ACADEMIC REGULATIONS, COURSE STRUCTURE

ANDDETAILED SYLLABUS

UNDER

CHOICE BASED CREDIT SYSTEM (CBCS)

Effective from the Academic Year 2015-16

COMPUTER SCIENCE & ENGINEERING

(CSE)
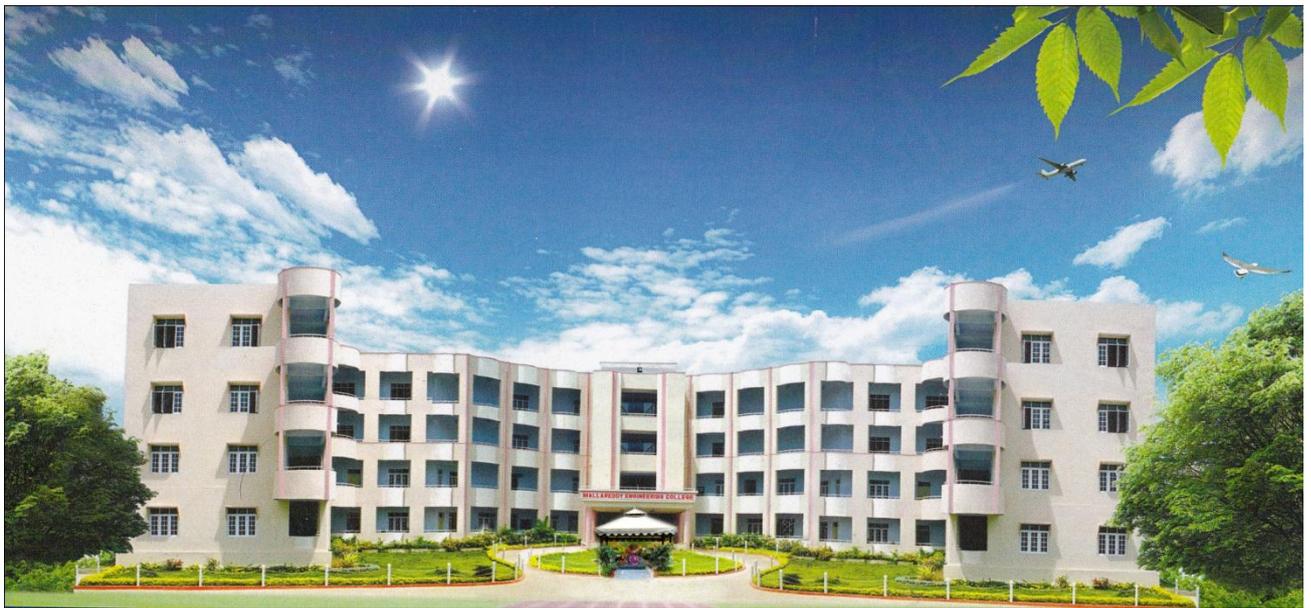
For

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 – ACADEMICREGULATIONS (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

Attaining global recognition in Computer Science &Engineering education, research and training to meet the growing needs of the industry and society.

DEPARTMENT MISSION

Quality education is imparted to develop innovative, entrepreneurial and efficient future professionals to fit in current global competitive environment.

State-of-art research facilities are provided to improve knowledge and develop technologies in the thrust areas of computer science and engineering.

Stake holders are allowed share their experiences in education and knowledge for mutual enrichment in the field of technical education.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

1. Impart with a sound knowledge in scientific and engineering technologies necessary to formulate, analyze, design and implement solutions to computer science & engineering related problems.
2. Carry out research in frontier areas of computer science and engineering with the capacity to learn independently throughout life to develop new technologies.
3. Train to exhibit effective technical, communication and project management skills in their profession by following ethical practices.
4. Posses leadership and team working skills to become visionary, inspirational leaders and entrepreneurs.

PROGRAMME OUTCOMES (POs)

PO1: Demonstrates knowledge in core subjects of Computer Science and Engineering with the ability to learn independently.

PO2: Acquires the ability to design and implement a software application or process that meets desired specifications within the specified constraints.

PO3: Gains the ability to solve problems relevant to industries and research organizations.

PO4: Develops innovative thinking capabilities to promote research in core and inter-disciplinary areas.

PO5: Familiarizes with modern engineering software tools and equipment to formulate and analyze computer science and engineering problems.

PO6: Coordinates and collaborates with engineers of other disciplines to work on projects involving multi-disciplines.

PO7: Engages in lifelong learning to cope with rapid technological changes in computer science and engineering.

PO8: Exhibits ethical and social responsibilities in professional and social context.

PO9: Able to identify business opportunities, lead and work in teams to become a successful entrepreneur.

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 CreditSystem (CBCS) with effect from theAcademic Year 2015 - 16 onwards, in the following branchesof 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 themerit 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 meritapproved by the University, subject to reservations as prescribedby the Government from time to time.

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

3. B.Tech. Programme (UGP) Structure
3.1 The B.Tech. Programmes of MREC (A) are of SemesterPattern, with 8 Semesters. Each Semester shall be of 22Weeks duration (inclusive of Examinations), with a minimumof 90 Instructional Days per Semester.
3.2 UGC/ AICTE specified Definitions/ Descriptions are adoptedappropriately for various terms and abbreviations used inthese Academic Regulations/ Norms, which are as listedbelow.
3.2.1 Semester Scheme:
Each UGP is of 8 Semesters, withthe academic year being divided into two Semesters of 22 weekseach, each Semester having - '**Continuous Internal Evaluation (CIE)**' and '**Semester End Examination (SEE)**'. Choice Based Credit System (CBCS) and Credit BasedSemester System (CBSS) as denoted by UGC, andCurriculum/ Course Structure as suggested by AICTE arefollowed.
3.2.2 Credit Courses:
All Subjects/ Courses are to be registered by a studentin a Semester to earn Credits. Credits shall be assignedto each Subject/ Course in a L: T: P: C (Lecture Periods:Tutorial Periods: Practical Periods: Credits) Structure, basedon 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 willnot carry Credits.
3.2.3 Subject/ Course Classification:
All Subjects/ Courses offered for the UGP are broadlyclassified 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:

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(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 Groupingfor the each of the UGP in E&T (B.Tech. DegreeProgrammes), is as listed below (along with AICTEspecified % Range of Total Credits)

Sl. No.	Classification		Course Work – Subject Area	Distributi on of credits	as per AICTE
	AICTE	UGC			
1	HS	Foundation Courses	Humanities and Social sciences including English, Environmental Sciences and Management subjects	9.24	5- 10 %
2	BS		Basic Sciences (BS) including Mathematics, Physics, Chemistry.	15.76	15- 20%
3	ES		Engineering sciences (ES), including Engineering Workshop, Engineering Graphics, Basics of Electrical Electronics / Mechanical / Computer Engineering	14.67	15 – 20%
4	PC	Core Courses	Professional Core subjects are relevant to the chosen specialization/branch; (May be split into Hard (no choice) and Soft (with choice), if required.	35.87	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;	9.78	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 specifiednumber of Credits required for the completion of the UGPand Award of the B.Tech. Degree in respective Branch ofEngineering.

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 $\pm$ 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 Semestershall 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 correspondingTheory 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 fromthe student for Registration in that Semester, and thesecond focus, if needed, will be on CGPA of the student).

6.4 If more entries for Registration of a Subject come intopicture, then the concerned Head of the Department shall takenecessary action, whether to offer such a Subject/ Coursefor TWO (or multiple) SECTIONS or NOT .

6.5 In case of options coming from Students of otherDepartments/ Branches/ Disciplines (not considering OPENELECTIVES), PRIORITY shall be given to the student ofthe '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 inaggregate 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 begranted by the College Academic Committee on genuine and **valid grounds such as Medical, NSS, Sports and Games,**based on the student's representationwith supporting evidence.

7.3 A stipulated fee shall be payable towards condoning of shortageof attendance.

7.4 Shortage of Attendance below 65% in aggregate shall in NOcase be condoned.

7.5 Students, whose shortage of attendance is not condoned in anySemester, are not eligible to register their Semester End Examinations, they get detained and their registration for thatSemester shall stand cancelled. They will not be promoted to thenext Semester. They may seek re-registration for all thoseSubjects registered in that Semester in which he gotdetained, by seeking re-admission for that Semester asand when offered; in case if there are any ProfessionalElectives and/ or Open Electives, the same may also be **re-registered**if offered, however, if those Electives are notoffered in later Semesters, then alternate Electives may bechosen from the **same** set of Elective Subjects offeredunder that category.

8. Academic Requirements

The following Academic Requirements have to be satisfied, inaddition to the Attendance Requirements mentioned in ItemNo.**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 AcademicRequirements and earned the Credits allotted to – Minor Project/Technical Seminar/Major Project, if he secures not less than40% of the total marks to be awarded for each.The student would be treated as failed, if he - (i) does notsubmit a report on his Minor Project / Technical Seminar / Major Project, ordoes not make a presentation of the same before theEvaluation 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 thesame in the next subsequent Semester, as and when it isscheduled.

8.3 Promotion Rules: Every Student has to fulfil the Attendance and Academic Requirements by securing the required creditsas 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 forthe successful completion of the entire UGP, an exemption of 6 secured Credits (in terms of two of theircorresponding Subjects/Courses) may be permitted for optional drop out from these 184 Credits earned; resulting in 178 Credits for UGP performance evaluation, i.e., theperformance of the Student in these 178 Credits shall alonebe 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 theGrade Card of VIII Semester; however, the Student'sPerformances in the earlier individual Semesters, with thecorresponding SGPA and CGPA for which already GradeCards 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 inany Semester, he may be re-admitted into that Semester, asand when offered, with the Academic Regulations of that Batch into which he gets readmitted. However, no GradeAllotments or SGPA/ CGPA calculations will be done for thatentire Semester in which he got detained.

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

8.9 A student eligible to appear in the Semester End Examination in any Subject/ Course, but absent at it orfailed (thereby failing to secure P Grade or above), mayreappear for that Subject/ Course at the supplementaryexamination 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 beobtained 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 beevaluated Subject-wise (irrespective of Credits assigned) witha maximum of 100 marks for Theory or Practicals orSeminar 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 InternalEvaluation) and 80% SEE (Semester End Examination), anda Letter Grade corresponding to the % marks obtained shallbe given.Students have to choose Open Electives from the givenlist. 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 theSemester, there shall be **2 mid-term examinations** for 40 markseach. Each mid-term examination consists of online**objective paper** for 10 marks with duration of **20 minutes** and **subjective paper** for 20 marks withduration of **90 minutes**. Further, there will be anallocation of 5 marks each for Assignment and Attendance. Objective paper maybe 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 ≤ 100	5
2	> 85 and ≤ 90	4
3	> 80 and ≤ 85	3
4	> 75 and ≤ 80	2
5	≥ 70 and ≤ 75	1

The first mid-term examination shall be conducted for thefirst 50% of the syllabus, and the second mid-termexamination shall be conducted for the remaining 50% of thesyllabus.

First Assignment should be submitted before the conduct ofthe first mid-term examinations, and the Second Assignmentshould be submitted before the conduct of the second midtermexaminations. The Assignments shall be as specifiedby the concerned subject teacher.

The first mid-term examination Marks, first AssignmentMarks and relative attendance marks shall make one set of CIE Marks, and the secondmid-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 markssecured by the Student towards Continuous InternalEvaluation in that Theory Subject.

9.1.2 Semester End Examination (SEE):
The distribution of marks is as given below:

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 beCIEfor40 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 beSEEfor 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 asEngineering 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 marksfor internal tests. The **SEE** will be evaluated for 60 marks.

9.4 Gender Sensitization:
9.4.1 Continuous Internal Evaluation (CIE):
There will beCIEfor40 marks shall be awarded with a distribution of 25 marksfor 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):
TheSEEfor 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 tobe 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:
ForTechnical Seminar Presentation, the student shall collect theinformation on a specialized topic, prepare a Technical Reportand submit to the Department at the time of SeminarPresentation. The Seminar Presentation (along with theTechnical Report) shall be evaluated by a committee consisting of Head of the Department and Two Faculty Membersfor 100 marks. Thereshall 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.Thereshall 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 eachstudent 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) asspecified in Item 9 above, and a corresponding Letter Gradeshall be given.

10.2 As a measure of the student's performance, a 10-point AbsoluteGrading System using the following Letter Grades (UGCGuidelines) and corresponding percentage of marks shall befollowed

% 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) willremain 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 anySubject/ Course (s) only for the sake of 'Grade Improvement'or 'SGPA/ CGPA Improvement'. However, he has to repeatall the Subjects/ Courses pertaining to that Semester, whenhe 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 thatSubject/ Course (excluding Mandatory non-credit Courses).Then the corresponding 'Credit Points' (CP) are computedby multiplying the Grade Point with Credits for that particularSubject/ Course.
Credit Points (CP) = Grade Point (GP) x Credits …For a Course

10.7 The Student passes the Subject/ Course only when he getsGP ≥ 4 (P Grade or above).

10.8 The Semester Grade Point Average (SGPA) is calculated bydividing the Sum of Credit Points (ΣCP) secured from ALLSubjects/ Courses registered in a Semester, by the TotalNumber of Credits registered during that Semester. SGPA isrounded off to TWO Decimal Places. SGPA is thuscomputed as

$SGPA = \left\{ \sum_{i=1}^{N} C_i G_i \right\} / \left\{ \sum_{i=1}^{N} C_i \right\}$ … for each Semester

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

10.9 The Cumulative Grade Point Average (CGPA) is a measureof the overall cumulative performance of a student over allSemesters considered for registration. The CGPA is theratio of the Total Credit Points secured by a student in ALLregistered Courses in ALL Semesters, and the TotalNumber of Credits registered in ALL the Semesters. CGPAis rounded off to TWO Decimal Places. CGPA is thuscomputed from the II Semester onwards, atthe end of each Semester, as per the formula

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

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

where 'M' is the TOTAL no. of Subjects (as specificallyrequired and listed under the Course Structure of the parentDepartment) the Student has 'REGISTERED' from the 1stSemester onwards upto and inclusive of the Semester S (obviously M > N), 'j' is the Subject indicator index (takesinto account all Subjects from 1 to S Semesters), is theno.

of Credits allotted to the jth Subject, andrepresents the Grade Points (GP) corresponding to theLetter Grade awarded for that jth Subject. After registrationand completion of I Year I Semester however, the SGPA of that Semester itself may be taken as the CGPA, asthere are no cumulative effects.

10.10 For Merit Ranking or Comparison Purposes or any otherlisting, ONLY the 'ROUNDED OFF' values of the CGPAswill be used.

10.11 For Calculations listed in Item 10.6 – 10.10, performance infailed Subjects/ Courses (securing F Grade) will also betaken into account, and the Credits of such Subjects/Courses will also be included in the multiplications andsummations. However, Mandatory Courses will not be takeninto consideration.

10.12 Passing Standards:

10.12.1 A student shall be declared successful or 'passed' in aSemester, only when he gets a SGPA $\geq$ 5.00 (at the endof that particular Semester); and a student shall bedeclared successful or 'passed' in the entire UGP, onlywhen he gets a CGPA $\geq$ 5.00; subject to the condition that hesecures a GP $\geq$ 4 (P Grade or above) in every registeredSubject/ Course in each Semester (during the entire UGP) forthe Degree Award, as required.

10.12.2 Inspite of securing P Grade or above in some (or all)Subjects/ Courses in any Semester, if a Student receives aSGPA < 5.00 and/ or CGPA < 5.00 at the end of such aSemester, then he 'may be allowed' (on the 'specificrecommendations' of the Head of the Department andsubsequent approval from the Principal) -(i) to go into the next subsequent Semester (subject tofulfilling all other attendance and academic requirements as listed under Items 7&8);(ii) to 'improve his SGPA of such a Semester (and henceCGPA) to 5.00 or above', by reappearing for ONE orMORE (as per Student's choice) of the same Course(s) in which he has secured P Grade(s) in thatSemester, at the Supplementary Examinations to be heldin the next subsequent Semester(s). In such cases, hisInternal Marks (CIE Marks) in those Subject(s) willremain same as those he obtained earlier. In these considerations, the newly secured Letter Gradeswill be recorded and taken into account for calculation ofSGPA and CGPA, only if there is an improvement.

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

10.13 After the completion of each Semester, a Grade Card orGrade Sheet (or Transcript) shall be issued to all theRegistered Students of that Semester, indicating the LetterGrades and Credits earned. It will show the details of theCourses 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 theprocedure listed in 10.6 – 10.10.

11.2 For Final % of Marks equivalent to the computed finalCGPA, the following formula may be used …

% of Marks = (final CGPA – 0.5) x 10

12. Award of Degree

12.1 A Student who register for all the specified Courses as listed in the Course Structure, satisfies all the Course Requirements, passes all the examinations prescribed in the entire UG Programme (UGP) within the specified period (refer 4.1), and secures the required number of 184 Credits (with CGPA $\geq$ 5.0), shall be declared to have 'QUALIFIED' for the Award of the B.Tech. Degree in the chosen Branch of Engineering as selected at the time of Admission.

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

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

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 atany stage, or has pending dues against his name due toany reason whatsoever, or if any case of indiscipline ispending against him, the result of the student may bewithheld, and he will not be allowed to go into the nexthigher Semester. The Award or issue of the Degree mayalso be withheld in such cases.

