

Credits: 3

DATA STRUCTURES

(OPEN ELECTIVE)

Prerequisites:NIL

Objectives:To develop skills to use and analyze simple linear and nonlinear data Structures and Strengthen the ability to identify and apply the suitable data structure for the given real world problem

Module I: Stacks and Queue

A: Operations on Stacks

[04 Periods]

Basic stack operations, Representation of a stack using arrays, Stack Applications: Reversing list, factorial calculation, infix-to-postfix transformation, postfix expression evaluation

B: Operations on Queues

[05 Periods]

Basic queue operations, Representation of a queue using array, Classification and implementation – Circular and Dequeues, Applications of Queues.

Module II: Lists

A: Linear lists

[09 Periods]

Introduction, linked lists, single linked list, representation of a linked list in memory, operations on a single linked list, advantages and disadvantages of single linked list. Stacks and Queues representation using Single linked list

Module III: Searching and sorting

A: General Notations and complexities

[02 Periods]

Algorithm specification, Time and Space complexities using Asymptotic notations

B: Searching

[03 Periods]

Basic concepts, linear search, binary search

C: Sorting techniques

[04 Periods]

Basic concepts, Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort and their implementation programs

Module IV: Trees

A: Types of Trees

[09 Periods]

Introduction, Basic terminology, Types of trees, Creating a binary tree from a general tree, Traversing a binary tree, Huffman's trees, applications of trees.

Module V: Graphs

A: Traversal of Graphs

[09 Periods]

Introduction, Graph terminology, Directed graphs, Bi-connected components, representation of graphs, Graph traversal algorithms (BFS algorithm, DFS algorithm), applications of graphs.

TEXT BOOKS:

1. Data Structures using C by Reema Thareja – Second Edition, Oxford University Press.
2. Data Structures: A Pseudocode Approach with C by R.F.Gilberg and B.A.Forouzan - Second Edition, Cengage Learning.
3. Beginning XML, Joe Fawcett, Danny Ayers, Liam R. E. QuinJoe Fawcett, Danny Ayers, Liam R. E. Quin, Wrox Press.2012.
4. Eclipse: Programming Java Applications , Steve Holzner, O'Reilley, 2004.

REFERENCES:

1. C& Data structures by P. Padmanabham - Third Edition, B.S. Publications.
2. Data Structures using C by A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein – Seventh Edition, Pearson Education
3. C Programming & Data Structures by E. Balagurusamy - TMH.
4. C& Data structures by E V Prasad and N B Venkateswarlu - S. Chand & Co.

Outcomes:

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

1. Use and analyze different data structures
2. Identity the appropriate data structure for given problem
3. Analyzes the programs for time and space complexities
4. Understand the basic concepts of searching and sorting methods
5. Use tree concepts and operations to solve problems
6. Applications of graphs in BFS, and DFS

2015-16

Malla Reddy Engineering College (Autonomous)

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3 - -

Course Code: 50511 Credits: 3

DATABASE MANAGEMENT SYSTEMS
(OPEN ELECTIVE)

Prerequisite: NIL

Objectives: To understand the data management and its relations, transactions, concurrency control.

Module I: Introduction to Databases and Database Management System

A: Basic Operations on Database System [04 Periods]

Database system Applications - Advantages of DBMS over File System - Data Models – Instances and schema - View of Data - Database Languages - DDL-DML - Database Users and Administrator - Database System Structure.

B: Database Design and ER diagrams [05 Periods]

Attributes and Entity Sets – Relationships and Relationship Sets – Constraints - Keys - Design Issues - Entity-Relationship Diagram-Weak Entity Sets - Extended E-R Features- Database Design with ER model - Database Design for Banking Enterprise

Module II: Relational Model and SQL

A: Introduction to the Relational Model [04 Periods]

Structure of RDBMS - Integrity Constraints over Relations – Enforcing Integrity Constraints – Querying Relational Data - Relational Algebra and Calculus.

B: Introduction to SQL [05 Periods]

Data Definition commands, Data Manipulation Commands, Basic Structure, Set operations Aggregate Operations - Join operations - Sub queries and correlated queries, SQL functions , views , Triggers, Embedded SQL.

Module III: Dependencies

A: Functional Dependencies [09 Periods]

Introduction , Basic Definitions, Trivial and Non trivial dependencies, closure of a set of dependencies, closure of attributes, irreducible set of dependencies- Schema Refinement in Database Design- Problems Caused by Redundancy – Decompositions – Problem Related to Decomposition – Lossless Join Decomposition – Dependency Preserving Decomposition - FIRST, SECOND, THIRD Normal Forms – BCNF — Multivalued Dependencies – Fourth Normal Form.

Module IV: Transactions and Recovery

A: Transaction concept [06 Periods]

Transaction state- Implementation of atomicity and Durability-Concurrent executions – Serializability, Recoverability Lock Based Protocols, Timestamp Based Protocols, Validation Based Protocols, Multiple Granularity, Dead Lock Handling – Failure Classification – Storage Structure

B: Recovery and Atomicity**[03 Periods]**

Log Based recovery – Recovery with concurrent transactions– Checkpoints .

Module V: File Organization**A: Storage of files using Various Techniques****[09 Periods]**

Organization of records in file - Data Dictionary Storage – Indexing and Hashing – Basic Concepts , Ordered Indices, B⁺ Tree Index files, B- tree index files– Static Hashing – Dynamic Hashing – Comparison of Indexing with Hashing.