14. Transitory Regulations

Student who has discontinued for any reason, or has beendetained for want of attendance or lack of required creditsas specified, or who has failed after having undergone theDegree Programme, may be considered eligible for readmissionto the same Subjects/ Courses (or equivalent Subjects/Courses, as the case may be), and same ProfessionalElectives/ Open Electives (or from set/category of Electivesor equivalents suggested, as the case may be) as andwhen they are offered (within the time-frame of 8 yearsfrom the Date of Commencement of his I Semester).

15. Student Transfers

There shall be no Branch transfers after the completion ofAdmission Process.

16. Scope

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

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

iii) The Academic Regulations should be read as a whole, forthe 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
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which 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	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course

	(ACE) / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-incharge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination	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 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. COMPUTER SCIENCE AND ENGINEERING (CSE)
(MR15 Regulations)

I SEMESTER

S. No.	Category	Course code	Name of the course	L	T	P	Credits	Internal (CIE)	External (SEE)	Total Marks
1	HS	50H01	English	2	-	-	2	40	60	100
2	BS	50B01	Engineering Mathematics	3	2	-	4	40	60	100
3	BS	50B02	Applied Physics - I	2	2	-	3	40	60	100
4	ES	50501	Computer Programming	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	50502	Computer Programming lab	-	-	4	2	40	60	100
9	AC	50A01	NSS & Sports	-	-	2	-	-	-	-
			Total	12	8	14	22	Contact Hours:34		

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	BS	50B06	Computational Mathematics	3	2	-	4	40	60	100
2	BS	50B07	Applied Physics - II	2	2	-	3	40	60	100
3	BS	50B03	Applied Chemistry	2	2	-	3	40	60	100
4	ES	50503	Data Structures	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	50504	Data Structures Lab	-	-	4	2	40	60	100
8	ES	50302	Engineering Workshop	-	-	4	2	40	60	100
9	AC	50A02	Computational Mathematics Lab	-	-	4	-	-	-	-
			Total	10	9	19	22	Contact Hours:38		

III-SEMESTER

S. No	Course 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	50B12	Applied Statistics	4	-	-	4	40	60	100
2	HS	50H16	Environmental Sciences	2	-	-	2	40	60	100
3	ES	50452	Digital Logic Design	3	-	-	3	40	60	100
4	PC	50505	Object Oriented Programming	3	-	-	3	40	60	100
5	PC	50506	Algorithm Design	3	-	-	3	40	60	100
6	PC	50507	Mathematical Foundation for CS	3	-	-	3	40	60	100
7	PC	50508	Object Oriented Programming Lab	-	-	4	2	40	60	100
8	PC	50509	Algorithm Design Lab	-	-	4	2	40	60	100
9	MC	50453	Digital Logic Design Lab	-	-	4	-	40	60	100
10	HS	50H17	Gender Sensitization	-	-	4	2	40	60	100
11	AC	50A03	Law for Engineers	-	2	-	-	-	-	-
			Total	18	2	16	24	Contact Periods : 36		

IV-SEMESTER

S. No	Course 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	50B13	Probability and Queueing Theory	4	-	-	4	40	60	100
2	PC	50510	Computer Organization	3	-	-	3	40	60	100
3	PC	50511	DataBase Management Systems	3	-	-	3	40	60	100
4	PC	50512	Operating Systems	3	-	-	3	40	60	100
5	PC	50513	Formal Languages and Automata Theory	3	-	-	3	40	60	100
6	PC	50514	Data Base Management Systems Lab	-	-	4	2	40	60	100
7	PC	50515	Operating Systems Lab	-	-	4	2	40	60	100
8	PC	50516	Formal Languages and Automata Theory Lab	-	-	4	2	40	60	100
9	MC	50H11	Human Values and Professional Ethics	-	2	-	-	40	60	100
			Total	16	2	12	22	Contact Periods : 30		

V-SEMESTER

S. No	Course 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	ES	50450	Microprocessors and Microcontrollers	3	-	-	3	40	60	100
3	PC	50517	Computer Networks	2	2	-	3	40	60	100
4	PC	50518	Software Engineering	3	-	-	3	40	60	100
5	PE		Professional Elective-1	3	-	-	3	40	60	100
6	OE		Open Elective-1	3	-	-	3	40	60	100
7	HS	50H04	Technical Communication and Presentation Skills Lab	-	-	4	2	40	60	100
8	ES	50451	Microprocessors and Microcontrollers Lab	-	-	4	2	40	60	100
9	PC	50519	Computer Networks Lab	-	-	2	1	40	60	100
10	PR	50520	Technical Seminar	-		4	2	100	-	100
			Total	16	2	14	24	Contact Periods : 32		

VI-SEMESTER

S. No	Course 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	50H12	Engineering Economics and Accountancy	2	2	-	3	40	60	100
2	PC	50521	Object Oriented Analysis and Design	4	-	-	4	40	60	100
3	PC	50522	Compiler Design	3	2	-	4	40	60	100
4	PE		Professional Elective-II	3	-	-	3	40	60	100
5	OE		Open Elective-II	3	-	-	3	40	60	100
6	PC	50523	Network Security	2	-	-	2	40	60	100
7	PC	50524	Object Oriented Analysis and Design and Software Engineering Lab	-	-	4	2	40	60	100
8	PC	50525	Compiler Design Lab	-	-	4	2	40	60	100
9	PR	50H05	Soft Skills	-	-	2	1	40	60	100
			Total	17	4	10	24	Contact Periods : 31		

VII-SEMESTER

S. No	Course 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	50H13/ 50H14	Management Science / Industrial Management	2	-	-	2	40	60	100
2	PC	50526	Linux Programming	3	-	-	3	40	60	100
3	PC	50527	Data Mining and Data warehousing	2	-	-	2	40	60	100
4	PC	50528	Advanced Computer Architecture	3	-	-	3	40	60	100
5	PE		Professional Elective-III	3	-	-	3	40	60	100
6	PE		Professional Elective-IV	3	-		3	40	60	100
7	PC	50529	Linux Programming Lab	-	-	4	2	40	60	100
8	PC	50530	Data Mining and Data warehousing Lab	-	-	4	2	40	60	100
9	PC	50531	Advanced Computer Architecture Lab	-	-	4	2	40	60	100
10	PR	50532	Minor Project	-	-	4	2	40	60	100
			Total	16	-	16	24	Contact Periods : 32		

VIII-SEMESTER

S. No	Course Category	Course Code	Name of the course	Contact hours/week			Credits	Scheme of Valuation		Total Marks
				L	T	P		Internal (CIE)	External (SEE)	
1	PE		Professional Elective-V	3	-	-	3	40	60	100
2	PE		Professional Elective-VI	3	-	-	3	40	60	100
3	OE		Open Elective-III	3	-	-	3	40	60	100
3	PR	50533	Major Project	-	-	14	10	40	160	200
5	PR	50534	Comprehensive viva-voce	-	4	-	2	100	-	-
6	PR	50H15	Entrepreneurship Skills	-	2	-	1	40	60	100
			Total	9	6	14	22	Contact Periods : 29		

PROFESSIONAL ELECTIVES

S. No	Category	Course Code	Name of the course
1.	Computer Networks	50535	Mobile Ad hoc Networks
2.		50536	Sensor Networks
3.		50537	Software Defined Networks
4.		50538	Storage Area Networks
5.		50539	Wireless Security
6.	Computing Environment	50540	Distributed Computing
7.		50541	Cloud Computing
8.		50542	Pervasive Computing
9.		50543	Mobile Computing
10.		50544	Grid Computing
11.		50545	Utility Computing
12.	Programming Languages	50546	Web Technologies
13.		50547	Assembly Language
14.		50548	LISP&PROLOG
15.		50549	Game Programming
16.	Databases	50550	Advanced Databases
17.		50551	Data base Security
18.		50552	Information Retrieval Systems
19.		50553	Big Data
20.		50554	Mobile Database

21.		50555	Web Mining
22.		50556	Text Mining
23.		50557	Multimedia Databases
24.	Software Engineering	50558	Software Testing Methodologies
25.		50559	Software Process Management
26.		50560	Software Project Management
27.		50561	Software Metrics
28.		50562	Design Patterns
29.		50563	System Analysis and Design
30.	Artificial Intelligence	50564	Artificial Intelligence
31.		50565	Expert Systems
32.		50566	Machine Learning
33.		50567	Neural Networks
34.		50568	Fuzzy Logic
35.		50569	Robotics
36.		50570	Natural language Processing
37.	Computer Graphics	50571	Computer Graphics
38.		50572	Multi Media Application Development
39.		50573	Digital Image Processing
40.		50574	Computer Vision
41.		50575	Pattern Recognition
42.		50576	Speech Recognition
43.		50577	Animation Techniques

Open Electives

S. No	Branch	Course Code	Name of the course
1.	CIVIL	50102	Surveying
2.		50123	Air Pollution And Control
3.		50124	Disaster Management
4.		50150	Green Buildings
5.	EEE	50208	Control Systems
6.		50229	Energy Auditing and Conservation
7.		50241	Principles of Electrical Engineering
8.	MECHANICAL	50303	Engineering Mechanics
9.		50305	Mechanics of Solids
10.		50342	Renewable Energy Sources
11.		50353	Mechanical Technology
12.		50355	Basics of Thermodynamics
13.	ECE	50433	VLSI Design
14.		50448	Principles of Communication Engineering
15.		50449	Embedded System Design
16.	MINING	52501	Fundamentals of Geology
17.		52511	Mine Construction Engineering
18.		52528	Introduction to Mineral Processing
19.	ENGLISH	50H08	Interpretation Of Literature And Analytical Writing
20.		50H09	Business Communication
21.		50H10	World Literatures
22.	MATHEMATICS	50B23	Advanced Optimization Techniques
23.		50B24	Mathematical Modelling
24.		50B25	Differential Equations and Dynamical Systems
25.	PHYSICS	50B20	Advanced Physics for Engineers
26.		50B21	Nano Materials: Synthesis and Characterization
27.		50B22	Ndt and Vacuum Technology
28.	CHEMISTRY	50B17	Chemistry of Engineering Materials
29.		50B18	Nano Chemistry
30.		50B19	Photochemistry and Spectroscopy

Malla Reddy Engineering College(Autonomous)

LTP
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Course Code: 50H01   **Credits:2**

B.Tech. – I Semester
ENGLISH
(Common for EEE, ECE and CSE)

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 Answer***s",** 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:
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

Malla Reddy Engineering College (Autonomous)

L T P
3 2 -

Course Code: 50B01   **Credits: 4**

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

Prerequisites: Pre calculus, concepts of Trignomentry 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: Diagonolization 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' - Evalution 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, 6ht Edi, 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.

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Course Code: 50B02   **Credits: 3**

B.Tech. - I Semester
APPLIED PHYSICS - I
(Common for CE, ME, EEE, ECE, CSE and Min. Engineering)

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

Module - 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

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Course Code:50501   **Credits: 3**

B.Tech. – I Semester
COMPUTER PROGRAMMING
(Common for CE, EEE, ME, ECE, CSE and Min.E)

Prerequisites: Nil.

Objective: 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, **"Programmingin 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 ProgrammingAbsolute beginner's guide**", QUE Publishers, 3rd Edition, 2013.
3. Paul Deitel and Harvey Deitel, "**C How to Program"**, PHI, 7th Edition, 2012.
4. Behrouz A. Forouzan, E.V.Prasad, Richard F.Gilberg, "**C programming: A Problem- Solving Approach**", Cengage Learning Press, 1st Edition, 2011

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.

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Course Code: 50202   **Credits: 4**

B.Tech. – I Semester
BASIC ELECTRICAL & ELECTRONICS ENGINEERING

Prerequisites: NIL

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

Module 1: 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)

Module2: 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 3: Single phase transformers & 3-phaseInduction 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-phaseInduction 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).

Module 4: 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 5 A: Amplifiers &Basic Digital Electronics
A: Amplifiers: **[5 Periods]**
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, 2001
2. R. S. Sedha, "**A Text Book of Electronic Devices and Circuits**", S.Chand & Co., 2010
3. Thomas L. Floyd and R. P. Jain, "**Digital Fundamentals**", Pearson Education, 2009

Reference books:

1. David A. Bell, "**Electronic Devices and Circuits**", Oxford University Press, 2008
2. R.L.Boylestad & Louis Nashlesky, "**Electronic Devices &Circuit Theory**", Pearson Education, 2007
3.P.S.Bimra, "**Electrical Machinery**", Dhanapatrai Publications

Course 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.

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Course Code: 50H02   **Credits: 2**

B.Tech. – I Semester
ENGLISH LANGUAGE LAB
(Common for EEE, ECE and CSE)

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 recognize them, awareness regarding stress and recognize and use the right intonation in sentences.
• Listening for general content
• Listening to fill up information
• Intensive listening
• Listening for specific information

Speaking Skills:

Objectives:

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

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

Module I:
CALL Lab: Introduction to Phonetics – Speech Sounds – Vowels and Consonants
ICS Lab: Ice-Breaking activity and JAM session
Listening: listening for sounds in context, for ideas.
Speaking: ideation and translation of ideas into sentences.

Module II:
CALL Lab: Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - Consonant Clusters.
ICS Lab: Situational Dialogues – Role-Play- Expressions in Various Situations – Self-introduction and Introducing others – Greetings – Apologies – Requests – Social and Professional Etiquette - Telephone Etiquette.
Listening: listening for specific purposes, for details.
Speaking: speaking in the above situations with clarity, connectivity, maintaining voice characters.

Module III:
CALL Lab: Word accent and Listening Comprehension-reading(aloud) meaningfully.
ICS Lab: Descriptions- Narrations- Giving Directions and guidelines.
Listening: listening for intelligible English
Speaking: formal and informal conversations, register.

Module IV:
CALL Lab: Intonation and Common errors in Pronunciation- reading aloud(evaluating through recording).
ICS Lab: Extempore- Public Speaking , Oral Presentation Skills
Listening: note taking and listening for speaker's tone/attitude
Speaking: organizing , connecting ideas and sentences, short forms in spoken English, errors in spoken English

Module V:
CALL Lab: Neutralization of Mother Tongue Influence and Conversation Practice
ICS Lab: Information Transfer, Debate
Minimum Requirement of infra structural facilities for 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/CommSkll/ActiveListening.htm
2. http://www.slideshare.net/alisonkis/dialogue-and-roleplay-activity
3. http://www.hse.ru/pubs/lib/data/access/ram/ticket/2/14309868938d576a532b71360b7 354268380727a22/An%20article%20for%20Monika%20(2010).pdf

Outcomes:

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.

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Course Code: 50B04   **Credits: 2**

B.Tech. – I Semester
APPLIED PHYSICS LAB
(Common for EEE, ECE and CSE)

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).

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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

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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: $1+x+x^2+x^3+\ldots\ldots\ldots + x^n$

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 of 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.

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Course Code: 50A01   **Audit Course**

B.Tech. – I Semester
NSS & SPORTS
(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.

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.

Reference books:

1. Pamela Grundy & Susan Shackleford, "**Shattering the Glass: The Remarkable History of Women in Basketball**" Published 15th May, 2007.
2. Roger Kahn, " **The Boys of Summer**" , 1st Edition, May 9th 1973.
3. Jaci Burton, "**Perfect Play**", 1st Edition, Feb 1st 2011, series 1.
4. Silva Mehta, Mira Mehta and Shyam Mehta, **"Yoga: The Iyengar Way",** Published by Knopp, 7th April, 1990.
5. Vishnu-Devananda, **"The Complete Illustrated Book of Yoga",** 18th April, 1995.
6. Timothy McCall, **"Yoga as Medicine: The Yogic Prescription for Health and Healing",** published by Harmony, 31st July 2007.
7. 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.

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Course Code: 50B06   **Credits: 4**

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

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

Syllabus

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 $1/3^{rd}$, 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 5 point formula – diagonal 5 point formula – solution of Laplace equation.
B: Solution of poission'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, 6ht Edi, 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.

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Course Code: 50B07   **Credits: 3**

B.Tech. - II Semester
APPLIED PHYSICS - II
(Common for CE, EEE, ME, ECE, CSE and Min.E)

Prerequisites: NIL

Objective:
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; actionof 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.

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Course Code: 50B03   **Credits: 3**

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

Objective:

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   **[12Periods]**

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-preparatrion,properties and applications of BUNA-S,SBR.
Fibre-rerinforced 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, 3rdEdition, 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

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Course Code: 50503   **Credits:3**

B.Tech. – II Semester
DATA STRUCTURES

Prerequisites: Programming knowledge in C language.

Course Objectives:
The main objective of this course is to deliver the knowledge in various data structures such as linked lists, stacks, queues, trees and graphs along with the applications. It also provides an overview of the fundamentals in performance analysis of algorithms.

Module – I : Introduction to data structures and Performance Analysis
A :Introduction to data structures,   **[4 Periods**]
Types of data structures: Primitive and Non-primitive data structures, Linear and Non-liner data structures. Definition of Algorithm.
B : Performance Analysis: **[6 Periods**]
Time and Space complexities. Asymptotic Notations - BigO, Omega and Theta notations, Recursion definition, Design methodology and implementation of recursive algorithms, Linear and Binary recursion, Recursive algorithms for Factorial of a given number, GCD Computation, Fibonacci sequence, Towers of Hanoi.

Module – II Linked lists   **[12 Periods**]
Single Linked Lists, Operations-Insertion, Deletion, Concatenating single linked lists, Circular linked lists, Operations- Insertion, Deletion. Double Linked Lists, Operations-Insertion, Deletion. Sparse matrices - Array and linked representations.

Module – III Stacks and Queues
A:Stacks:[6 Periods]
Basic stack operations, Representation of a stack using arrays and linked lists, Stack Applications - Reversing list, factorial calculation, postfix expression evaluation, infix-to-postfix conversion.
B:Queues:[6 Periods]
Basic queue operations, Representation of a queue using array and Linked list, Classification and implementation – Circular, Enqueue and Dequeues, Applications of Queues - Round Robin Algorithm, Priority queues.

Module – IV Trees and Graphs
A:Trees: **[8 Periods**]
Basic concepts, Binary Trees: Properties, Representation of binary trees using arrays and linked lists, operations on a binary tree, binary tree traversals, creation of binary tree from in, pre and post -order traversals, Tree travels using stack, Threaded binary trees.
B:Graphs: **[6 Periods**]
Basic concepts, Representations of Graphs using Linked list and Adjacency matrix, Graph algorithms, Graph traversals (BFS & DFS)

Module – V Search Trees   **[12 Periods**]
Binary Search Trees, Definition, Operations- Searching, Insertion and Deletion, AVL Trees-Definition and Examples, Insertion into an AVL Tree, B-Trees, Definition, B-Tree of order operations-Insertion and Searching, Introduction to Red-Black and Splay Trees (Elementary treatment-only Definitions and Examples), Comparison of Search Trees.

Text Books:

1. Jean Paul Tremblay, Paul G Sorenson, "**An Introduction to Data Structures with Applications**", Tata Mc Graw Hills, 2nd Edition, 1984.
2. Richard F. Gilberg, Behrouz A. Forouzan – "**Data Structures: A Pseudo code approach with C**", Thomson (India), 2nd Edition, 2004.

Reference Books:

1. Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan – "**Fundamentals of Data Structure in C**", University Press (India), 2nd Edition, 2008..
2. A.K.Sharma, **"Data structures using C"**, Pearson, 2nd Edition, June, 2013.
3. R.Thareja, **"Data Structures using C"**, Oxford University Press, 2nd Edition, 2014.

Outcomes:

At the end of the course the students will be able to:
1. Be capable to identity and apply the appropriate data structures for real world problems.
2. Understand and implement single, double, and circular linked-lists.
3. Implement the Stacks and Queues using both array based and linked-list based representations.
4. Understand tree data structures, including binary tree, and implements both array based and reference based representations.
5. Implement various algorithms on graph data structures, including finding the minimum spanning tree and shortest path.

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Course Code: 50301   **Credits: 3**

B.Tech. – II Semester
ENGINEERING GRAPHICS
(Common for EEE, ECE and CSE)

Prerequisites: 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) Involutes

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. BasantAgrawal**, "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.

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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 stalagnometer.

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

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Course Code: 50504   **Credits: 2**

B.Tech. – II Semester
DATA STRUCTURES LAB

Prerequisites:
Programming knowledge in C language and data structures

1. Write a recursive program to:
a) Compute the nth Fibonacci number and also display the series.
b) Compute Factorial of a positive integer.
c) Find the GCD (n, m).
d) Solve Towers of Hanoi problem - N disks are to be transferred from peg S to peg D with Peg I as the intermediate peg.

2. Write a program that uses functions to perform the following:
a) Create a single linked list of integers.
b) Insert an element in all locations of the single linked list.
c) Implement all delete operations on single linked list.
d) Display the contents of the single linked list after insertion/deletion.

3. Write a program that uses functions to perform the following:
a) Create a circular linked list of integers.
b) Insert an element in all locations of the circular linked list.
c) Implement all delete operations on circular linked list.
d) Display the contents of the circular link list after insertion/deletion.

4. Write a program that uses functions to perform the following:
a) Create a double linked list of integers.
b) Insert an element in all locations of the double linked list.
c) Implement all delete operations on double linked list.
d) Display the contents of the double linked list after insertion/deletion.

5. Write a program to implement the sparse matrices using:
a) Arrays
b) Linked list

6. Write a program that implements stack operations using:
a) Arrays
b) Linked lists

7. Write a program that uses Stack operations to:
a) Evaluate Postfix expression.
b) Convert infix expression into postfix expression

8. Write a program that implements Linear Queue operations using:
a) Arrays
b) Linked lists

9. Write a program that implements Circular Queue operations using Arrays

10. Write a program that implements Double-ended Queue operations using Arrays

11.
a) Write a recursive program to create a Binary Tree of integers, traverse the tree in preorder, in order and post order and also print the number of leaf nodes and height of the tree.
b) Write a non-recursive program to create a Binary Tree of integers, traverse the tree in pre-order, in order, post order and also print the number of leaf nodes and height

12. Write a program to perform Insertion into a B-tree.

13. Write a program for implementing the following graph traversal algorithms:
a) Depth First Traversal (DFT)
b) Breadth First Traversal (BFT)

14. Write a program for Binary Search tree operations

15. Write a program to create AVL tree and insert an element in AVL tree

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Course Code: 50302   **Credits: 2**

B.Tech. – II Semester
ENGINEERING WORKSHOP
(Common for EEE, ECE and CSE)

I.   1. 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.

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Course Code: 50A02   **Credits: -**

B.Tech. – II Semester
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' $1/3^{rd}$ and $3/8^{th}$ 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

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Course Code: 50B12   **Credits: 4**

B.Tech. – III Semester
APPLIED STATISTICS

Objective: The course Statistics for Engineers is introduced to understand the central tendency of a given data. The objective of this course is to provide foundations on design of experiments and statistical analysis of experimental data obtained from laboratory and/or industrial processes. It is preferred that at the end of the course, the student will be equipped with the basic knowledge and art of statistical data analysis combined with systematic approaches to experimental design. While the lectures will cover the theory, the assignments will give an opportunity to implement and learn the practical aspects of the subject.

MODULE-I: **[12 Periods]**
Descriptive measures: Measures of central tendency: Arithmetic mean – median – mode – geometric mean – harmonic mean.
Measures of dispersion: Range – Quartile deviation – mean deviation – standard deviation,Measures of sleekness,Measures of kurtosis

MODULE-II: **[12 Periods]**
Analysis of Variance (ANOVA): one-way & two-wav ANOVA and multiple comparisons. Introduction to Factorial design-2^2 and 2^n.Factorial design, Analysis of Co-variance (ANCOVA), Conducting ANCOVA.

MODULE-III: **[12 Periods]**
Design of Experiments: Importance and applications of design of experiments. Principles of experimentation, Analysis of Completely randomized Design (C.R.D), Randomized Block Design (R.B.D) and Latin Square Design (L.S.D) including one missing observation, expectation of various sum of squares. Comparison of the efficiencies of above designs.

MODULE-IV: **[12 Periods]**
Importance of SQC in industry. Statistical basis of Shewart control charts. Construction of control charts for variables (mean, range and standard deviation) and attributes (p, np, c&d charts with fixed and varying sample sizes). Interpretation of control charts. Natural tolerance limits and specification limits, process capability index. Concept of Six sigma and its importance, Single and double sampling plans.

MODULE-V: **[12 Periods]**
Time Series and Data Analysis: Fitting a trend line to a time series, Method of least Squares and Method of Moving Averages, Measure of Seasonal Variation.
Index Numbers: Laspeyre's, Paasche's and Fisher's Ideal index, FRT, TRT, Circular Test.

TEXT BOOKS:
1. V.K.Kapoor and S.C.Gupta: Fundamentals of Applied Statistics, Sultan Chand&Sons, New Delhi
2. Willam Feller: Introduction to Probability theory and its applications. Volume –I, Wiley 2.
3. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand&Sons, New Delhi

4. GoonAM,Gupta MK,Das Gupta B : Fundamentals of Statistics, Vol-I, the World Press Pvt.Ltd., Kolakota.
5. Applied statistics and probability for engineers,Montgomery.

Course Outcomes:

1. The students will understand central tendency and variability for the given data.
2. The students will be able to perform hypothesis testing.
3. The students will be able to carry out error analysis.
4. The student can able to design an experiment with his statistical technique.
5. The students will learn the concept of Six Sigma and its importance to real life problems.

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Course Code: 50H16   **Credits: 2**

B.Tech. – III Semester
ENVIRONMENTAL SCIENCES

PREREQUISITES: Environment

OBJECTIVE: 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 ofecosystem, Classification of ecosystems, Structural Components of anecosystem, Functions ofecosystem,Foodchains,foodwebsandecological pyramids.Flowofenergy.

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: Environmentalpollutionandcontrol   [09 Periods]
Classificationofpollution   andpollutants, causes,effectsandcontroltechnologies.AirPollution:Primaryandsecondarypollutants,Automobil eandIndustrialpollution,Ambientairqualitystandards.Waterpollution:Pointandnon-pointsourcesofpollution,   Major   pollutantsofwaterandtheirsources,drinkingwaterquality standards,SoilPollution:Soilassinkforpollutants,Impactofmodernagricultureonsoil,degradation ofsoil.MarinePollution:
MisuseofInternationalwaterfordumpingofhazardouswaste,coastalpollutiondue tosewage and marine disposal of industrial effluents.

MODULE - IV: Globalenvironmentalproblemsand globalefforts   [06 Periods]
Greenhouseeffect,GreenHouse Gases (GHG), Global   Warming, Sea level rise, climate change   andtheir   impacts   on humanenvironment.OzonedepletionandOzonedepletingsubstances(ODS).   Deforestation anddesertification.Internationalconventions/Protocols:Earthsummit,Kyotoprotocol andMontréalProtocol.

MODULE - V:TowardsSustainableFuture   [08 Periods]
Concept ofSustainable Development,Threatsto Sustainability,   Populationanditsexplosion, Crazy Consumerism,   Over-exploitation of   resources, Strategies   for   Achieving Sustainabledevelopment,   EnvironmentalEducation,Conservation ofResources,UrbanSprawl,Sustainable   CitiesandSustainable

Communities,Humanhealth,RoleofITinEnvironment,EnvironmentalEthics,EnvironmentalEconomics,ConceptofGreenBuilding,CleanDevelopmentMechanism(CDM).

TEXT BOOKS:
1. R. Rajagopalan, **"Environmental studiesFromcrisistocure"**, 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"**UniversityGrants Commission,and UniversityPress, 1st Edition, 2005. (Modules I, II, III, IV & V)

REFERENCE BOOKS:
1. M. AnjiReddy "**TextbookofEnvironmental ScienceandTechnology"**3rd Edition, 2007.
2. RichardT. Wright, **"EnvironmentalScience:towardsasustainablefuture"**PHLLearning, PrivateLtd.NewDelhi, 2nd Edition, 2008.
3. Gilbert McMastersandWendell P. Ela, **"Environmental Engineeringandscience"**, 3rd Edition,PHI Learning Pvt.Ltd., 2008.

OUTCOMES:
At the end of the course students are 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.

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Course Code: 50452   **Credits: 3**

B.Tech. – III Semester
DIGITAL LOGIC DESIGN

Prerequisites: NIL
Objective: To understand the basics of logic gates and its applications in real time.

Module I: Basics of Number Systems
A: Number Systems And Codes   **[09 Periods]**

Review of number systems- number base conversion-binary arithmetic- binary weighted and non-weighted codes – Complements-Signed binary numbers-Error Detection and Correcting Codes-Binary Logic.

Module II: Boolean Algebra And Gate Level Minimization
A: K-MAP and HDL   **[09 Periods]**

Postulates and theorems- representation of switching functions-SOP and POS forms – Canonical forms-digital logic gates –Karnaugh Maps –minimization using three variable, four variable and five variable K-Maps, Don't Care Conditions- NAND and NOR implementation , Other Two-Level Implementation –Exclusive –OR function - Integrated Circuits-Hardware Description Language(HDL)

Module III: Design of Combinational Circuits
A: Combinational Circuits   **[09 Periods]**

Tabular Minimization- Combinational Circuits- Analysis and Design Procedure- Binary adder and subtractors – Carry Look-ahead adder-Decimal adder-Binary multiplier-magnitude comparator-BCD adder- Decoders- Encoders-Multiplexers-Random Access Memory-Read Only Memory-Programmable Logic Array-Programmable Array Logic - HDL for Combinational Circuits

Module IV: Design of Sequential Circuits
A: Sequential Circuits   **[09 Periods]**

Combinational Vs Sequential Circuits – Latches-Flip Flops-RS flip flop, JK flip flop, T flip flop, D flip flop, Master-Slave Flip flop- Flip Flops excitation functions –Conversion of one flip flop to another flip flop- Asynchronous Vs Synchronous circuits-Analysis of clocked sequential circuits-State Table-State Diagram-State Reduction and State Assignment-Mealy and Moore Machines-capabilities and limitations of Finite State Machine-State equivalence and machine minimization-Design of synchronous counters- Ripple Counters-Asynchronous counters-Registers-Shift Registers- HDL for Sequential circuits

Module V: Asynchronous Sequential Logic
A: Latches   **[09 Periods]**

Introduction-Analysis Procedure, Circuits with Latches, Design Procedure-Reduction of state and flow Tables – Race Free State Assignment Hazards, Design examples.

Text Books:
1. DIGITAL DESIGN, Third Edition , M.Morris Mano, Pearson Education/PHI.
2. FUNDAMENTALS OF LOGIC DESIGN, Roth, 5th Edition,Thomson.
3. Switching Theory and Logic Design, Anand Kumar, PHI

References:

1. Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGraw Hill.
2. Switching and Logic Design, C.V.S. Rao, Pearson Education
3. Digital Principles and Design Donald D.Givone, Tata McGraw Hill, Edition.
4. Fundamentals of Digital Logic & Micro Computer Design , 5TH Edition,
    M.Rafiquzzaman John Wiley

Outcomes:

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

1. To apply the principles of Boolean algebra to manipulate and minimize logic
   expressions.
2. To understand the functionalities, and minimization techniques using of all   logical gates (NAND, NOR, AND, NOR, NOT, XOR,XNOR…)
3. To design combinational circuits using adders, decoders, Multiplexers, Encoders, De Multiplexers, ROM , RAM, PLD's
4. The operation of sequential (sync. & async.) circuits (flip-flops, counters, registers,
   and register) and in analyzing the operation of sequential circuits along with hazards handling
5. For all the above concepts students will be able to simulate the functionalities using
   Verilog HDL with the support of the Lab.

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Course Code: 50505   **Credits: 3**

B.Tech. - III Semester
OBJECT ORIENTED PROGRAMMING
(Using C++ and Java)

Prerequisite: Any Programming Language basics.
Objective: To understand the CPP and Java programming and APIs to develop an real-time applications.

Module I: **[09 Periods]**
A:Introduction -What is object oriented programming? Why do we need object oriented Programming. characteristics of object-oriented languages such as C++ and Java. Making sense of core object concepts (Encapsulation, Abstraction, Polymorphism, Classes, Messages Association, Interfaces)
B: Classes and Objects- Implementation of class in C++ and Java, C++ Objects as physical object, Java Objects as physical object, C++ object as data types constructor and Java object as data types constructor. Object as function arguments. The default copy constructor, returning object from function. Classes objects and memory static class data. Const and classes. assigning java object reference variables, introducing methods, constructors, usage of static with data and methods, usage of final with data, access control, this key word, garbage collection, overloading methods and constructors, parameter passing - call by value, recursion,nested classes and inner classes, exploring the String class.

Module II: Inheritance   **[09 Periods]**
A: Inheritance in CPP: Concept of inheritance. Derived class and based class. Derived class constructors, member function, inheritance in the English distance class, class hierarchies, inheritance and graphics shapes, public and private inheritance, aggregation : Classes within classes, inheritance and program development.
B:Inheritance in Java: member access rules, usage of super key word, forms of inheritance, method overriding, abstract classes, dynamic method dispatch, using final with inheritance, the Object class.

Module III Packages and Interfaces[09 Periods]
A:Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

Module IV : Exception Handling and Multithreading[09 Periods]
A:Exception Handling: Concepts of Exception handling, types of exceptions, usage of try, catch, throw, throws and finally keywords, Built-in exceptions, creating own exception sub classes.
B: Multithreading: Concepts of Multithreading, differences between process and thread, thread life cycle, creating multiple threads using Thread class, Run able interface, Synchronization, thread priorities, inter thread communication, daemon threads, deadlocks, thread groups.

Module V : Event Handling and AWT[09 Periods]
A:Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes.

B:AWT : Concepts of components, container, panel, window, frame, canvas, Font class, Color class and Graphics. Buttons, Labels, Text fields, Text area, Check boxes, Check box groups, Lists, Choice, Scrollbars, Menus, Layout Managers - Flow, Border,Grid, Card and Gridbag. Swing - JApplet, JFrame and JComponent, Icons and Labels, Handling threading issues, text fields, buttons - The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables. Applets - Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets

TEXT BOOKS
1. Object Oriented Programming in C++ by Robert Lafore Techmedia Publication.
2. The Complete Reference Java J2SE 5th Edition, Herbert Schildt, TMH Publishing Company Ltd, NewDelhi.
3. Big Java 2nd Edition, Cay Horstmann, John Wiley and Sons.

REFERENCE BOOKS:
1. OOPS C++ Big C++ Cay Horstmann Wiley Publication.
2. Object Oriented Programming in C++ R Rajaram New Age International Publishers2nd .
3. Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, PearsonEducation/PHI
4. Core Java 2, Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, SeventhEdition, Pearson Education.
5. Core Java 2, Vol 2, Advanced Features, Cay.S.Horstmann and Gary Cornell,Seventh Edition, Pearson Education.
6. Beginning in Java 2, Iver Horton, Wrox Publications.