TEXTBOOKS:

1. Database System Concepts, Silberschatz, Korth , Fifth Edition, McGraw hill (1,2,3 & 5 Units)
2. Database Management Systems, Raghuramakrishnan, Johannes Gehrke,TATA McGraw Hill(1,2,3 & 5 Units)
3. Introduction to Database Systems, C.J.Date, Pearson Education (4th Unit)

REFERENCES:

1. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
2. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.

Outcomes:**After completion of this course, students will be able to:**

1. Understand the fundamental concepts of database management system. These concepts include aspects of database design, database languages, and database-system implementation.
2. The students will be able to design and query databases, as well as understand the internalsof databases.
3. Define the basic functions of DBMS & RDBMS.

Course Code: 50512

Credits: 3

OPERATING SYSTEMS
(Open Elective)**Prerequisite:** NIL**Objectives:** To learn the basics of operations of system and its processing and memory management with file system operations.**Module I: Computer System and Operating System Overview****A: Basic system and process operations [09 Periods]**

Overview of Computer System hardware, Operating System Objectives and functions, Evolution of operating System, Example Systems. Operating System Services, System Calls, System Programs. Process Management: Process Description, Process Control, Process States, Cooperating Processes, Inter-process Communication.

Module II: Scheduling and Concurrency**A: CPU Scheduling [04 Periods]**

Basic Concepts, Scheduling Criteria, Scheduling Algorithms and evaluation, Threads Overview, Threading issues.

B: Concurrency [05 Periods]

Principles of Concurrency, Mutual Exclusion, Software and hardware approaches, Semaphores, Monitors, Message Passing, Classic problems of synchronization.

Module III: Deadlocks**A: Principles of deadlock [09 Periods]**

System Model, Deadlock Characterization, Methods for handling Deadlocks, Deadlock Prevention, Deadlock avoidance, Deadlock detection, Recovery from Deadlocks, Dining philosopher's problem.

Module IV: Memory**A: Memory Management [04 Periods]**

Basic concepts, Swapping, Contiguous memory allocation, Paging, Segmentation, Virtual memory, Demand paging, Page-replacement algorithms, Thrashing.

B: Secondary storage structure [03 Periods]

Disk structure; Disk scheduling, Disk management, Swap-space Management, RAID structure, Stable-storage Implementation, Tertiary-Storage Structure

C: I/O systems [02 Periods]

I/O hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O request to hardware operations, STREAMS

Module V: Files

A: File Management

[07 Periods]

File system-File concepts, Access methods, Directory structure, File system mounting, File sharing and Protection. Implementing file systems-File system structure and implementation, Directory implementation, Allocation methods, Free-space management, Efficiency and performance

B: Security

[02 Periods]

Security threats, Protection, Intruders, Viruses, Trusted System.

TEXT BOOKS:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2. Operating Systems - Internal and Design Principles, Stallings, Fifth Edition-2005, Pearson education/PHI

REFERENCES:

1. Operating System A Design Approach-Crowley, TMH.
2. Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI.
3. “An Introduction to Operating Systems, Concepts and Practice”, PHI, 2003 – Pramod Chandra P. Bhat.
4. Operating Systems – A concept based approach – DM Dhamdhere – 2nd Edition TMH

Outcomes:

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

1. Identify the System calls, protection and interrupts of any GOS.
2. Explain Input/output, disk access, file systems facilities any GOS()
3. Write application keeping Concurrency and synchronization Semaphores/monitors, shared memory, mutual exclusion Process scheduling services of an GOS in the mind.
4. The student will learn the responsibilities of OS in concerned with process management and memory management.

ARTIFICIAL INTELLIGENCE

Perquisite: NIL

Objectives: This course contributes to the development of the following capabilities
Enabling Knowledge, Problem Solving: and Critical Analysis.

Module I :

A:Introduction

[09 Periods]

AI problems, AI Technique, defining problem as a static space search production systems, problem characteristics, production system characteristics. Heuristic **Search B:Techniques:** Generate –and –test, hill climbing, Best –First Search, problem reduction, constraint satisfaction, means-ends analysis.

Module II:

Knowledge Representation

[09 Periods]

Issues, predicate logic, resolution, representing, knowledge using rules, forward versus Backward reasoning, Matching, control knowledge, weak slot –and –filler structures, semantic nets, frames, strong slot –and –filler structures, conceptual dependency, scripts

Module III:

Reasoning Techniques

[09 Periods]

Nonmonotonic reasoning, Augmenting a problem solver, implementation of depth first search and Breadth first search, statistical reasoning, probability and Bayes theorem, certainty factors and rule - based systems, Bayesian Networks.

Module IV:

Game Playing

[09 Periods]

Mini max search, alpha – beta cutoffs, planning system, Goal stack planning, hierarchical planning, understanding, understanding as constraint satisfaction, Waltz algorithm, natural language processing, syntactic processing, Augmented transition Networks, semantic analysis, case grammars.

Module V:

Learning

[09 Periods]

Role learning, learning by taking advice, learning in problem solving, learning from examples, Winston’s learning program, Decision trees, perception, vision, speech recognition, Navigation, manipulation, Robot architectures, Expert systems, shell, explanation, knowledge acquisition.