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

1.Create classes and objects and use them in their program.
2. Learn the use OOP concept i.e data abstraction & data hiding, encapsulation, inheritance, polymorphism.
3. Create and use threads, handle exceptions and write applets.

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Course Code: 50506   **Credits: 3**

B.Tech. – III Semester
ALGORITHMDESIGN

Prerequisites: NIL

Objective: The objective of this course is to cover key techniques for designing and analyzing algorithms.

Module I: Basics of Algorithm Design

A: Introduction   **[05 Periods]**
Algorithm, Psuedo code for expressing algorithms,Performance Analysis-Space complexity, Time complexity, Asymptotic Notations Probabilistic analysis, Amortized analysis.

B: Disjoint Sets   **[04 Periods]**
Disjoint set operations, union and find algorithms, spanning trees, connected components and biconnected components.

Module II: Algorithm Methods

A: Divide and conquer   **[04 Periods]**
General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

B: Greedy method   **[05 Periods]**
General method, applications-Job sequencing with deadlines, 0/1 knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

Module III: Dynamic Programming

A: Various Dynamic Programming   **[09 Periods]**
General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem,Travelling sales person problem, Reliability design.

Module IV: Backtracking

A: Graph coloring Method   **[09 Periods]**
General method, applications-n-queen problem, sum of subsets problem, graph coloring,Hamiltonian cycles.

Module V: Branch and Bound ,NP Problems

A: Branch and Bound   **[04 Periods]**
General method, applications - Travelling sales person problem,0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.

B: NP-Hard and NP-Complete problems   **[05 Periods]**
Basic concepts, non deterministic algorithms, NP - Hard and NPComplete classes, Cook's theorem.

Text Books:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam,Galgotia publications pvt. Ltd.
2. Algorithm Design: Foundations, Analysis and Internet examples, M.T.Goodrich and R.Tomassia, John wiley and sons.

3. Design and Analysis of algorithms-Parag Himanshu Dave, Himanshu Balchandra Dave Publisher:Pearson.

References:

1. Introduction to Algorithms, second edition, T.H.Cormen,C.E.Leiserson, R.L.Rivest,and C.Stein,PHI Pvt. Ltd./ Pearson Education
2. Introduction to Design and Analysis of Algorithms A strategic approach, R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, Mc Graw Hill.

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

1. Describe and use major algorithmic techniques (divide-and-conquer, dynamic programming, linear programming, greedy paradigm, graph algorithms) and cite problems for which each technique is suitable.
2. The correctness of algorithms using inductive proofs and loop invariants.
3. Evaluate and compare different algorithms using worst-, average-, and best-case analysis. Identify the complexity of problems.
4. Understand asymptotic notation, its properties and use in measuring algorithm behavior
5. Determine asymptotic expressions for the worst-case execution time and space requirements of algorithms and data structures.

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Course Code: 50507   **Credits: 3**
B.Tech. – III Semester
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Prerequisites: NIL
Objective: To understand the Basic need of computers environment with logic gate,functions, relations and graph theory.

Module I: Mathematical Logic and Predicates
A: Mathematical Logic   **[04 Periods]**
Statements and notations, Connectives, Well formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Quantifiers, universal quantifiers.
B: Predicates   **[05 Periods]**
Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Proof of automatic Theorem.

Module II: Relations, Functions and Algebraic Structures
A: Relations   **[04 Periods]**
Properties of Binary Relations, equivalence, transitive closure, compatibility and partial ordering relations, Lattices, Hasse diagram.
B: Functions   **[04 Periods]**
Inverse Function, Composition of functions, recursive Functions - Lattice and its Properties.
C: Algebraic structures   **[03 Periods]**
Algebraic systems Examples and general properties, Semi-groups and monoids, groups, sub-groups' homomorphism, Isomorphism. Lattice as POSET, Boolean algebra.

Module III: Elementary Combinatorics   **[09 Periods]**
Basis of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial & Multinomial theorems, the principles of Inclusion – Exclusion. Pigeon hole principle and its applications.

Module IV: Generating functions and Recurrence Relation   **[09 Periods]**
Generating Functions, Function of Sequences Calculating Coefficient of generating function, Recurrence relations, Solving recurrence relation by substitution and Generating functions. Method of Characteristics roots, solution of Non-homogeneous Recurrence Relations.

Module V: Graph Theory   **[09 Periods]**
Basic concepts -Representation of Graph, Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers. DFS, BFS, Spanning Trees, planar Graphs.

Text Books:
1. Elements of DISCRETE MATHEMATICS - A computer Oriented Approach-
   C L Liu, D P Mohapatra. Third Edition, Tata McGraw Hill.
2. Discrete Mathematics for Computer Scientists & Mathematicians, J.L. Mott,
   A. Kandel, T.P.Baker, PHI.
3. Discrete Mathematics with applications to Computer Science J P Tremblay &
   R Manohar

4. Fundamentals of Logic – Arindama Singh, IIT, Madras,Munshiram Manoharlal Publishers

References:

1. Discrete Mathematics and its Applications, Kenneth H. Rosen, Fifth Edition.TMH.
2. Discrete Mathematical structures Theory and application-Malik & Sen, Cengage.
3. Discrete Mathematics with Applications, Thomas Koshy, Elsevier.
4. Logic and Discrete Mathematics, Grass Man & Trembley, Pearson Education.

Outcomes:

1. Ability to illustrate by examples the basic terminology of functions, relations, and sets and demonstrate knowledge of their associated operations.
2. Ability to demonstrate in practical applications the use of basic counting principles of permutations, combinations, inclusion/exclusion principle and the pigeonhole methodology.
3. Ability to represent and Apply Graph theory in solving computer science problems.

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Course Code: 50508   **Credits: 2**

B.Tech. – III Semester

OBJECT ORIENTED PROGRAMMING LAB

1. Simple C++ Programs to Implement Various Control Structures.
   a. If statement
   b. Switch case statement and do while loop
   c. For loop d. While loop

2. program using functions with default arguments implementation of call by value, address, reference

3 Simple classes for understanding objects, member functions & constructors
   Classes with primitive data members,
   Classes with arrays as data members
   Classes with pointers as data members
   Classes with constant data members
   Classes with static member functions

4. Programs to Understand Friend Function & Friend Class. a. Friend Function b. Friend class

5. Programs to Implement Inheritance and Function Overriding.
   a. Multiple inheritance –Access Specifies
   b. Hierarchical inheritance – Function Overriding /Virtual Function

6. Programs to Overload Unary & Binary Operators as Member Function & Non Member Function.
   a. Unary operator as member function
   b. Binary operator as non member function

7. run time polymorphism inheritance virtual functions virtual base classes templates

8. file handling sequential access random access

9 simple java applications for understanding references to an instant of a class handling strings in JAVA

10. Simple package creation developing user defined packages in java 8. interfaces developing user defined interfaces use predefined interfaces

11. Threading creation of threading in java applications multi threading

12. Exception handling mechanism in java handling predefined exceptions handling user defined exceptions

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Course Code: 50509   **Credits: 2**

B.Tech. – III Semester
ALGORITHM DESIGN LAB

1. Implement the minimum cost spanning tree algorithm(Kruskal's algorithm)
2. Implement the minimum cost spanning tree algorithm(Prim's algorithm)
3. Write a program to evaluate a postfix expression E. Assume E is presented as a String.
4. Write a program to obtain the postfix form of an infix expression E. Again assume E has only the binary operators +,-,*,/,^.
5. Implement the Knapsack Algorithm.
6. Implement the Quick Sort Algorithm.
7. Implement the shortest path Dijkstra's Algorithm.
8. Implement the Longest Common Sequence Algorithm

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Course Code: 50453   **Credits: 0**

B.Tech. – III Semester
DIGITAL LOGIC DESIGN LAB

Programming can be done by using Verilog compiler and verification by simulation with any of the front end tools.

1. HDL code to realize all the logic gates.
2. Design of 2-to -4 decoder.
3. Design of 8-to-3 encoder
4. Design of 8-to-1 Multiplexer
5. Design of 1 to 8 Demultiplexer
6. Design of comparator
7. Design of half adder and full adder.
8. Design of half subtractor and full Subtractor.
9. Design of flip flops: SR, D, JK, T.
10. Design of code converters.
11. Design of 4-bit Asynchronous counter.
12. Design of 4-bit synchronous counter

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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   [06 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. DifferentMasculinities.

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   [06 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   [06 Periods]

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

MODULE-IV:ISSUES OF VIOLENCE   **[06 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   **[06 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 htto://harooreollins.co.in/BookDetailasp?Flook Cndet'3732
4) Vimata. "Vantillu (The Kitchen)". *Women Writing in India: 600 BC to the Present. Volume II:* The 20th Century. Ed. Susie Thaw and K. Lalita. Delhi: Oxford University Press 1995. 599-601.
5) Shatrughna, Veena et al. *Women's Work and its Impact on Child Health end Nutrition,* Hyderabad, National Institute of Nutrition, Indian Council of Medical Research. 1993.
6) Stree Shakti Sanghatana. 'We Were *Making I listory ....' Life Stories of Women in the Telangana* People's *Struggle.* New Delhi: Kali for Women, 1989.
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 20" 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, l.iela 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.'*Available   online at: htte://www.thealternativeinilifestylefi-fouoht-for-mv-lifeand-won-sohaila-abdulall

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.

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Course Code: 50A03   **Credits: Audit Course**

B.Tech. – III Semester
LAW FOR ENGINEERS

Objective: The objective of the course is to familiarize students (Prospective engineers) withelementary knowledge of laws that would be of utility in their profession. The syllabuscovers Constitution of India and new areas of law like Cyber, IPR, Human Rights, Right toInformation, Corporate and Labour.

Module I   **[06 Periods]**
Constitutional Law covering the Preamble; Fundamental Rights, Fundamental Duties;
Human Rights and Public International Law - Theoretical foundation, human rights and international law; UNMechanism 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, StatutoryCommissions – NHRC, NCW, NCM, NC-SCST.

Module II   **[06 Periods]**
Right to Information Act, 2005 - Evolution and concept; Practice andprocedures;
Labour Laws - Industrial Employment (Standing Orders) Act, 1946; Workmen's Compensation Act, 1923;(3 Lectures)
Corporate Laws - Law relating to public, private and multinationalcompanies, collaboration agreements fortechnology transfer

Module III   **[06 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 andpolicy 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 the course, the student will 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.

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Course Code: 50B13   **Credits: 4**

B.Tech. – IV Semester
PROBABILITY AND QUEUEING THEORY

Prerequisites: NIL

Objectives:
1. To understand and conduct computer systems modeling and performance analysis.
2. To introduce the basic probability tools and concepts this is useful in modeling, such as Markov models and queuing theory.
3. To provide necessary mathematical support and confidence to tackle real life problems.

MODULE-I: Probability   **[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: Random variables: **[12 Periods]**
Discrete and continuous random variables – Moments – Moment generating functions – Binomial , Poisson , Geometric , Uniform , Exponential , Gamma and Normal distributions.
Two dimensional random variables: Joint distributions – Marginal and conditional distributions – Covariance – Correlation and Linear regression.

MODULE-III: Random Processes   **[12 Periods]**
Classification, Stationary process, Markov process – Poisson process – Discrete parameter, Markov chain Chapman Kolmogorov equations, Limiting distributions.

MODULE-IV: Queuing Theory: **[12 Periods]**
Structure of a queuing system , Operating Characteristics of queuing system, Transient and Steady states, Terminology of Queuing systems.

Arrival and service Processes, Pure Birth-Death process
Deterministic queuing Models, (M/M/1):(∞:FIFO) Model , (M/M/1):(N:FIFO) Model .

MODULE-V: Advanced Queuing Models   **[12 Periods]**

Markovian queues – Birth and Death processes – Single and multiple server queuing models – Little's formula – Queues with finite waiting rooms – Queues with impatient customers: Balking and reneging.

Finite source models – M/G/1 queue – M/D/1 and M/EK/1 as special cases – Series queues – Open Jackson networks.

TEXT BOOKS:

1) Probability & Queuing Theory by S Palaniammal , Eastern Economy Edition.
2) Probability and Statistics for Engineers and Scientists by Sheldon M.Ross ,
   Academic Press
3) Operations Research by S.D. Sarma.
4) 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 l.Devore.

Course outcomes:

1) To acquire skills in handling situations involving more than one random variable and functions of random variables.
2) To apply basic probability techniques and models to analyze the performance of computer systems, and, in particular, of networks and queues.
3) To have a well – founded knowledge of standard distributions which can describe real life phenomena.
4) To understand and characterize phenomena which evolve with respect to time in a probabilistic manner.
5) To expose the basic characteristic features of a queuing system and acquire skills in analyzing queuing models.
6) To use discrete time Markov chains to model computer systems.
7) To learn how to analyze a network of queues with Poisson external arrivals, exponential service requirements and independent routing. (Jackson networks)

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Course Code: 50510   **Credits: 3**

B.Tech. – IV Semester
COMPUTER ORGANIZATION

Prerequisites: NIL
Objective: This course is used to master the basic hardware and software issues involved in the organization of the computer and ability to analyze the hardware and software issues related to computers and the interface among them.

Module I: Structure of Computers   **[09 Periods]**
Computer types, functional unit, basic operational concepts, bus structures, multi processors and multi computers, multi tasking. Register Transfer Language and Micro operations- Register Transfer, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations, Arithmetic logic shift unit.

Module II: Computer Organization and Design   **[09 Periods]**
Instruction Codes, Computer Registers, computer instructions – instruction Cycle, memory reference instructions, input-output and interrupt. Central Processing Unit: Stack organization, instruction formats, addressing modes, data transfer and manipulation, program control, CISC and RISC.

Module III: Micro-Program and Control and Memory Organization
A: Micro programmed Control   **[05 Periods]**
Control memory, address sequencing, micro program example, design of control unit, hardwired control and micro programmed control.
B: Memory Organization   **[04 Periods]**
Memory hierarchy, Main Memory, Cache memory, performance considerations, virtual memory, secondary storage.

Module IV: Computer Arithmetic and I/O Organization
A: Computer Arithmetic   **[05 Periods]**
Addition and subtraction, multiplication algorithms, Division algorithms, floating-point arithmetic operations, Decimal arithmetic unit, Decimal arithmetic operations.
B: I\O Organization   **[04 Periods]**
Peripheral devices, input-output interface,asynchronous data transfer, modes of transfer, priority interrupt, direct memory access.

Module V: Pipeline and vector processing   **[09 Periods]**
Parallel Processing, types of Pipeline- Arithmetic , Instruction , RISC Vector Processing, Array Processors.

Text Books:
1. Computer organization – Carl Hamacher, Zvonks Vranesic, Safeazaky, V edition, Mc Graw Hill
2. Computer System Architecture – M. Morris Mano, III edition, Pearson/PHI

References:
1. Computer Organization and Architecture – William Stallings Sixth edition,Pearson/PHI
2. Fundamentals of Computer Organization and Design, Sivarama Dandamudi

3. Computer Architecture a Quantitative approach, John L. Hennessy and David A Patterson,Fourth edition Elsevier.
4. Computer Architecture Fundamentals and Principles of Computer Design, Joseph D/Dumas II,BS Publication

Outcome:
Upon completion of this course, student is able to understand the following:

1. Apply the concepts of computer organization for several engineering   applications.
 2. Develop the ability and confidence to use the fundamentals of computer organization as a tool in the engineering of digital systems.
3. Identify, formulate, and solve hardware and software computer   engineering problems using sound computer engineering principles

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Course Code: 50511 Credits: 3

B.Tech. – IV Semester
DATABASE MANAGEMENT SYSTEMS

Prerequisite: NIL
Objective: 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.

Text Books:
1. Database System Concepts, Silberschatz, Korth , Fifth Edition, McGraw hill (1,2,3 & 5 Units)
2. Database Management Systems, Raghuramakrishnan, Johannes Gehrke, TATA Mc Graw 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:
Upon completion of the course, the students are expected 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 internals of databases.
3. Define the basic functions of DBMS & RDBMS.
4. Describe database development process and to Apply the Relational Database Model to understand the Logical and Physical aspects of the DBMS architecture.
5. Analyze database models & entity relationship models. Draw the E-R diagram for the given case study.
6. Use Structured Query Language (SQL) with complex queries.

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Course Code: 50512   **Credits: 3**

B.Tech. – IV Semester
OPERATING SYSTEMS

Prerequisite: NIL
Objective: 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: Memeory
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:
Upon completion of this course, students should 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.

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Course Code: 50513   **Credits: 3**

B.Tech. – IV Semester
FORMAL LANGUAGES AND AUTOMATA THEORY

Prerequisite: NIL

Objective: To introduce the theoretical foundations of computer science concerning– the relationships between languages and machines, the inherent limits of what can be computed, and the   inherent efficiency of solving problems.

Module I: Fundamentals
A: Basics of Formal Languages: **[09 Periods]**
Strings, Alphabet, Language, Operations, Chomsky hierarchy of languages, Finite state machine Definitions, finite automation model, acceptance of strings and languages, DFA and NFA, transition diagrams and language recognizers.NFA with ε transitions –Equivalence between NFA with and without ε transitions, NFA to DFA conversion, minimization FSM, equivalence between two FSM's, Output machines- Moore and Mealy machine.

Module II: Regular Languages
A: Regular Language: **[09 Periods]**
Regular Sets , Regular Expressions , identity Rules, Constructing Finite automata for a given regular expressions, Conversion of Finite automata to 86 regular expressions, Pumping lemma of regular sets , closure properties of regular sets (proofs not required). Regular Grammars – right linear and left linear grammars, equivalence between regular grammar and FA.

Module III: CNF PDA
A: Context Free Grammar: **[05 Periods]**
Derivation trees, sentential forms, right most and left most derivations of strings. Ambiguity in Context frees Grammars. Minimization of Context free grammars, CNF, GNF, Pumping Lemma for Context Free Languages. Enumeration of properties of CFL (proofs omitted).
B: Push Down Automata: **[05 Periods]**
Definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence, Equivalence of CFL and PDA (proofs not required), Introduction to DCFL and DPDA.

Module IV: Turing Machine
A: Basic Nature of TM: **[09 Periods]**
Definition, model, Design of TM, computable functions, recursively enumerable languages. Church's hypothesis, counter machine, types of Turing Machines (proofs not required)

Module V: Computability Theory
A: LR Grammar: **[09 Periods]**
Linear Bounded Automata and context sensitive languages, LR(0) grammar, decidability of problems, Universal TM, Un decidable problems about Turing Machine – Post's Correspondence Problem - The classes P and NP.

Text Books:
1. H.E.Hopcroft, R.Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", Second Edition, Pearson Education, 2003.

References:

1. H.R.Lewis and C.H.Papadimitriou, "Elements of The theory of Computation", Second Edition, Pearson Education/PHI, 2003
2. J.Martin, "Introduction to Languages and the Theory of Computation", Third Edition, TMH, 2003.
3. Micheal Sipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997.

Outcome:

At the end of this course the student should be able to
 1. Understand the theory of automata.
 2. Classify computational devices according to their computational power, and tools   which will allow us to tell if a device is powerful enough to solve a givencomputational problem.
 3. Understand the concept of the grammar and concept of programming language.
 4. Understand Turing machine concept and in turn the technique applied in computers.Classify P vs NP- Class problems and NP-Hard vs NP-complete problems.

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Course Code: 50514   **Credits: 2**

B.Tech. – IV Semester
DATA BASE MANAGEMENT SYSTEMS LAB

Roadway Travels

"Roadway Travels" is in business since 1997 with several buses connectingdifferent places in India. Its main office is located in Hyderabad.
The company wants to computerize its operations in the following area
- Reservations and Ticketing
- Cancellations

Reservations & Cancellation:

      Reservations are directly handled by booking office. Reservations can be made 30 days in advance and tickets issued to passenger. One passenger/ person can book many tickets (to his/her family).

Cancellations are also directly handed at the booking office.

In the process of Computerization of Roadway Travels you have to design and develop a Database which consists the data of Buses, Passengers, Tickets and Reservation and cancellation details. You should also develop query's using SQL to retrieve the data from the database.

The above process involves many steps like
1. Analyzing the problem and identifying the Entities and Relationships
2. E-R Model
3. Relational Model
4. Normalization
5. Creating the database
6. Querying. Students are supposed to work on these steps week wise and finally create a complete ―Database system to Roadway Travels. Examples are given at every experiment for guidance to students.

1: E-R Model

Analyze the problem carefully and come up with the entities in it. Identify what data has to be persisted in the database. This contains the entities, attributes etc. Identify the primary keys for all the entities. Identify the other keys like candidate keys, partial keys, if any.

Example: **Entities:**
          1. BUS
          2. Ticket
          3. Passenger
    Relationships:
          1. Reservation
          2. Cancellation

PRIMARY KEY ATTRIBUTES:
1. Ticket ID (Ticket Entity)
2. Passport ID (Passenger Entity)
3. Bus_NO (Bus Entity)

Apart from the above mentioned entities you can identify more. The above mentioned are few.

Note: The student is required to submit a document by writing the Entities andKeys to the lab teacher.

2: Concept design with E-R Model

Relate the entities appropriately. Apply cardinalities for each relationship. Identify strong entities and weak entities (if any). Indicate the type of relationships (total / partial). Try to incorporate generalization, aggregation, specialization etc wherever required.
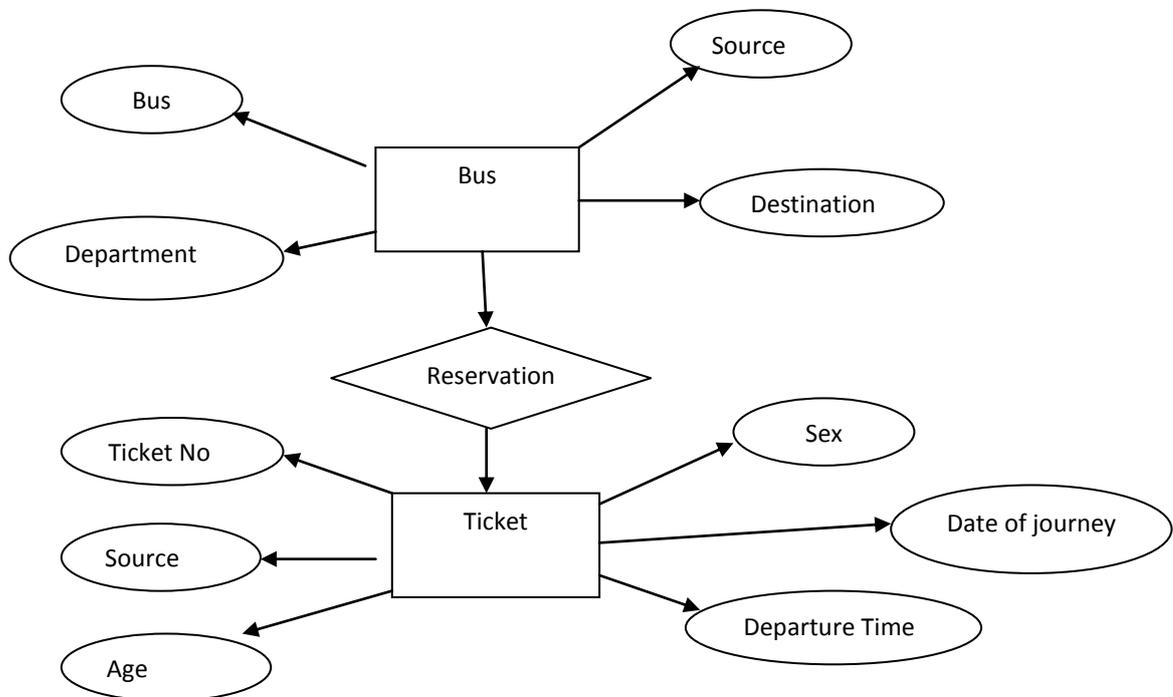
Note: The student is required to submit a document by drawing the E-RDiagram to the lab teacher.

3: Relational Model

Represent all the entities (Strong, Weak) in tabular fashion. Represent relationships in a tabular fashion. There are different ways of representing relationships as tables based on the cardinality. Represent attributes as columns in tables or as tables based on the requirement. Different types of attributes (Composite, Multi-valued, and Derived) have different way of representation.

Example: E-R diagram for bus

Example: The passenger tables look as below. This is an example. You can add more

attributes based on your E-R model. This is not a normalized table.

Passenger

Name	Age	Sex	Address	Passport Id

Note: The student is required to submit a document by Represent relationshipsin a tabular fashion to the lab teacher.

Experiment 4: Normalization

Database normalization is a technique for designing relational database tables to minimize duplication of information and, in so doing, to safeguard the database against certain types of logical or structural problems, namely data anomalies.

For example, when multiple instances of a given piece of information occur in a table, the possibility exists that these instances will not be kept consistent when the data within the table is updated, leading to a loss of data integrity.

Passportid	Ticketid

A table that is sufficiently normalized is less vulnerable to problems of this kind, because its structure reflects the basic assumptions for when multiple instances of the same information should be represented by a single instance only.

For the above table in the First normalization we can remove the multi valued attribute. Ticket_id and place it in another table along with the primary key of passenger.

First Normal Form: The above table can be divided into two tables as shownbelow.

Passenger

Name	Age	Sex	Address	Passport ID

You can do the second and third normal forms if required. Anyhow Normalized tables are given at the end.

Experiment 5: Installation of Mysql and practicing DDL commands

Installation of MySql. In this week you will learn Creating databases, How to create tables, altering the database, dropping tables and databases If not required. You will also try truncate, rename commands etc.

Example for creation of a normalized "Passenger" table.
CREATE TABLE Passenger (Passport_id INTEGER PRIMARY KEY,Name
  VARCHAR (50) Not NULL,Age Integer Not NULL, Sex Char,Address VARCHAR (50)
  Not NULL);

Similarly create all other tables.
Note: Detailed creation of tables is given at the end.

6: Practicing DML commands

DML commands are used to for managing data within schema objects. Some examples:

SELECT - retrieve data from the a database INSERT - insert
data into a table
UPDATE - updates existing data within a table

DELETE - deletes all records from a table, the space for the records remain

Inserting values into Bus table:
Insert into Bus values (1234,'hyderabad', _tirupathi');
Insert into Bus values (2345,'hyderabd','Banglore');
Insert into Bus values (23, _hyderabad', _Kolkata');
Insert into Bus values (45, _Tirupathi', _Bangalore');
Insert into Bus values (34, _hyderabad', _Chennai');

Inserting values into Bus table:

Insert into Passenger values (1, 45,'ramesh', 45,'M','abc123'); Insert into Passenger values (2, 78,'geetha', 36,'F','abc124'); Insert into Passenger values (45, 90, _ram', 30, _M', _abc12'); Insert into Passenger values (67, 89, _ravi', 50, _M', _abc14'); Insert into Passenger values (56, 22, _seetha', 32, _F', _abc55');

Few more Examples of DML commands:
Select * from Bus; (selects all the attributes and display)

UPDATE BUS SET Bus No = 1 WHERE BUS NO=2;

7: Querying

In this week you are going to practice queries (along with sub queries) using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.

Practice the following Queries:
1. Display unique PNR_no of all passengers.

2. Display all the names of male passengers.

3. Display the ticket numbers and names of all the passengers.

4. Display the source and destination having journey time more than 10 hours.

5. Find the ticket numbers of the passengers whose name start with _A' and ends with _H'.

6. Find the names of passengers whose age is between 30 and 45.

7. Display all the passengers names beginning with _A'

8. Display the sorted list of passengers names

8 and 9: Querying (continued…)

You are going to practice queries using Aggregate functions (COUNT, SUM, AVG, and MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

Write a Query to display the Information present in the Passenger and cancellation tables. **Hint:** Use UNION Operator.

Write a Query to display different travelling options available in British Airways. Displaythe number of days in a week on which the 9W01 bus is available.

Find number of tickets booked for each PNR_no using GROUP BY CLAUSE. **Hint:** Use GROUP BY on PNR_No.

Find the distinct PNR numbers that are present.

Find the number of tickets booked in each class where the number of seats is greater than 1. **Hint:** Use GROUP BY, WHERE and HAVING CLAUSES.

Find the total number of cancelled seats.

10: Triggers

In this week you are going to work on Triggers. Creation of insert trigger, delete trigger, update trigger. Practice triggers using the above database.

```
Eg: CREATE TRIGGER updcheck BEFORE UPDATE ON passenger FOR EACH
    ROW
    BEGIN
    IF NEW.TickentNO > 60 THEN SET New.Tickent no
      = Ticket no;
    ELSE
          SET New.Ticketno = 0; END IF;
    END;
```

11: Procedures

In this session you are going to learn Creation of stored procedure, Execution of procedure and modification of procedure. Practice procedures using the above database.

```
Eg:CREATE PROCEDURE myProc() BEGIN
age>=40; End;
```

12: Cursors

In this week you need to do the following: Declare a cursor that defines a result set.

Open the cursor to establish the result set. Fetch the data into local variables as needed from the cursor, one row at a time. Close the cursor when done

```
CREATE PROCEDURE myProc(in_customer_id INT) BEGIN
 DECLARE v_id  INT;
 DECLARE v_name VARCHAR(30);

 DECLARE c1 CURSOR FOR SELECT stdId, stdFirstname FROM students WHERE
```

```
stdId=in_customer_id;
OPEN c1;
FETCH c1 into v_id, v_name; Close c1;
END;
```

Tables

BUS
Bus No: Varchar: PK(Public key) Source : Varchar Destination : Varchar

Passenger
PPNO: Varchar(15) : PK Name: Varchar(15) Age : int (4) Sex:Char(10) : Male / Female
Address: VarChar(20)

Passenger_Tickets
PPNO: Varchar(15): PK Ticker_No: Numeric(9)

Reservation
PNR_No: Numeric(9) : FK Journey_date : datetime(8) No_of_seats : int (8)
Address : Varchar (50) Contact_No: Numeric (9) --> Should not be less than 9 and Should
not accept any other character other than Integer Status: Char (2) : Yes / No

Cancellation
PNR_No: Numeric(9) : FK Journey_date : datetime(8) No_of_seats : int (8) Address :
Varchar (50) Contact_No: Numeric (9) --> Should not be less than 9 and Should not accept
any other character other than Integer Status: Char (2) : Yes / No

Ticket
Ticket_No: Numeric (9): PK Journey_date : datetime(8) Age : int (4) Sex:Char(10) : Male /
Female Source : Varchar Destination : Varchar Dep_time : Varchar

Text Books:
1. Introduction to SQL,Rick F.Vander Lans,Pearson education.
2. Oracle PL/SQL, B.Rosenzweig and E.Silvestrova,Pearson education.
3. Oracle PL/SQL Programming,Steven Feuerstein,SPD.
4. SQL & PL/SQL for Oracle 10g,Black Book,Dr.P.S.Deshpande,Dream Tech.

References:
1. Oracle Database 11g PL/SQL Programming,M.Mc Laughlin,TMH.
2. SQL Fundamentals,J.J.Patrick,Pearson Education

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Course Code: 50515   **Credits: 2**

B.Tech. – IV Semester
OPERATING SYSTEMS LAB

List of Experiments

1. Simulate the following CPU scheduling algorithms
   a) Round Robin b) SJF c)FCFS d) Priority
2. Simulate all file allocation strategies a) Sequential b) Indexed c) Linked
3. Simulate MVT and MFT
4. Simulate all File Organization Techniques
   a) Single level directory b) Two level c) Hierarchical d) DAG
5. Simulate Bankers Algorithm for Dead Lock Avoidance
6. Simulate Bankers Algorithm for Dead Lock Prevention
7. Simulate all page replacement algorithms a) FIFO b) LRU c) LFU etc....
8. Simulate Paging Technique of memory management

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.

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Course Code: 50516   **Credits: 2**

B.Tech. – V Semester

FORMAL LANGUAGES AND AUTOMATA THEORY LAB

Features

- Supports FA, PDA, TM, Grammar, RE and more
- Save image to BMP or JPEG and more
- Convert NFA ↔ DFA
- Convert RE ↔ NFA
- Convert Grammar ↔ NFA
- Determination and Minimization

Experiments samples:

Basics: Learning about various simulators available in the market.

Using one simulator (JFLAP) implement the following:

1. Creating NFA and DFA using finite automata
2. Converting NFA to DFA
3. Converting RE to NFA
4. Convert FA to RE
5. Convert FA to grammar
6. Creating Pushdown Automata
7. Creating Grammar
8. Convert Pushdown Automata to Grammar
9. Restriction free Languages and Turing Machines

Under the above sample programs we can design 2 to 3 programs for design.

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Course Code: 50H11   **Credits: 0**

B.Tech. – IV Semester
HUMAN VALUES AND PROFESSIONAL ETHICS

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 complementarily 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:
Upon completion of the course, the students are expected to:
   1. To define various terms related to Human value with professional ethics..
   2. To understand the professional responsibilities.
   3. To analyse the soft ware engineering ethics and practices.

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Course Code: 50H03   **Credits: 2**

B.Tech. – V Semester
TECHNICAL COMMUNICATION AND PRESENTATION SKILLS

PREREQUISITES: Basic English.

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.

OBJECTIVE: 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.

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: 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, SQR3, 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

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Course Code: 50450   **Credits: 3**
B.Tech. – V Semester
MICROPROCESSORS AND MICROCONTROLLERS

Prerequisite: NIL
Objective: To develop an in-depth understanding of the operation of microprocessors and microcontrollers, machine language programming & interfacing techniques.

Module I: Architecture of 8086
A: 8086 Architecture: **[09 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.

Module II: Programming
A: Instruction Set and Assembly Language Programming of 8086:   **[09 Periods]**
Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Macros, Simple Programs involving Logical, Branch and Call Instructions, Sorting, Evaluating Arithmetic Expressions, String Manipulations.

Module III: I/O and Communication Interface
A: I/O Interface: **[03 Periods]**
8255 PPI, Various Modes of Operation and Interfacing to 8086, Interfacing Keyboard, Display, D/A and A/D Converter.
B: Communication Interface: **[03 Periods]**
Serial Communication Standards, Serial Data Transfer Schemes, 8251 USART Architecture and Interfacing.
C: Interfacing with advanced devices: **[03 Periods]**
Memory Interfacing to 8086, Interrupt Structure of 8086, Vector Interrupt Table, Interrupt Service Routine.

Module IV: Micro Controller
A: Introduction to Microcontrollers: **[09Periods]**
Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051, Simple Programs

Module V: Real time Controller
A: 8051 Real Time Control: **[09 Periods]**
Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters

Text Books:
1. D. V. Hall, Microprocessors and Interfacing, TMGH, 2nd Edition 2006.
2. Kenneth. J. Ayala, The 8051 Microcontroller , 3rd Ed., Cengage Learning.