TEXT BOOKS:

1. “Artificial Intelligence”, 2nd Edition., E. Rich and K. Knight (TMH).
2. Neural Computing: Theory and practice – Wasserman

REFERENCES:

1. Artificial Intelligence Structures and Strategies complex problem Solving – George F. Luger Pearson Education.

Outcomes:**After completion of this course, students will be able to:**

1. Describe the key components of the artificial intelligence (AI) field
2. Describe search strategies and solve problems by applying a suitable search method
3. Describe minimax search and alpha-beta pruning in game playing.
4. Describe and apply knowledge representation
5. Describe and list the key aspects of planning
6. Describe and apply probability theorem and Bayesian networks.
7. Describe the key aspects of intelligent agents

Course Code: 50571

Credits: 3

COMPUTER GRAPHICS
(Open Elective)**Prerequisites:** NIL**Objectives:** To understand and use the application programming interface for the implementation of the graphics and its pipeline and modeling.**Module I: Introduction of Graphics****A: Basics of Graphics** [04 Periods]

Introduction, Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphicsmonitorsandworkstationsandinputdevices.

B: Outputprimitives [05 Periods]

Pointsandlines,linedrawingalgorithms,mid-pointcircle andellipsealgorithms.Filledareaprimitives:Scan linepolygonfillalgorithm, boundary-fillandflood-fillalgorithms.

Module II: Transforming and Viewing**A: 2-Dgeometricaltransforms** [03 Periods]

Translation,scaling,rotation,reflectionandshear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

B: 2-Dviewing [06 Periods]

Theviewingpipeline,viewingcoordinateframe,window toview-portcoordinate transformation,viewingfunctions,Cohen-Sutherlandand Cyrus-beck lineclipping algorithms, Sutherland –Hodgeman polygon clippingalgorithm.

Module III: 3D Objects**A: 3-D Object Representation** [09 Periods]

Polygon surfaces, quadric surfaces, spline representation,Hermitecurve,BeziercurveandB-Splinecurves,BezierandB-Splinesurfaces.Basic illuminationmodels,polygonrenderingmethods.

Module IV:3D Transforming and Viewing**A: 3-DGeometrictransformations** [04 Periods]

Translation, rotation,scaling,reflectionand Shear transformations,composite transformations.

B: 3-Dviewing [05 Periods]

Viewingpipeline,viewingcoordinates,viewvolumeandgeneralprojectiontransformsandclipping.

Module V: Surface detection Methods and Animation

A: Visible surface detection methods

[05 Periods]

Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-treemethods, area sub-division and octree methods.

B: Computer Animation

[04 Periods]

Design of animation sequence, general computer animation functions, raster animation, computer animation languages, keyframe systems, motion specifications

TEXT BOOKS:

1. "Computer Graphics *Cversion*", Donald Hearn and M. Pauline Baker, Pearson Education.
2. "Computer Graphics Principles & practice", second edition in C, Foley, Van Dam, Feiner and Hughes, Pearson Education.

REFERENCES:

1. "Computer Graphics", second Edition, Donald Hearn and M. Pauline Baker, PHI/Pearson Education.
2. "Computer Graphics Second edition", Zhigangxiang, Roy Plastock, Schaum's outlines, Tata Mc-Graw Hill edition.

Outcomes:

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

1. Gain a proficiency with OpenGL, a standard specification defining a cross-language, cross-platform API for writing applications that produce 2D and 3D computer graphics.
2. Learn the principles and commonly used paradigms and techniques of computer graphics.
3. Develop a facility with the relevant mathematics of computer graphics
4. Be able to write basic graphics application programs including animation
5. Understand the basic aspects of 2D image representations and transformation

2015-16

Malla Reddy Engineering College (Autonomous)

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Credits: 3

Course Code: 50H08

INTRODUCTION TO INTERPRETATION OF LITERATURE AND ANALYTICAL WRITING

Prerequisites: NIL

Objectives :

To determine how well the students can develop a compelling argument in writing for an academic audience. To involve them in critical thinking and persuasive writing exercises .

To develop effective writing skills -to analyze , to evaluate the data and ideas for making sense Encourage students to learn strategies for becoming accurate readers and critical analysts. To help learners understand their abilities and strengths while laying a road map towards their career goals.

Introduction :

Developing Analytical writing skills through interpretation of literature and enabling the students to think critically. It assesses the ability to articulate and support complex ideas , construct and evaluate arguments and sustain a focused and coherent discussion.

Interpreting the text triggers the students' analytical and critical thinking skills while expanding their outlook.

Methodology :

- Giving them exercises pertaining to translation of their thoughts into words.
- Giving them vocabulary exercises in different contexts.
- Find supporting evidence.
- Make an outline

MODULE – I :

Introduction to interpretation skills

- 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 :

Critical Reading

- 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- III:

Critical Writing

- 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

From the short novel : Animal Farm : George Orwell

MODULE – IV :

Analytical writing:

- 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:

Approaches to literary Criticism

Formalist Criticism

Biographical Criticism

Historical Criticism

Gender Criticism

Psychological Criticism

Sociological Criticism

Reader-Response Criticism

Mythological Criticism

Deconstructionist Criticism

REFERENCE BOOKS:

GRE by CliffsTestPrep-7th edition

GRE Exam- A Comprehensive Program

MacMilan edition- Glossary of English Literary terms by – M H Abraham

Interpreting Literature- A Myth and a Reality- GD Barche

Outcomes :

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

1. Know the capable of critical thinking and analytical writing.
2. Get real life experiences through interpretation of literature.
3. Learn strategies for becoming accurate readers and critical analysts
4. Know the logical thinking towards social, political, economical, legal and technological issues.
5. Capable of drawing their career vision and mission independently.