References:
1. Advanced Microprocessors and Peripherals – A. K. Ray and K.M. Bhurchandani, TMH,2nd Edition 2006.

2. The 8051Microcontrollers, Architecture and Programming and Applications -K.Uma Rao,Andhe Pallavi, Pearson, 2009.
3. Micro Computer System 8086/8088 Family Architecture, Programming and Design - Liu and GA Gibson, PHI, 2nd Ed.
4. Microcontrollers and Application - Ajay. V. Deshmukh, TMGH, 2005.
5. The 8085 Microprocessor: Architecture, programming and Interfacing – K.Uday Kumar,B.S.Umashankar, 2008, Pearson

Outcomes:
1. The student will learn the internal organization of popular 8086/8051 microprocessors/microcontrollers.
2. The student will learn hardware and software interaction and integration.
3. The students will learn the design of microprocessors/microcontrollers-based systems.

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Course Code: 50517   **Credits: 3**

B.Tech. – V Semester
COMPUTER NETWROKS

Prerequisites: NIL
Objectives: TO Build an understanding of the fundamental concepts of computer networking and Familiarize the student with the basic taxonomy and terminology of the computer networking area.

Module I: Basics of Networking and Physical layer
A: Data Communications   **[04 Periods]**
Components – Direction of Data flow – Networks – Components and Categories – Types of Connections – Topologies –Protocols and Standards – ISO / OSI model, Example Networks such as NSF NET, ARPANET, ATM, Frame Relay, ISDN
B: Physical layer   **[06 Periods]**
Digital transmission, Multiplexing, Transmission Media, Switching, Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks, Switch and Telephone Networks.

Module II: Data link layer
A: Data link layer   **[05 Periods]**
Introduction, Framing, Error – Detection and Correction – Parity   – LRC – CRC-Hamming code, Flow and Error Control, Noiseless Channels, Noisy Channels, HDLC, Point to Point Protocols.
B: Medium Access sub layer   **[05 Periods]**
ALOHA, CSMA/CD, LAN - Ethernet IEEE 802.3 - IEEE 802.4 - IEEE 802.5 - IEEE 802.11, Random access, Controlled access, Channelization, Collision Free Protocols

Module III: Network layer
A: Network layer   **[09 Periods]**
Logical Addressing, Internetworking, Tunneling, Address mapping, ICMP, IGMP, Forwarding, Uni-Cast Routing Protocols, Multicast Routing Protocols, Congestion Control Mechanism

Module IV: Transport Layer   **[09 Periods]**
Transport Layer: Process to Process Delivery, UDP and TCP protocols, SCTP, Data Traffic, Congestion, Congestion Control, QoS, Integrated Services, Differentiated Services,QoS in Switched Networks.

Module V: Application layer   **[09 Periods]**
Application Layer: Domain name space, DNS in internet, electronic mail, SMTP, FTP, WWW, HTTP, SNMP, Network Security, Cryptography.

Text Books:
1. Data Communications and Networking – Behrouz A. Forouzan , Fourth Edition TMH,2006.
2. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI.

References:

1. Data communications and computer Networks, P.C .Gupta, PHI.

2. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition,Pearson
   Education.
3. Understanding communications and Networks, 3rd Edition, W.A. Shay, Cengage
Learning.
4. Computer Networking: A Top-Down Approach Featuring the Internet. James
F.Kurose&Keith W. Ross,3rd Edition, Pearson Education.
5. Larry L.Peterson and Peter S. Davie, "Computer Networks", Harcourt Asia Pvt.
Ltd.,Second Edition.
6. William Stallings, "Data and Computer Communication", Sixth Edition, Pearson
   Education, 2000.

Outcomes:
Upon completion of this course, students should be able to:
1. Understand the Layered Architecture of Computer Networks.
2. Understand the operation of the main components of computer networks.
3. Learn various network protocols and algorithms.
4. Acquire the required skill to design simple computer networks.
5. Become familiar with security risks threatening computer networks.

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Course Code: 50518   **Credits: 3**

B.Tech. – V Semester
SOFTWARE ENGINEERING

Prerequisite: NIL
Objective: To understand the basic concepts, issues of software and Identify Life cycle phases In the requirements for a software in real time with test cases.

Module I: Introduction to Software Engineering
A: Basics terms of Software Engineering: **[04 Periods]**
Changing nature of Software, Software Myths. A Generic View of Process:-Software engineering-A layered technology, The Capability Maturity Model Integration (CMMI)
B: Process Models: **[05 Periods]**
The water fall model, Incremental process models, evolutionary process models, and the unified process.

Module II: Requirements of Software Engineering
A: Software Requirements: **[04 Periods]**
Functional and non functional requirements, User requirements, System requirements, Interface specification, The software requirements document.
B: Requirements Engineering Process: **[05 Periods]**
Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management

Module III: Phases of Software Engineering
A: System Models: **[03 Periods]**
Context models, behavior models, data models, object models, structured methods
B: Design Engineering: **[03 Periods]**
Design process and design quality, design concepts the design model
C: Creating an architectural design: **[03 Periods]**
Software architecture, data design, architectural styles and patterns, architectural design

Module IV: Test Strategies
A: Methods of Testing: **[09 Periods]**
A strategic approach to software testing, Black box and White box Testing, Validation Testing, System Testing. Product Metrics, Software Quality, Metrics for analysis model, Metrics for design model, Metrics for source code, Metrics for testing, Metrics for maintenance Metrics for process and products. Software measurement, Metrics for software quality
Module V: Risk Management
A: Management of Risk Process: **[09 Periods]**
Reactive vs proactive risk strategies, Software risks, Risk identification, Risk projection Risk refinement, RMMM, RMMM plan Quality Management, Quality concepts, Software quality assurance, Software reviews, Formal technical reviews, Statistical Software Quality Assurance, Software reliability, ISO 9000 Quality standards

Text Book:

1. Roger S. Pressman, Software engineering- A practitioner's Approach, McGraw-Hill International Edition, 5th edition, 2001.

References:

1. Ian Summerville, Software engineering, Pearson education Asia, 6th edition, 2000.
2. Pankaj Jalote- An Integrated Approach to Software Engineering, Springer Verlag,1997.
3. James F Peters and Witold Pedryez, "Software Engineering – An Engineering Approach",John Wiley and Sons, New Delhi, 2000.
4. Ali Behforooz and Frederick J Hudson, "Software Engineering \ Fundamentals", Oxford University Press, New Delhi, 1996.

Outcomes:

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

1. Choose the appropriate Process model for the given project
2. Document the Requirements
3. Develop Different system Models
4. Create simple Test cases
5. Develop the skills for Software measurement
6. Prepare RMMI plan

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Course Code: **Credits: 3**

B.Tech. – V Semester

Professional Elective –I

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Course Code: **Credits: 3**

B.Tech. – V Semester

Open Elective – I

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Course Code: 50H04   **Credits: 2**

B.Tech. – V Semester
TECHNICAL COMMUNICATION AND PRESENTATION SKILLS LAB

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

OBJECTIVE: 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

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

REFERENCES 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

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Course Code: 50451   **Credits: 2**

B.Tech-V Semester
MICROPROCESSORS AND MICROCONTROLLERS LAB

The following programs are to be written for assembler and execute the same with 8086 and 8051 kits

1. Programs for 16 bit arithmetic operations for 8086 (using various addressing modes)
2. Program for sorting an array for 8086.
3. Program for searching for a number or character in a string for 8086.
4. Program for string manipulations for 8086.
5. Program for digital clock design using 8086.
6. Programming using arithmetic, logical and bit manipulation instructions of 8051.
7. Program and verify timer/counter in 8051.
8. Program and verify interrupt handling in 8051.
9. UART operation in 8051.
10. Communication between 8051 kit and PC.
11. Interfacing LCD to 8051.
12. Interfacing Matrix/keyboard to 8051..

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Course Code: 50519   **Credits: 2**

B.Tech. – IV Semester
COMPUTER NETWORKS LAB

1. PC to PC Communication
2. Parallel Communication using 8 bit parallel cable
3. Serial communication using RS 232C
4. Ethernet LAN protocol
5. To create scenario and study the performance of CSMA/CD protocol through simulation
6. Token bus and token ring protocols
7. To create scenario and study the performance of token bus and token ring protocols through simulation
8. Wireless LAN protocols
9. To create scenario and study the performance of network with
    1. CSMA / CA protocol and compare with CSMA/CD protocols.
    2. Implementation and study of stop and wait protocol
    3. Implementation and study of Goback-N and selective repeat protocols
    4. Implementation of distance vector routing algorithm
    5. Implementation of Link state routing algorithm
10. Implementation of Data encryption and decryption
11 Transfer of files from PC to PC using Windows / Unix socket processing

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Course Code: 50520   **Credits: 2**

B.Tech. – V Semester

Technical Seminar

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Course Code: 50H12   **Credits: 3**

B.Tech. – VI Semester
ENGINEERING ECONOMICS AND ACCOUNTANCY

Prerequisites: NIL
Objective: 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
A: Introduction to Managerial Economics: **[04 Periods]**
Definition, Nature and Scope of Managerial Economics–Demand Analysis: Demand Determinants, Law of Demand and its exceptions.
B: Elasticity of Demand: **[08 Periods]**
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
A: Theory of Production: **[05 Periods]**
Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.
B: Cost Analysis: **[06 Periods]**
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
A: Introduction to Markets & Market structures: **[05 Periods]**
Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.
B: Pricing Policies & Methods: **[06 Periods]**
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
A: Business & New Economic Environment: **[05 Periods]**
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.
B: Capital And Capital Budgeting: **[06 Periods]**
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
A: Introduction to Financial Accounting: **[04 Periods]**
Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).
B: Financial Analysis Through Ratios: **[07 Periods]**
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.(UNITS I,II,III,IV,V).
2. Varshney & Maheswari, **"Managerial Economics"**, 5th edition Sultan Chand, 2003.(UNITS, I,II,III).

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

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. Ability to identify, formulate, and solve financial problems
A knowledge of Financial Concepts as applied to Business Management

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Course Code: 50521   **Credits: 4**

B.Tech. – VI Semester
OBJECT ORIENTED ANALYSIS AND DESIGN

Prerequisite: NIL

Objective: Thestudent will be able to understand the Unified Modeling Language Principles and learns fundamental process pattern for object-oriented analysis and design.

Module I: UML

A: Introduction to UML   **[09 Periods]**

Importance of modeling, principles of modeling, object orientedmodeling, conceptual model of the UML, Architecture, and Software Development Life Cycle.

Module II: Behavioral and structural Modeling

A: Basic Behavioral Modeling-I   **[04 Periods]**

Use cases, Use case Diagrams, Activity Diagrams.

B: Basic Structural Modeling   **[04 Periods]**

Classes, Relationships, common Mechanisms, and diagrams.

Module III: Behavioral Model II

A: Advanced Structural Modeling   **[04 Periods]**

Advanced classes, advanced relationships, Interfaces, Typesand Roles, Packages.

B: Class & Object Diagrams   **[04 Periods]**

Terms, concepts, modeling techniques for Class & ObjectDiagrams.

C: Basic Behavioral Modeling-II   **[02 Periods]**

Interactions, Interaction diagrams

Module IV: Advanced Behavioral Modeling

A: Advanced Behavioral Modeling   **[09 Periods]**

Events and signals, state machines, processes and Threads,time and space, state chart diagrams.

Module V: Architecture Modeling

A: Architectural Modeling   **[06 Periods]**

Component, Deployment, Component diagrams and Deploymentdiagrams.

B: Case Study   **[03 Periods]**

The Unified Library application.

Text Books:

1. Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling Language User Guide, Pearson Education.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd.

References:

1. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
2. Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hill.
3. Mark Priestley: Practical Object-Oriented Design with UML,TATA McGrawHill.
4. Appling UML and Patterns: An introduction to Object – Oriented Analysis and Design and

Unified Process, Craig Larman, Pearson Education.

Outcome:

Upon completion of the course, the students are expected to:
1. Analyze the requirements through Use-Case View
2. Identify all structural and behavioral concepts of the entire system
3. Develop a model using UML concepts by different types of diagrams like Use case diagram,Class Diagram,Sequence Diagram e.t.c….

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Course Code:50522   **Credits: 4**

B.Tech. – VI Semester
COMPILER DESIGN

Prerequisite: NIL
Objective: This course will Illustrating different phases of compilation and Learning the effectiveness of optimization.

Module I: Overview of Compilation
A: Compilation   **[09 Periods]**
Phases of Compilation – Lexical Analysis, Regular Grammar and regular expression for common programming language features, pass and Phases of translation, interpretation, bootstrapping, data structures in compilation – LEX lexical analyzer generator.

Module II: Parsing
A: Parsing   **[04 Periods]**
Context free grammars, Top down parsing – Backtracking, LL (1), recursive descent parsing, Predictive parsing, Preprocessing steps required for predictive parsing.
B: Bottom up parsing   **[05 Periods]**
Shift Reduce parsing, LR and LALR parsing, Error recovery in parsing , handling ambiguous grammar, YACC – automatic parser generator.

Module III: Semantic
A: Semantic analysis   **[05 Periods]**
Intermediate forms of source Programs – abstract syntax tree, polish notation and three address codes. Attributed grammars, Syntax directed translation, Conversion of popular Programming languages language Constructs into Intermediate code forms, Type checker.
B: Symbol Tables   **[05 Periods]**
Symbol table format, organization for block structures languages, hashing, tree structures representation of scope information. Block structures and non
block structure storage allocation: static, Runtime stack and heap storage allocation, storage allocation for arrays, strings and records.

Module IV: Optimization
A: Code optimization   **[09 Periods]**
Consideration for Optimization, Scope of Optimization, local optimization, loop optimization, frequency reduction, folding, DAG representation. Data flow analysis: Flow graph, data flow equation, global optimization, redundant sub expression elimination, Induction variable elements, Live variable analysis, Copy propagation.

Module V: Code Generation
A: Object code generation   **[09 Periods]**
Object code forms, machine dependent code optimization, register allocation and assignment generic code generation algorithms, DAG for register allocation.

Text Books:

1. Principles of compiler design -A.V. Aho .J.D.Ullman; Pearson Education.
2. Modern Compiler Implementation in C- Andrew N. Appel, Cambridge University Press.

3. Systems programming and operating systems – D.M Dhamdhere ,2nd edition,tata McGraw hill publishing comp pvltd.

References:

1. Lex&yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
2. Modern Compiler Design- Dick Grune, Henry E. Bal, Cariel T. H. Jacobs, Wiley dreamtech.
3. Engineering a Compiler-Cooper & Linda, Elsevier.
4. Compiler Construction, Louden, Thomson.

Outcomes:

Upon successful completion of this course, students will be able to:
  1. Know the major phases of compilation, particularly lexical analysis, parsing,semantic analysis and code generation.
  2. Understand the differences types of parsing techniques and syntax directedtranslations.
  3. Understand the code optimization methods.
  4. Apply the optimization techniques to programming languages.
  5. Know the language features and natural language representations.

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Course Code: **Credits: 3**

B.Tech. – VI Semester

Professional Elective –II

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Course Code: **Credits: 3**

B.Tech. – VI Semester

Open Elective – II

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Course Code: 50523   **Credits: 2**

B.Tech. – VI Semester
NETWORK SECURITY

Prerequisite: NIL

Module I: Security Attacks   **[09 Periods]**

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

Module II: Encryption   **[09 Periods]**

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.

Module III: Crypto graphic   **[09 Periods]**

Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service.

Module IV : Email Privacy   **[09 Periods]**

Pretty Good Privacy (PGP) and S/MIME.

Module V: IP Security   **[09 Periods]**

IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3. Intruders, Viruses and related threats.Firewall Design principles, Trusted Systems. Intrusion Detection Systems.

Text Books:

1.Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.

2.Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W.Manzuik and Ryan Permeh, wiley Dreamtech

References :

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
2. Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Cryptography and network Security, Third edition, Stallings, PHI/Pearson Principles of Information Security, Whitman, Thomson.
4. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
5. Introduction to Cryptography, Buchmann, Springer.