2015-16

Malla Reddy Engineering College (Autonomous)

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Course Code: 50H09

Credits: 3

BUSINESS COMMUNICATION

Prerequisites: NIL

Objectives:

To upgrade the learner's communication and presentation skills and to make the student's competent in communication at an advanced level. To groom the learners' personality. To make the students self-confident individuals by mastering inter-personal skills, team management skills, and leadership skills.

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

[05 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

[07 Periods]

Informal and Formal conversation , Verbal and Non-verbal communication.Barriers to effective communication- Kinesics

MODULE –III :Reading skills

[06 Periods]

Types of reading –reading for facts, guessing meaning from context, strategies of reading-scanning, skimming, inferring meaning, critical reading,.

MODULE – IV: Writing and compositionII

[06 Periods]

Letter-writing-business letters-pro forma culture-format-style-effectiveness, promptness-Analysis of sample letters collected from industry-email, fax, Essay writing-nuances of essay writing, types of essays.

MODULE – V: E- Correspondence

[05 Periods]

e mail, etiquette, characteristics and types of social correspondence -advantages and disadvantage.

REFERENCE BOOKS:

1. Essentials of Business Communication, Rajendra Pal S KorlahaHi: Sultan Chand & Sons, New Delhi.
2. Basic Communication Skills for Technology, Andrew J.Rutherford: Pearson Education Asia, Patparganj, New Delhi-92.
3. Advanced Communication skills, V.Prasad, 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. Business Cimmunication, RK Madhukar, Vikas Publishing House Pvt Ltd
6. K.R. Laxminarayana: English for Technical Communication-Vols.1 and 2.SCITECH Publications (India) Pvt.Ltd. T.Nagar, Chennai-6000 017
7. Edmond H. Weiss: Writing Remedies: Practical Exercises for Technical Writing, Universities Press, and Hyderabad.
8. Cliffs test Prep for GRE and TOFFEL: Computer Based, IDG Books. India (P) Ltd.New Delhi-002.
9. How to build a better vocabulary – Nurnberg Maxwell & Morris Rosenblum: Grand Central Publishing.
10. How to read better and faster: Norman Lewis, W.R. Goyal Publishers, New Delhi.

Outcomes:

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

1. understand the importance of non-verbal signals in communication.
2. Will be confident to participate in business meetings
3. Get encouraged in all- round development by focusing on soft skills
4. Aware of importance of soft skills in the real time situations.

2015-16

Malla Reddy Engineering College (Autonomous)

Course Code: 50H10

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Credits: 3

WORLD LITERATURES

Prerequisites: NIL

Objectives:

The undergraduates need to know about the societies across the globe to understand their society better, and this course aims at bringing awareness about the societies across the globe. The students need to understand the cultures of different nations as they are going to enter into global careers and understanding these cultures of different nations will help them to cope with the culture shock.

Module I

African literature

- **Wole Soyinka**
Dedication (poem)
- **Chinua Achebe**
A Mother in a Refugee Camp.(poem)
- **OyetSisto Ocean**
In the Plantation (short story)
- **David Oyuke**
Of days and nights of old (short story)

Module-II

Australian Literature

- **Christopher Kelen**
Dark between Empires (poem)
- **Henry Lawson**
Sons of the South (poem)
- **Ryan O’Neill**
It’s a Tuesday Morning(short story)
- **Linda Heuring**
Roommates (Short Story)

Module III

American Literature

- **Robert Frost**
A Late Walk (poem)
- **Maya Angelou**
Caged Bird (poem)
- **Stephen Crane**
A Dark Brown Dog(Short Story)
- **Mark Twain**
A True Story –word to word as I heard It (Short Story)

Module IV

European Literature

- **Herta Muller**
“Gri” (fragment) (poem)

- **William Wordsworth**
I Wandered Lonely As A Cloud (Poem)
- **Grazia Deledda**
The Portrait of a Country woman (Short Story)
- **Guy de Maupassant**
Miss Harriet(Short Story)

Module V

Asian Literature

- **Gieve Patel**
How Do You Withstand, Body(poem)
- **Amrita Pritam**
Empty Space(poem)
- **Mahasweta Devi**
Our Non-veg Cow (short story)
- **Basil Fernando**
Albert the Murderer (short story)

REFERENCES:

Africa's Best Stories: An Anthology of Africa's Best Short Stories
:Chimamanda Ngozi Adichie, Wole Soyinka, E. C. Osondu StoryAfrica.inc, America, 2010
Our Non-veg Cow and Other Stories Mahāśvetā Debī, Seagull Books, 1998
Original Short Stories of Maupassant by Guy de Maupassant The Floating Press, 2014

Unspeakable Women: Selected Short Stories Written by Italian Women during Fascism by Robin Pickering-Iazzi :The Feminist Press, New York, 1993

www.naosite.lb.nagasaki-u.ac.jp/dspace/bitstream/.../keieikeizai70_03_08.pdf
www.poetryfoundation.org
www.bigbridge.org/BB17/poetry/indianpoetryanthology/Gieve_Patel.html
www.romanianstudies.org/.../poetry-in-translation
www.poemhunter.com
www.americanliterature.com
www.fishpublishing.com/short-stories-to-read-online.php
www.theliftebrow.com/post/.../an-australian-short-story-by-ryan-oneill
www.universeofpoetry.org/australia.shtml
www.famouspoetsandpoems.com › Poets › Wole Soyinka
www.goodreads.com
www.africanwriterstrust.org

Outcomes:

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

1. Learnt about the literatures of different nations and continents.
2. Aware of 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.