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Course Code: 50524   **Credits: 2**

B.Tech. – V Semester

OBJECT ORIENTED ANALYSIS AND DESIGN AND SOFTWARE ENGINEERING LAB

1. Study of UML
2. Passport automation system
3. Book bank management system
4. Exam registration system
5. Stock maintenance system
6. Online course reservation system
7. E-ticketing
8. Employee management system
9. Credit card processing system
10. E-books management system
11. Online recruitment systems
12. Foreign trading systems
13. Conference management system
14. Business process outsourcing management system

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Course Code: 50525   **Credits: 2**

B.Tech. – V Semester

COMPILER DESIGN LAB

Recomended System / Software Requirements:
- Intel based desktop PC with minimum of 166 MHZ or faster processor with atleast 64 MB RAM and 100 MB free disk space
- C++ comiler and JDK kit

Consider the following mini Language, a simple procedural high-level language, only operating on integer data, with a syntax looking vaguely like a simple C crossed with Pascal. The syntax of the language is defined by the following BNF grammar:

<program> ::= <block>

<block> ::= { <variabledefinition><slist> } | { <slist> }

<variabledefinition> ::= int<vardeflist>;

<vardeflist> ::= <vardec> | <vardec>, <vardeflist>

<vardec> ::= <identifier> | <identifier> [<constant>]

<slist> ::= <statement> | <statement>; <slist>

<statement> ::= <assignment> | <ifstatement> | <whilestatement> | <block> | <printstatement> | <empty>

<assignment> ::= <identifier> = <expression> | <identifier> [<expression>] = <expression>

<ifstatement> ::= <bexpression> then <slist> else <slist> endif | if <bexpression> then <slist> endif

<whilestatement> ::= while <bexpression> do <slist> enddo

<printstatement> ::= print (<expression>)

<expression> ::= <expression><additionop><term> | <term> | addingop><term>

<bexpression> ::= <expression><relop><expression>

<relop> ::= < | <= | == | >= | > | !=

<addingop> ::= + | -

<term> ::= <term><mulitop><factor> | <factor>

<multop> ::= * | /

<factor> ::= <constant> | <identifier> | <identifier> [<expression>] | (<expression>)

<constant> ::= <digit> | <digit><constant>

<identifier> ::= <identifier><letterordigit> | <letter>

<letterordigit> ::= <letter> | <digit>

<letter> ::= a|b|c|d|e|f|g|h|i|j|k|l|m|n|o|p|q|r|s|t|u|v|w|x|y|z

<digit> ::= 0|1|2|3|4|5|6|7|8|9

<empty> has the obvious meaning

Comments (zero or more characters enclosed between the standard C / Java style comment brackets /*...*/) can be inserted. The language has rudimentary support for 1-dimensional arrays. The declaration

int a[3] declares an array of three elements, referenced as a[0], a[1] and a[2] Note also that you should worry about the scoping of names.

A simple program written in this language is:

```
{
 int a[3], t1, t2;
 t1 = 2;
 a[0] = 1; a[1] = 2; a[t1] = 3;
 t2 = -(a[2] + t1 * 6)/ a[2] - t1);
 if t2 > 5 then
 print(t2);
```

```
    else
    {
      int t3;
      t3 = 99;
      t2 = -25;
      print(-t1 + t2 * t3); /* this is a comment on 2 lines */
    }
  endif
}
```

1. Design a Lexical analyzer for the above language. The lexical analyzer should ignore redundant spaces, tabs and newlines. It sholud also ignore comments. Although the syntax specification states that identifiers can be arbitrarily long, you may restrict the length to some reasonable value.
2. Implement the lexical analyzer using JLex, flex or lex or other lexical analyzer generarting tools.
3. Design Predictive parser for the given language.
4. Design LALR bottom up parser for the above language.
5. Convert the BNF rules into Yacc from and write code to generate abstract syntax tree.
6. Write program to generate machine code from the abstract syntax tree generated by the parser. The following instruction set may be considered as target code.

The following is a simple register-based machine, supporting a total of 17 instructions. It has three distinct internal storage areas. The first is the set of 8 registers, used by the individual instructions as detailed below, the second is an area used for the storage of variables and the third is an area used for the storage of program. The instructions can be precede by a label. This consists of an integer in the range 1 to 9999 and the label is followed by a colon to seperate it from the rest of the instruction. The numerical label can be used as the argument to a jump instruction, as detailed below.

In the description of the individual instructions below, instruction argument types are specified as follows:

R specifies a register in the form R0, R1, R2, R3, R4, R5, R6 or R7 (or r0, r1, etc).

L specifies a numerical label (in the rabge 1 tp 9999).

V specifies a "variable location" (a variable number, or a variable location pointed to by a register - see below).

A specifies a constant value, a variable location, a register or a variable location pointed to by a register (an indirect address). Constant values are specified as an integer value, optionally preceded by a minus sign, preceded by a # symbol. An indirect address is specified by an @ followed by a register.

So, for example an A-type argument could have the form 4 (variable number 4), #4 (the constant value 4), r4 (register 4) or @r4 (the contents of register 4 identifies the variable location to be accessed).

The instruction set is defined as follows:

LOAD A, R

loads the integer value secified by A into register R.

STORE R, V

stores the value in register R to variable V.

OUT R

outputs the value in register R.

NEG R

negates the value in register R.

ADD A, R

adds the value specified by A to register R, leaving the result in register R.

SUB A, R

subtracts the value specified by A from register R, leaving the result in register R.

MUL A, R

multiplies the value specified by A by register R, leaving the result in register R.

DIV A, R

divides register R by the value specified by A, leaving the result in register R.

JMP L

causes an unconditional jump to the instruction with the label L.

JEQ R, L

jumps to the instruction with the label L if the value in register R is zero.

JNE R, L

jumps to the instruction with the label L if the value in register R is not zero.

JGE R, L

jumps to the instruction with the label L if the value in register R is greater than or equal to zero.

JGT R, L

jumps to the instruction with the label L if the value in register R is greater than zero.

JLE R, L

jumps to the instruction with the label L if the value in register R is less than or equal to zero.

JLT R, L

jumos to the instruction with the label L if the value in register R is less than zero.

NOP

is an instruction with no effect. It can be tagged by a label.

STOP

stops execution of the machine. All programs should terminate by executing a STOPinstruction.

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Course Code:50H05

Credits: 1

B.Tech. – VI Semester
SOFT SKILLS

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.

Objective:

- 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 Jobsby 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

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Course Code: 50H13   **Credits: 2**

B.Tech. – VII Semester
MANAGEMENT SCIENCE

Prerequisites: NIL

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

Module – I: Management and Principles of Management
A: Introduction to Management: **[04Periods]**

Concepts of Management and organization-nature, importance and Functions of Management, Taylor's Scientific Management Theory, Fayols.

B:Principles of Management: **[08 Periods]** Mayo's Hawthorne Experiments, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Systems Approach to Management, Leadership Styles, Social responsibilities of Management.

Module – II: Organizational Structures and Types of Organizations
A: Designing Organizational Structures: **[04 Periods]**

Basic concepts related to Organization - Departmentation and Decentralization, Types of mechanistic and organic structures of organization

B: Types of Organizations: **[07 Periods]**

Line organization, Line and staff organization, functional organization ,committee organization, matrix organization, Virtual Organization, Cellular Organization, team structure, boundary less organization, inverted pyramid structure, lean and flat Organization structure and their merits, demerits and suitability.

Module – III: Operations Management and Materials, Marketing Management
A: Operations Management: **[05 Periods]**

Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement- Statistical Quality Control: chart, R chart, c chart, p chart, (simple Problems), Acceptance Sampling, Deming's contribution to quality.

B: Materials Management: **[03 Periods]**

Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records.

C: Marketing Management: **[03 Periods]**

Functions of Marketing, Marketing Mix, Marketing Strategies based on Product Life Cycle, Channels of distribution

Module – IV: HRM and SM
A: Human Resources Management (HRM):   **[06 Periods]**

Concepts of HRM, HRD and Personnel Management and Industrial Relations (PMIR), HRM vs. PMIR, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating.

B: Strategic Management: **[05 Periods]**

Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives

Module – V: Management Practices and PERT/CPM

A: Contemporary Management Practices: **[11 Periods]**

Basic concepts of MIS, End User Computing, Materials Requirement Planning (MRP), Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma and Capability Maturity Model (CMM) Levels.

B: Project Management (PERT/CPM):   **[11 Periods]**

Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing(Simple problems) .

TEXT BOOKS:

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

REFERENCE BOOKS*:*

1. Kotler Philip & Keller Kevin Lane, **"Marketing Management"**, PHI, 12th edition, 2005
2. Koontz & Weihrich, **"Essentials of Management"**, TMH, 6th edition, 2005.
3. Thomas N.Duening & John M. Ivancevich **"Management - Principles and Guidelines"**, Biztantra, 5th edition 2003.
4. Memoria & S.V. Gauker, **"Personnel Management"**, Himalaya, 25th edition, 2005
5. Samuel C. Certo, **"Modern Management"**, PHI, 9th edition, 2005.

OUTCOMES:

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

1. Learn the history of management and the contributions of important management techniques.
2. Understand the relevance of environmental scanning, planning and how to take decisions.
3. How to delegate authority and use power to influence people to get the work done through proper communication and control.
4. HR strategies of recruitment and selections and Marketing strategies.

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Course Code: 50H14   **Credits: 2**

B.Tech. – VII Semester
INDUSTRIAL MANAGEMENT

Prerequisites: NIL

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

Module I : Management and   Principles of Management
A: Introduction to Management: **[06 Periods]**
Concepts of Management and organization-nature, importance and Functions of Management, Taylor's Scientific Management Theory, Fayols.
B: Principles of Management: **[05 Periods]**
Mayo's Hawthorne Experiments, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Systems Approach to Management, Leadership Styles, Social responsibilities of Management.

Module II: Organizational Structures and Types of Organizations
A: Designing Organizational Structures: **[04 Periods]**
Basic concepts related to Organization - Departmentation and Decentralization, Types of mechanistic and organic structures of organization
B: Types of Organizations: **[07 Periods]**
Line organization, Line and staff organization, functional organization ,committee organization, matrix organization, Virtual Organization, Cellular Organization, team structure, boundary less organization, inverted pyramid structure, lean and flat Organization structure and their merits, demerits and suitability.

Module III   Operations Management and Quality Control
A: Operations Management: **[04 Periods]**
Principles and Types of Plant Layout-Methods of production (Job, batch and Mass production), Work Study –Basic procedure involved in Method Study and Work Measurement-Statistical
B: Quality Control: **[07 Periods]**
X chart, R chart, C chart, P chart, (simple problems), Acceptance Sampling, Deming's contribution to quality,
Material Management: Objectives, Need for Inventory Control, EOQ, ABC Analysis, Purchase procedure, Store Management and Stores Records –Supply Chain Management
Marketing: Functions of Marketing, Marketing Mix, Marketing Strategies based on Product life Cycle., Channels of Distribution

Module IV: HRM and PERT/CPM
A: Human Resource Management (HRM):   **[05 Periods]**
Evolution of HRM, Concepts of HRM, Basic functions of HR Manager: Manpower Planning, Recruitment, Selection, Training and Development, Placement, Wage and salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating.

B: Project Management: [06 Periods]

Network Analysis, Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems)

Module V: Management Practices and Strategic Management

A: Contemporary Management Practices: [05 Periods]

Basic Concepts of Just -In-Time (JIT) systems, Total Quality Management (TQM), Six sigma and capability maturity modal (CMM) levels, Value Chain Analysis, Entrepreneurship Resource Planning (ERP), Performance Management, business process Outsourcing (BPO), Business process re-engineering 5s Model, Deming's PDCA, Kaizen, Poka-Yoke, Muda, Bench marking, Balanced Score Card.

B: Strategic Management: [06 Periods]

Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of corporate planning process, Environmental Scanning, SWOT Analysis, Steps in Strategy Formulation and Implementation, generic Strategy Alternatives.

Text Books:

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

References:

1. Kotler Philip & Keller Kevin Lane, "Marketing Management", PHI, 12th edition, 2005
2. Koontz & Weihrich, "Essentials of Management", TMH, 6th edition, 2005.
3. Thomas N.Duening & John M. Ivancevich "Management - Principles and Guidelines", Biztantra, 5th edition 2003.
4. Memoria & S.V. Gauker, "Personnel Management", Himalaya, 25th edition, 2005
5. Samuel C. Certo, "Modern Management", PHI, 9th edition, 2005.

Outcomes:

They should be able to

1. Learn the history of management and the contributions of important management techniques.
2. Understand the relevance of environmental scanning, planning and how to take decisions.
3. How to delegate authority and use power to influence people to get the work done through proper communication and control.
4. HR strategies of recruitment and selections and Marketing strategies.

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Course Code: 50526   **Credits: 3 B.Tech. - VII**
Semester
LINUX PROGRAMMING

Prerequisite: Operating Systems.
Objective: To understand basic principles of Linux programming and to learn the fundamentals of shell scripting with basic Linux administration.

Module I: Linux Utilities
A: Basic Commands: **[04 Periods]**
File handling utilities, Security by file permissions, Process utilities, Diskutilities, Networking commands, Filters, Text processing utilities and Backup utilities.
B: SED and AWK: **[04 Periods]**
SED – scripts, operation, addresses, commands, applications, awk – execution, fields and records, scripts, operation, patterns, using system commands in awk.

Module II: Working with the Bourne again shell (bash)
A: Introduction of Shell: **[04 Periods]**
Shell responsibilities, pipesand input Redirection, output redirection, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command.
B: Control structure with Script :   **[04 Periods]**
Control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts.

Module III: Files and Process
A: Working with Files: **[05 Periods]**
File Concept, File System Structure, Inodes, File Attributes, File types, Libraryfunctions, the standard I/O and formatted I/O in C, stream errors, kernel support for files, System calls, file descriptors, low level file access – File structure related system calls(File APIs), file and record locking, file and directory management – Directory file APIs, Symbolic links & hard links.
B: Working with Process: **[04 Periods]**
Process concept, Kernel support for process, process attributes, process control - process creation, waiting for a process, process termination, zombie process, orphan process, Process APIs.

Module IV: Signals and IPC
A: Working with Signals: **[04 Periods]**
Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise, alarm, pause, abort, sleep functions.
B: Interprocess Communication: **[06 Periods]**
Introduction to IPC, Pipes, FIFOs, Introduction to three types of IPC-message queues, semaphores and shared memory. Message Queues-Kernel support for messages, Unix system V APIs for messages, client/server example.

Module V: Semaphores and Sockets
A: Need of Semaphores: **[05 Periods]**
Kernel support for semaphores, Unix system V APIs for semaphores. Shared Memory-

Kernel support for shared memory, Unix system V APIs for shared memory, semaphore and shared memory example.

B: Need of Sockets: [05 Periods]

Introduction to Sockets, Socket Addresses, Socket system calls for connection oriented protocol and connectionless protocol, example-client/server programs.

Text Books:
1. Unix System Programming using C++, T.Chan, PHI.
2. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH,2006.
3. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones,Wrox, Wiley India Edition,rp-2008

References:
1. Linux System Programming, Robert Love, O'Reilly, SPD.
2. Advanced Programming in the Unix environment, 2nd Edition, W.R.Stevens, Pearson Education.
3. Unix Network Programming, W.R.Stevens,PHI.
4. Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education

Outcomes:

Upon completion of this course, students should be able to:
1. Understand the how to work with Linux commands
2. Understand the how to write Shell Scripts
3. Learn various System Calls in Linux
4. Become familiar with Write shell scripts to automate various tasks

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Course Code: 50527   **Credits: 2**

B.Tech – VII Semester

DATA MINING AND DATA WAREHOUSING

Prerequisite: NIL

Objectives: To understand Basics of processes and the concepts, techniques of data mining. To learn Develop an appreciation for the inherent complexity of the data-mining task with Advance relevant programming skills and research skills through the investigation.

Module I: Basics of Data Mining

A: Introduction: **[04 Periods]**

Fundamentals of data mining, KDD process, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task primitives, Integration of a Data mining System with a Database or a Data warehouse systems, Major issues in Data Mining.

B: Data Preprocessing: **[05 Periods]**

Needs for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Descretization and Concept Hierarchy Generation.

Module II: Data ware House Architecture

A: Data Warehouse and OLAP Technology for Data Mining: **[04 Periods]**

Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining.

B: Data Cube computation and Data Generalization: **[05 Periods]**

Efficient Methods for Data Cube Computation, Further Development of data cube and OLAP Technology, Characterization and Discrimination: Attribute-Oriented Induction.

Module III: Relationships of Data

A: Mining Frequent, Associations and Correlations: **[09 Periods]**

Basic Concepts, Frequent Item setmining methods, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

Module IV: Data Classification and Prediction

A: Classification and Prediction: **[09 Periods]**

Issues Regarding Classification and Prediction,Classification by Decision Tree Induction, Bayesian classification, Classification by Back propagation, Classification Based on Concepts from association Rule Mining, Other Classification Methods, Prediction, Classifier Accuracy.

Module V: Analysis on Data

A: Cluster Analysis Introduction: **[09 Periods]**

Types of Data in Cluster Analysis, A Categorization ofMajor Clustering Methods, Partitioning Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Outlier Analysis.

B: Mining Complex Types of Data: **[09 Periods]**

Mining Spatial Databases, Mining MultimediaDatabases, Mining Time-Series and Sequence Data, Mining Text Databases, Mining the World Wide Web.

Text Books:
1. Data mining: Concepts and Techniques, Jiawei Han and Micheline Kamber, 2nd Edition, Elsevier, 2006.

References:
1. Introduction to data mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Addison-Wesley, 2005. ISBN : 0321321367.
2. Mining Introductory and advanced topics –Margaret H Dunham, Pearson Education.
3. Data Mining Techniques – Arub K Pujari, University Press.
4. Data Mining for Association Rules and Sequential Patterns: Sequential and Parallel Algorithms, Jean-Marc Adamo, ISBN: 0387950486
5. The Data Warehouse Life cycle Tool kit – Ralph Kimball Wilsy Student Edition.
6. Data Warehousing in the Real World – Sam Anahory & Dennis Murray. Pearson Edn Asia.

Outcomes:
Upon completion of the course, the students are expected to:
1. Apply database analysis and design techniques to the concept of Data Warehousing.
2. Construct a data model for a case sample Data Warehouse project.
3. List and describe the core components of a Data Mart.
4. Summarize the rational and key benefits of using Data Martsand Construct a data model representing a Data Mart strategy.
5. Explain the concept of Data Mining and List and describe the core components of a Data Mining initiative.
6. Summarize the tools and approaches used in support of Data Mining and Analyze sample data and identify correlations. To introduce advanced topics in data mining, applications and trends in data mining.