2015-16

Malla Reddy Engineering College (Autonomous)

Course Code: 50B23

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2 2 -
Credits: 3

ADVANCED OPTIMIZATION TECHNIQUES

Prerequisites: NIL

Course Objectives:

To understand the theory of optimization methods and algorithms developed for solving various types of optimization problems To develop and promote research interest in applying optimization techniques in problems of Engineering and Technology To apply the mathematical results and numerical techniques of optimization theory to concrete Engineering problems.

MODULE- I: Single Variable Non-Linear Unconstrained Optimization: [8Periods]

One dimensional Optimization Methods:- Uni-modal function, elimination method, Fibonacci method, golden section method, interpolation methods- quadratic method.

MODULE – II: Multi Variable Non-Linear Unconstrained Optimization:[8 Periods]

Direct search method –Univariant Method – pattern search methods – Powell’s – Hook – Jeeves search

MODULE – III: Geometric Programming:

Polynomials – arithmetic – geometric inequality – unconstrained G.P

Dynamic Programming: [08 Periods]

Multistage decision process, principles of optimality, examples, conversion of final problem to an initial value problem, application of dynamic programming, production inventory.

MODULE IV: Linear Programming: [08Periods]

Formulation – Sensivity analysis. Change in the constraints, cost coefficients, coefficients of the constraints, addition and deletion of variable, constraints. Simulation – Introduction

MODULE V

Stochastic Programming: [08 Periods]

Basic concepts of probability theory, random variables –distributions – mean, variance, Correlation, co variance, joint probability distribution – stochastic linear, dynamic programming.

TEXT BOOKS:

1. S.S Rao / **Optimization theory & Applications** / New Age International/4th Edition/2009.
2. Kanan & Kumar / **Introductory to operation research** /Springer/2004.
3. M.C Joshi / **Optimization Techniques theory and practice**/K.M Moudgalya/ Narosa Publications/2004.

REFERENCE BOOKS:

1. H.A. Taha / **Operation Research** /TMH/8th Edition/2011
2. R.L Rardin / **Optimization in operations research** /3rd Edition/1998.
3. Benugundu & Chandraputla / **Optimization Techniques** /Person Asia/2nd Edition/2014

Course Outcomes:

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

1. Develop models of optimization
2. Develops the skills to consider real-world problems and determine whether or not linear programming is an appropriate modeling framework.
3. Solve the models for their optimal solutions; interpret the models' solutions and infer solutions to the real-world problems.

Course Code: 50B24

MATHEMATICAL MODELLING

Prerequisites: NIL

Course Objectives:

The objective of the course is to introduce mathematical modeling of engineering problems. The construction and analysis of mathematical models inspired by real life problems. The course will present several modelling techniques and the means to analyze the resulting systems.

MODULE-I: Mathematical Modeling & Types of models using Ordinary Differential Equations of First Order: [08Periods]

Mathematical Model, types of Mathematical models, Procedure of modeling, Linear Growth and

Decay Models, Non-Linear Growth and Decay Models, Mathematical Modeling in Dynamics Through Ordinary Differential Equations of First Order,

MODULE-II: Mathematical Modeling through Systems of Ordinary Differential Equations of the First Order [08Periods]

Mathematical Modeling in Population Dynamics, Mathematical Modelling in Economics Through Systems of Ordinary Differential Equations of First Order, Mathematical Models in Medicine, Mathematical Modelling in Dynamics Through Systems of Ordinary Differential Equations of First Order.

MODULE-III: Mathematical Modelling Through Ordinary Differential Equations of Second Order [07 Periods]

Mathematical Modeling of Planetary Motions, Mathematical Modeling of Circular Motion and Motion of Satellites, Mathematical Modeling Through Linear Differential Equations of Second Order, Miscellaneous Mathematical Models Through Ordinary Differential Equations of the Second Order.

MODULE-IV: Mathematical Modeling Through Difference Equations [08Periods]

The Need for Mathematical Modelling Through Difference Equations: Some Simple Models, Basic Theory of Linear Difference Equations with Constant Coefficients, Mathematical Modelling Through Difference Equations in Economics and Finance, Mathematical Modelling Through Difference Equations in Population Dynamics and Genetics, Mathematical Modelling Through Difference Equations in Probability Theory, Related problems.

MODULE-V: Mathematical Modeling through Partial Differential Equation [08Periods]

Motivation of Partial Differential Equations Models, First Method of Getting PDE Models, Momentum Balance Equations: The Second Method of Obtaining Partial Differential Equation Models, Variational Principles: Third Method of Obtaining Partial Differential Equation Models, Probability Generating Function, Fourth Method of Obtaining Partial Differential Equation Models, Model for Traffic Flow on a Highway, Nature of Partial Differential Equations, Initial and Boundary Conditions.

TEXT BOOKS:

1. Edward A. Bender..An Introduction to Mathematical Modeling.
2. A. C. Fowler..Mathematical Models in Applied Sciences, Cambridge University Press.
3. J. N. Kapoor..Mathematical Modeling, Wiley eastern limited.
4. S.M. Ross ..Simulation, India Elsevier Publication.
5. A.M.Law and W.D.Kelton.. Simulation Modeling and Analysis, T.M.H. Edition.
6. Numerical Solutions of Differential Equations by M.K.Jain, Wiley Eastern Ltd.

Course Outcomes:

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

1. Types of models (static, discrete time, continuous time, stochastic) with case studies chosen from population dynamics and other fields can to be determined.
2. Identify the most important processes governing the problem (theoretical assumptions)
3. Identify the state variables (quantities studied)
4. Identify the basic principles that govern the state variables (physical laws, interactions)
5. Express mathematically these principles in terms of state variables (choice of formalism)

Course Code: 50B25

DIFFERENTIAL EQUATIONS AND DYNAMICAL SYSTEMS

Prerequisites: NIL

Course Objectives:

The aim is to give a self contained introduction to the field of ordinary differential equations with emphasis on the dynamical systems point. The objective of this course is to provide the student with an understanding of the Apply techniques of Nonlinear ODE and Dynamical Systems .

MODULE-I : [07 Periods]

Linear Systems , Uncoupled Linear Systems , Diagonalization , Exponentials of Operators , Linear Systems .

MODULE-II: [08 Periods]

Complex Eigen values, Multiple Eigen values, Jordan Forms , Stability Theory Non homogeneous Linear Systems.

MODULE-III: [07 Periods] The Stable Manifold Stability and Liapunov Functions , Saddles, Nodes, Foci and Centers Global Theory, Dynamical Systems and Global Existence Theorems .

MODULE-IV: [08 Periods]

Limit Sets and Attractors, The Stable Manifold Theorem for Periodic , Global Phase Portraits and Separatrix Configurations Structural Stability , Higher Codimension Bifurcations at Non hyperbolic Equilibrium Points.

MODULE-V: [07 Periods]

Hopf Bifurcations and Bifurcations of Limit Cycles from a Multiple Focus Bifurcation , Finite Co -dimension Bifurcations in the Class of Bounded Quadratic Systems.

TEXT BOOKS:

- 1) Lawrence Perko, Springer Publications , Third edition ,Texts in Applied Mathematics.
- 2) Advanced engineering Mathematics by Kreyszig, John Wiley & Sons Publishers, 10th Edition, Reprint 2010.

REFERENCES:

1. Mathematics for Engineers and Scientists, Alan Jeffrey, 6th Edi, 2013, Chapman & Hall/ CRC
2. Advanced Engineering Mathematics, Michael Greenberg, Second Edition. Pearson Education.

Course Outcomes:

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

1. Develops the theory of dynamical systems systematically
2. Learn to analyze non-linear systems described for diagonalization.
3. Gets knowledge of basic concepts and methods from the theory of differential equations and dynamical systems.

2015-16

Malla Reddy Engineering College (Autonomous)

Course Code: 50B20

L T P
2 2 -
Credits: 3

ADVANCED PHYSICS FOR ENGINEERS

Prerequisite: Applied Physics – I & II

Objectives: The objective of this course is to make the students familiar with the recent advanced concepts in physics.

Module-I: Special Theory of Relativity: [09 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 [09 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

III A - Synthesis [07 Periods]

Introduction, Deposition techniques-Pulsed Laser Deposition (PLD), Spray Pyrolysis; Nucleation and growth of the thin films, properties (Mechanical, Electrical, Magnetic and Optical).

III B –Characterization [07 Periods]

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 [09 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 [09 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 / REFERENCE 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.
3. R F Bun shah, “**Hand Book of Technologies for Films and coating**”, Noyes publishers, 1st Edition, 1996
4. B E A Saleh and A C Tech, “**Fundamentals of Photonics**”, John Wiley and Sons, New York, 1st Edition, 1993.
5. K L Chopra and S R Das, “**Thin film Solar Cells**”, Plenum press, 1st Edition 1983.
6. K Vijaya Kumar, T Sreekanth and S Chandralingam, “**Engineering Physics**” S Chand and Co 1st Edition, 2008.

Outcomes:

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

1. Understand the concepts of special theory of relativity.
2. Analyze the basic concepts of Holography and applications.
3. How to synthesize and different methods of characterization of thin films.
4. Develop basic knowledge on the photonic crystals and solar physics and their applications .

2015-16

Malla Reddy Engineering College (Autonomous)

Course Code: 50B21

L T P
2 2 -
Credits: 3

NANO MATERIALS SYNTHESIS AND CHARACTERIZATION

Prerequisite: Applied Physics – I & II

Objectives: The objective is to provide different methods of synthesis and characterization of nano material.

Module-I: Physical Methods [09 periods]

Bottom-up approach and Top-down approach, Inert gas condensation, Arc Discharge, lasers ablation, laser pyrolysis, ball milling, molecular beam epitaxial, and electro deposition.

Module-II: Chemical methods [08 periods]

Nanocrystals by chemical reduction, photochemical synthesis, electrochemical synthesis, Nano crystals of semiconductors.

Module-III: Thermal Methods

III A-Thermal Methods:

[08 periods]

Thermolysis route – spray pyrolysis and solvated metal atom dispersion, sol-gel method solvothermal and hydrothermal routes, solution combustion synthesis, CVD method.

III B: Surface Characterization

[08 periods]

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 [08 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 Applications**” John Wiley, First Edition, 2004
2. Hari Singh Nalwa, “**Nanostructured Materials and Nanotechnology**”, Academic Press, First Edition, 2002.

REFERENCE BOOKS:

1. Charles P Poole Jr “**Introduction to Nanotechnology**”, John Willey & Sons, 1st Edition, 2003
2. C Dupas, P Houdy, M Lahmani, Nanoscience: “**Nanotechnologies and Nanophysics**”, Springer-Verlag Berlin Heidelberg, 1st Edition, 2007
3. Guozhong Cao, “**Nanostructures and Nanomaterials, synthesis, properties and applications**”, Imperial College Press, 1st Edition, 2004.
4. T Pradeep, “**NANO: The Essentials: Understanding Nanoscience and Nanotechnology**”. Tata McGraw-Hill Publishing Company Limited, Revised Edition, 2007
5. Z L Wang, “**Characterization of Nanophase Materials**” Wiley-VCH, 1st Edition, 2000.
6. K Vijaya Kumar, T Sreekanth and S Chandralingam, “**Engineering Physics**” S Chand and Co 1st Edition, 2008.

Outcomes:

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

1. Understand different methods of synthesis of nano materials
2. Analyze the differences in the different methods of synthesis
3. Learn different characterization techniques of nano materials.
4. Develop basic knowledge on the properties and the applications few nano materials.

2015-16

Malla Reddy Engineering College (Autonomous)

Course Code: 50B22

L T P
2 2 -
Credits: 3

NDT AND VACUUM TECHNOLOGY

Prerequisite: Applied Physics – I & II

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

Module – I: Introduction to Non destructive testing [06 periods]

Introduction, Objectives of Non destructive testing, Types of defects – Cracking, Spalling, Staining, Construction and Design defects, Honey combing, Dusting, Blistering, Rain damage.

Module – II: Methods of Non destructive Testing [10 Periods]

Liquid penetration method, Dye penetration method, Radiographic testing, Ultrasonic Inspection method, Pulse Echo method, Magnetic particle testing, Eddy current Testing.

Module – III: Introduction to Vacuum Technology and Flow meters

A: Introduction to Vacuum Technology [09 Periods]

Definition of vacuum, Degrees of vacuum and their ranges; Review of Kinetic theory of gases; Definitions of particle flux, mono layer formation time, pressure; Elementary gas transport phenomena; Knudsen's and Reynolds' numbers; Throughput, mass flow and conductance;

B: Flow meters [08 Periods]

Molar flow, Mass flow and throughput; Rota meters and chokes; differential pressure techniques;

Module – IV: Pressure gauges [08 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

Outcomes:

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

1. Understand the concepts of NDT and Vacuum technology.
2. Learn different methods of NDT.
3. Develop basic knowledge of flow meters, pressure gauges and vacuum pumps working and their applications.

2015-16

Malla Reddy Engineering College (Autonomous)

Course Code: 50B17

L T P
2 2 -
Credits: 3

CHEMISTRY OF ENGINEERING MATERIALS

Prerequisite: Engg Chemistry

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-refractories and adhesives. To make the students to understand the basic concepts of chemistry to develop futuristic materials for high-tech applications in the area of engineering.

Module-I

Phase Rule and Alloys [10 Periods]

Phase Rule: Definition of terms : Phase, component, degree of freedom, phase rule equation. Phase diagrams – one component system- water system. Two component system Lead-Silver, cooling curves, heat treatment based on iron-carbon phase diagram - hardening, annealing and normalization. Alloys-fabrication of alloys-Ferrous alloys-Non ferrous alloys-industrial applications.

Module-II

Lubricants, Abrasives and Adhesives [09 Periods]

Introduction to Lubricants-Mechanism of Lubrication-classification of Lubricants-properties of lubricants-viscosity, flash and fire points, cloud and pour points, decomposition stability, saponification number. Abrasives-natural and artificial abrasives-grinding wheels-abrasive paper and cloth. Adhesives-classification -action of adhesives- factors influencing adhesive action development of adhesive strength.

Module-III

Cement and Concrete [09 Periods]

Introduction-Classification of cement-natural –chemical composition of cement-portland cement-chemical reactions involved in setting and hardening of cement-additives for cement-mortars and concretes-pre stressed concrete-post tensioning-curing-overall scenario of cement industry-Reinforced concrete constructions-testing and decaying of cement-prevention of cement decay.

Module-IV

Glass, Ceramics and Refractories [09 Periods]

Structure of glass-properties-Manufacturing of glass-Types of glasses-uses Ceramics-clays-methods for fabrication of ceramic ware plasticity of clays. Ceramic products-glazes. Porcelain and vitreous enamels. Requisites of a good refractory-classification, properties and applications of refractories.

Module-V

Polymers and Composite materials

[09 Periods]

Structure and properties of polymers-rubber –classification-vulcanization of rubber – preparation properties and application of Buna-S and Buna-N and Thiokol rubber. Biodegradable polymers- poly vinyl acetate and poly lactic acid. Liquid crystals- Introduction-structure of liquid crystal forming compounds-classification-chemical properties-importance and applications.

REFERENCE BOOKS:

1. Engineering Chemistry by R.P. Mani, K.N. Mishra, B. Rama Devi / CENGAGE learning.
2. Engineering Chemistry by P.C Jain & Monica Jain, Dhanpatrai Publishing Company (2008).
3. Engineering Chemistry by B. Siva Shankar Mc.Graw Hill Publishing Company Limited, New Delhi (2006).
4. Engineering Chemistry J.C. Kuriacase & J. Rajaram, Tata McGraw Hills Publishing Company Limited, New Delhi (2004).
5. Text Book of Engineering Chemistry by S.S. Dara & Mukkati S. Chand & Co Publishers, New Delhi (2006) Chemistry of Engineering Materials by CV Agarwal, C.P Murthy, A.Naidu, BS Publications.

Outcomes:

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

1. Ability to practice professional chemical - polymer engineering knowledge for sustainable development.
2. Be able to apply core concepts in Materials Science to solve engineering problems.

2015-16

Malla Reddy Engineering College (Autonomous)

Course Code: 50B18

L T P
2 2 -
Credits: 3

NANO CHEMISTRY

Prerequisite: Engg Chemistry

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 nonmaterials. To make aware of the learners of different applications of nano materials.

MODULE-I

NANO CHEMISTRY-I [09 Periods]

Introduction -synthesis of nanostructure materials, Bottom-up approach and Top-down approach

With examples-sol-gel method,-solvothermal and hydrothermal routes, Chemical Vapor Deposition and precipitation methods.

MODULE-II

NANO CHEMISTRY-II [09 Periods]

Properties of nano materials-Electronic properties, Energy bands and gaps in semiconductors, Fermisurfaces-Opticalproperties-Fluorescence/luminescence,

photoluminescence/fluorescence, electroluminescence, quantum dot.Magnetic properties-mechanical properties-thermal properties.

MODULE-III

INSTRUMENTAL ANALYSIS [09 Periods]

Characterization techniques: Principles involved in Scanning Electron Microscopy(SEM), Electron Dispersion Spectroscopy(EDS), Transmission Electron Microscopy (TEM), Dynamic Light Scattering (DLS) and Atomic Force Microscopy(AFM) -Illustrative examples.

MODULE-IV

CARBON NANO TUBES AND APPLICATION [09 Periods]

Carbon Nano structures ,types and preparation of Carbon Nano tubes.Nano structured crystals. Graphene, Carbon nano-fibers- Carbon clusters and Fullerenes- optical and telecommunication applications.Organic Nano Solar cells and its applications.

MODULE-V

ENVIRONMENTAL NANOTECHNOLOGY [09 Periods]

Implications of Nanotechnology & Research needs-Nano structured Catalysts TiO₂ 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.

REFERENCE BOOKS:

1. Nano Technology and Nano Electronics – Materials, devices and measurement Techniques by WR Fahrner – Springer
2. Nano Technology – science, innovation and opportunity by Lynn E Foster; Prentice Hall - Pearson education.
3. Hand book of Nano structured materials; Vol I to V Bio Ethics Readings and cases by Branch.
4. Nano: The Essentials – Understanding Nano Science and Nanotechnology – by T. Pradeep; Tata Mc.Graw Hill.
5. Nanotechnology: Principles and Practices – Sulabha K. Kulkarni – Capital Publishing Company
6. Specimen preparation for Transmission Electron microscopy by John & Bravmno et al, published by MRS.

Outcomes:

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

1. Aware about the synthesis of nanostructure materials.
2. Get knowledge about the properties of nano materials and instrumental analysis.
3. Know about the Carbon nano tubes, Carbon nano-fibers, nano structured Catalysts and Organic nano solar cells.

2015-16

Malla Reddy Engineering College (Autonomous)

Course Code: 50B19

L T P
2 2 -
Credits: 3

PHOTOCHEMISTRY AND SPECTROSCOPY

Prerequisite: Engg Chemistry

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:

[09 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.

Module –II:

Photochemistry II:

[09 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: [09 Periods]

Introduction and importance; Principles and instrumentation; Interferences - Chemical & Spectral methods; Applications of Atomic Absorption Spectroscopy for qualitative and quantitative analysis. UV-Visible spectroscopy: principles, applications for qualitative and quantitative analysis.

Module –IV:

IR Spectroscopy:

[09 Periods]

Introduction- basic principles, Instrumentation. Identification of some functional groups applications for qualitative and quantitative analysis.

Module –V:

Nuclear magnetic resonance spectroscopy: [09 Periods]

Introduction-basic principles, Instrumentation – chemical shift- Spin-Spin splitting- coupling constant, Spin decoupling, shift reagents. Structure determination, applications of proton NMR spectroscopy.

REFERENCES BOOKS:

1. “Vogel’s Text Book of Quantitative Chemical Analysis”, by J. Mendham, R.C. Denney, J.D. Barnes and M.J.K. Thomas, Pearson Education Pvt. Ltd., New Delhi, (6th edition).
2. Organic Spectroscopy by R.C. Banwell

3. Organic Spectroscopy by William Kemp.
4. R.O. Kan .Organic Photochemistry.New York :Mc Graw-Hill.
5. N.J Turro ,modern molecular photochemistry,The Benjamin/comings publishing
6. Applications of Absorption Spectroscopy of Organic Compounds” by John R.Dyer, Prentice-Hall of India Pvt. Ltd., New Delhi (1969).
7. Instrumental Methods of Analysis by Hobart H. Willard and D.U. Merritt & J.R.J.A. Dean, C.E.S Publishers and distributors.
8. Instrumental methods of chemical analysis – By Scoog and West .

Outcomes:

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

1. Aware about the light matter interaction.
2. Get knowledge about the usage of UV-Visible, IR & NMR radiations for structural identification of matter.