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Course Code:50528   **Credits: 3**

B.Tech. – VII Semester

ADVANCED COMPUTER ARCHITECTURE

Prerequisite: Computer organization and Architecture.
Objective: This course will give advanced concepts of Computer organization and architectures with process and environment behavior for minimizing the recourses.

Module I: INTRODUCTION GPU   [09 Periods]

Importance of GPU, Introduction to GPU Hardware, GPU Computing Architecture, Differences between multi-core CPU and GPU, Data Parallel Problem Decomposition, Parallel Memory Sharing, Transparent Scalability,Thread creation and synchronization between CPU-GPU, ,Multithreading and Thread Arrays,Performance metrics - speed-up(events), utilization, efficiency, Performance Estimation- theoretical

Module II: GPU-accelerated Libraries   [09 Periods]

NVIDIA cuBLAS, NVIDIA cuRAND, NVIDIA cuSPARSE, NVIDIA NPP, C++ STL Features for CUDA

Module III: CUDA   [09 Periods]

Getting started with CUDA Installation, Driver, Sdk, Toolkit, Basic Programming Concepts, Modes of Parallel programming CUDA Programming Model, Kernel, Calling Kernel on Device, Compiling and running a CUDA Program, Shared Memory Usage in CUDA. CUDA-C on the GPU, CUDA Examples and Applications

Module IV: CUDA Programming   [09 Periods]

Performance metrics - speed-up, utilization, efficiency, Transparent Scalability, Memory organization in CUDA, Pinned memory, texture memory & constant ,memory usage

Module V: Error Handling   [09 Periods]

CUDA events, Models of Parallel Computation: SIMD (Single Instruction Multiple Data), MIMD (Multiple Instruction and Multiple Data), Using streams: Overlapping GPU and CPU tasks, Overlapping Computation with Memory Copy, Atomic Operations and their limitations using occupancy calculator, CUDA profiler, Debugger

Text Books:
1. Programming Massively Parallel Processors,A Hands on Approch,David B.Kirk & Wen-mei W.Hwu,second edition

References:
1. The CUDA Handbook: A Comprehensive Guide to GPU Programming Book by Nicholas Wilt

2. CUDA Programming: A Developer's Guide to Parallel Computing with GPUs Book by Shane Cook
3. Patterns for parallel programming Book by Timothy G. Mattson
4. "Computer Architecture and parallel Processing" Kai Hwang and A.Briggs International Edition McGraw-Hill.

Outcomes:

Upon completion of the course, the students are expected to:
1. Understand and apply concept and principle of cache memory and virtual memory to high -performance computer architecture.
2. Understand pipelining and its speed advantage & design pipelined logic.
3. Proficient in fault-tolerant design techniques and examine various methods of error detection and correction such as TMR and Hamming Codes.
4. Identify tradeoffs between complex instruction set computers (CISC) and reduced instruction set computers (RISC).

Analyze and perform tradeoffs between the cost, performance, and reliability of alternative computer architectures.

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Course Code: **Credits: 3**

B.Tech. – VII Semester

Professional Elective –III

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Course Code: 50529   **Credits: 2**

B.Tech. – VII Semester

LINUX SHELL PROGRAMMING LAB

1. Basic Linux Commands, File handling utilities, Security by file permissions, Process utilities, Disk utilities, sed, awk, grep.
2. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
3. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.
4. Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.
5. C programming examples using Linux Operating systems.
6. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.
7. Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.
8. Write a shell script to list all of the directory files in a directory.
9. Write a shell script to find factorial of a given integer.
10. Write an awk script to count the number of lines in a file that do not contain vowels.
11. Write an awk script to find the number of characters, words and lines in a file.
12. Implement in C the following Unix commands using System calls
     a) Cat   b) mv
13. Write a C program to emulate the Unix ls – l command.
14. Write a C program on zombie process
15. Write a C program that illustrates the following.
     a) Creating a message queue.
     b) Writing to a message queue.
     c) Reading from a message queue.
 16. Write a C program that illustrates file locking using semaphores.

Text Books:

1. Unix System Programming using C++, T.Chan, PHI.
2. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH,2006.
3. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones,Wrox, Wiley India Edition,rp-2008

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Course Code: 50530   **Credits: 2**

B.Tech. – VII Semester

DATA WAREHOUSING AND DATA MINING LAB

1:

Title: Introduction to the Weka machine learning toolkit
Aim: To learn to use the Weak machine learning toolkit

Requirements

How do you load Weka?

1. What options are available on main panel?

2. What is the purpose of the the following in Weka:

    1. The Explorer

    2. The Knowledge Flow interface

    3. The Experimenter

    4. The command-line interface

3. Describe the arfffile format.
4. Press the Explorer button on the main panel and load the weather dataset and answer the following questions

    1. How many instances are there in the dataset?

    2. State the names of the attributes along with their types and values.

    3. What is the class attribute?

    4. In the histogram on the bottom-right, which attributes are plotted on the X,Y-axes? How do you change the attributes plotted on the X,Y-axes?

    5. How will you determine how many instances of each class are present in the data

    6. What happens with the Visualize All button is pressed?

    7. How will you view the instances in the dataset? How will you save the Changes?

2:

 a . What is the purpose of the following in the Explorer Panel?

    1. The Preprocess panel

        1.   What are the main sections of the Preprocess panel?

2. What are the primary sources of data in Weka?

2.The Classify panel

3.The Cluster panel

4.The Associate panel

5.The Select Attributes panel

6.The Visualize panel.

b. Load the weather dataset and perform the following tasks:

1.Use the unsupervised filter Remove With Values to remove all instances where the attribute 'humidity' has the value 'high'?

2.Undo the effect of the filter.

c. Answer the following questions:

1.What is meant by filtering in Weka?

2.Which panel is used for filtering a dataset?

3.What are the two main types of filters in Weka?
4.What is the difference between the two types of filters? What is the difference between and attribute filter and an instance filter?

d. Load the iris dataset and perform the following tasks:

1. Press the Visualize tab to view the Visualizer panel.

2. What is the purpose of the Visualizer?

3. Select one panel in the Visualizer and experiment with the buttons on the panel.

3:
Title: Classification using the Weka toolkit
Aim: To perform classification on data sets using the Weka machine learning toolkit
Requirements

1.Load the 'weather.nominal.arff' dataset into Weka and run Id3 classification algorithm**.** Answer the following questions

1. List the attributes of the given relation along with the type details

2. Create a table of the weather.nominal.arff data

3. Study the classifier output and answer the following questions

1.Draw the decision tree generated by the classifier

2.Compute the entropy values for each of the attributes

3.What is the relationship between the attribute entropy values and the nodes of the decision tree?

4. Draw the confusion matrix? What information does the confusion matrix provide?

5. Describe the following quantities:

FP

1. TP Rate   2. Rate
3. Precision   4. Recall

4:
Title: Performing data preprocessing tasks for data mining in Weka

Aim: To learn how to use various data preprocessing methods as a part of the datamining

Requirements

Application of Discretization Filters
1. Perform the following tasks
   1. Load the 'sick.arff' dataset

   2. How many instances does this dataset have?

   3. How many attributes does it have?

   4. Which is the class attribute and what are the characteristics of this attribute?

   5. How many attributes are numerics? What are the attribute indexes of the numeric attributes?

5:
Title: Performing clustering using the data mining toolkit

Aim: To learn to use clustering techniques

Requirements

1. Perform the following tasks:
   1.Load the 'bank.arff' data set in Weka.
   2.Write down the following details regarding the attributes:
      1.names
      2.types
      3.Values.
   3.Run the Simple K-Means clustering algorithm on the dataset
      1.How many clusters are created?
      2.What are the number of instances and percentage figures in each cluster?
      3.What is the number of iterations that were required?
      4.What is the sum of squared errors? What does it represent?
      5.Tabulate the characteristics of the centroid of each cluster.
      6. Visualize the results of this clustering (let the X-axis represent the cluster name, and the Y-axis represent the instance number)

1. Is there a significant variation in age between clusters?
2. Which clusters are predominated by males and which clusters are predominated by females?
3. What can be said about the values of the region attribute in each cluster?
4. What can be said about the variation of income between clusters?
5. Which clusters are dominated by married people and which clusters are dominated by unmarried people?
6. How do the clusters differ with respect to the number of children?
7. Which cluster has the highest number of people with cars?
8. Which clusters are predominated by people with savings accounts?
9. What can be said about the variation of current accounts between clusters?
10. Which clusters comprise mostly of people who buy the PEP product and which ones are comprised of people who do not buy the PEP product?

6:

Title Using Weka to determine Association rules

Aim: To learn to use Association algorithms on datasets

Requirements

1. Perform the following tasks

    1. Define the following terms

        1. item and item set

        2. Association

        3. Association rule

        4. Support of an association rule

        5. Confidence of an association rule

        6. Large item set

        7. Association rule problem

    2. What is the purpose of the Apriori Algorithm

2. Perform the following tasks:

    1. Load the 'vote.arff' dataset

    2. Apply the Apriori association rule

    3. What is the support threshold used? What is the confidence threshold used?

    4. Write down the top 6 rules along with the support and confidence values.

    5. What does the figure to the left of the arrow in the association rule represent?

6. What does the figure to the right of the arrow in the association rule represent?

7. For rule 8, verify that numerical values used for computation of support and confidence is in accordance with the data by using the Preprocess panel. Then compute the support.

1. Load the dataset 'weather.nominal.arff'.

2. Apply the Apriori association rule

   1. Consider the rule "temperature=hot ==> humidity=normal." Compute the support and confidence for this rule.

   2. Consider the rule "temperature=hot humidity=high ==> windy=TRUE."

      Consider the support and confidence for this rule.
   3. Is it possible to have a rule like the following rule:
      "outlook=sunny temperature=cool" ==> humidity=normal play=yes

   4. Perform the following tasks:

      1. Load the bank-data.csv file.

      2. Apply the Apriori association rule algorithm. What is the result? Why?

      3. Apply the supervised discretization filter to the age and income attributes.

      4. Run the Apriori rule algorithm

      5. List the rules that were generated.

Text Books:
1. Data mining: Concepts and Techniques, Jiawei Han and Micheline Kamber, 2nd Edition, Elsevier, 2006.

References:

1. SQL-PL/SQL by Ivan Bayrose
2. Data Warehousing Fundamentals By Paulraj
3. Data Mining Introductory & Advanced Topic by Margaret H. Dunham
4. Data Mining Techniques – ARUN K PUJARI, University Press.
5. Data Mining for Association Rules and Sequential Patterns: Sequential and Parallel Algorithms, Jean-Marc Adamo, ISBN: 0387950486

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Course Code: 50531   **Credits: 2**

B.Tech. – VII Semester
ADVANCED COMPUTER ARCHITECTURE LAB

1. Installation   and configuring with CUDA
2. Getting started with CUDA
   A) Write a program for printing "Hello, world" using CUDA.
   B) Write program that adds two numbers together using a kernel function:
3. Write a program that implement the following atomic operations using CUDA
   i.   Add (add), Sub (subtract), Inc (increment), Dec (decrement)
   ii.   And (bit-wise and), Or (bit-wise or) , Xor (bit-wise exclusive or)
   iii. Exch (Exchange)
4. How Heterogeneous Computing concepts are implemented CUDA? Write a program for the same.
5. Write a program for data movement in CUDA
6. Implement a parallel program using CUDA
7. Write a program for de Casteljau algorithm using CUDA
8. Write a program for implementing a Simple Thread.
9. Illustrate how the matrix multiplication is implemented With Shared Memory.
10. Illustrate how the matrix multiplication is implemented Without Shared Memory.
11. Implement Asynchronous Concurrent Execution using streams
12. Write a program for testing Race conditions using CUDA

Text Book:

1. NVIDIA CUDA – Programming Guide

2. Getting started with CUDA by Greg Ruetsch and Brant Ostar

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Course Code: 50532   **Credits: 2**

B.Tech. – VII Semester
Minor Project

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Course Code: **Credits: 3**

B.Tech. – VIII Semester

Professional Elective – V

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Course Code: **Credits: 3**

B.Tech. – VIII Semester

Professional Elective – VI

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Course Code: **Credits: 3**

B.Tech. – VIII Semester

Open Elective – III

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Course Code: 50533   **Credits: 10**

B.Tech. – VIII Semester

Major Project

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Course Code: 50534   **Credits: 2**

B.Tech. – VIII Semester
Comprehensive viva-voce

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Course Code:50H15   **Credits: 1**

B.Tech. – VIII Semester
ENTREPRENEURSHIP SKILLS

PRE-REQUISITE: Nil
Objective: The aim of this course is to inspire students to become entrepreneurs so that they will emerge as job providers rather than job seekers.

MODULE-I: **[05 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 centaury trends in entrepreneurship-Difference between entrepreneur and entrepreneurship.

MODULE-II: **[05 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: **[05 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

Outcome: By the end of this course the students should be able to 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.

PROFESSIONAL ELECTIVES

COMPUTER NETWORKS

Malla Reddy Engineering College (Autonomous)

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Course Code:50535   **Credits: 3**

B.Tech.
MOBILE ADHOC NETWORKS
(Professional Elective)

Prerequisite: NIL

Objective: To understand the Basic communication of wireless sensor networks and its applications.

Module I: Introduction   [09 Periods]
Introduction to adhoc networks – definition, characteristics features, applications. Characteristics of Wireless channel, Adhoc Mobility Models:- Indoor and outdoor models.

Module II: Medium Access Protocols   [09 Periods]
MAC Protocols: design issues, goals and classification. Contention based protocols- with reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN.

Module III: Network Protocols   [09 Periods]
Routing Protocols: Design issues, goals and classification. Proactive Vs reactive routing, Unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, Energy aware routing algorithm, Hierarchical Routing, QoS aware routing.

Module IV: End-End Delivery and Security   [09 Periods]
Transport layer : Issues in desiging- Transport layer classification, adhoc transport protocols. Security issues in adhoc networks: issues and challenges, network security attacks, secure routing protocols.

Module V: Cross Layer Design and Integration of Adhoc for 4G   [09 Periods]
Cross layer Design: Need for cross layer design, cross layer optimization, parameter optimization techniques, Cross layer cautionary prespective. Intergration of adhoc with Mobile IP networks.

Text Books:

1 .C.Siva Ram Murthy and B.S.Manoj, Ad hoc Wireless Networks Architectures and protocols,2nd edition, Pearson Education. 2007
2. Charles E. Perkins, Ad hoc Networking, Addison – Wesley, 2000

References:

1.Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, Mobile ad hoc networking, Wiley-IEEE press, 2004.
2. Mohammad Ilyas, The handbook of adhoc wireless networks, CRC press, 2002.
3. T. Camp, J. Boleng, and V. Davies "A Survey of Mobility Models for Ad Hoc

Network Research," Wireless Commun. and Mobile Comp., Special Issue on Mobile Ad Hoc Networking Research, Trends and Applications, vol. 2, no. 5, 2002, pp. 483–502.

Outcomes:

1. Will have an understanding of state of wireless and mobile ad hoc networking
2. Will be familiar with sensor networks and their design challenges

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Course Code: 50536   **Credits: 3**

B.Tech.
SENSOR NETWORKS
(Professional Elective)

Prerequisite: Basic network communication.

Objective: To understand the Basic communication of wireless sensor networks and its applications.

Module I: Basics of Sensor Networks   **[09 Periods]**
Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks, The Mica Mote, Sensing and Communication Range, Design Issues, Energy consumption, Clustering of Sensors, Applications

Module II: Architectures   **[09 Periods]**
Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes , Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

Module III: Sensor Network Communication: **[09 Periods]**
Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols and Wakeup Concepts - S-MAC, The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing, Geographic Routing.

Module IV: Sensor infrastructure and Data Retrieval
A:Infrastructure Establishment   **[04 Periods]**
Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and control.
B: Data Retrieval in Sensor Networks   **[05 Periods]**
Classification of WSNs, MAC layer, Routing layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

Module V: Platforms and Tools   **[09 Periods]**
Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

Text Books:

1. Holger Karl & Andreas Willig, "Protocols And Architectures for Wireless Sensor Networks",John Wiley, 2005.
2. Feng Zhao & Leonidas J. Guibas, "Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.
3. Raj Kamal, Mobile Computing, Oxford University Press, 2007, ISBN: 0195686772

4. Ad Hoc and Sensor Networks – Theory and Applications, Carlos Corderio Dharma P.Aggarwal, World Scientific Publications / Cambridge University Press, March 2006

5. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science imprint, Morgan Kauffman Publishers, 2005, rp2009

References:

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor networks technology, Protocols, And Applications", John Wiley, 2007.
2. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.
3. Adhoc Wireless Networks – Architectures and Protocols, C.Siva Ram Murthy, B.S.Murthy,Pearson Education, 2004
4.Wireless Sensor Networks – Principles and Practice, Fei Hu, Xiaojun Cao, AnAuerbach book, CRC Press, Taylor & Francis Group, 2010
5.Wireless Ad hoc Mobile Wireless Networks – Principles, Protocols and   Applications, Subir Kumar Sarkar, et al., Auerbach Publications, Taylor & Francis Group, 2008.

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Course Code: 50537   **Credits: 3**

B.Tech.
SOFTWARE DEFINED NETWORKS
(Professional Elective)

Module I : High Speed Networks   **[09 Periods]**

Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL. High Speed LANs: Fast Ethernet, Gigabit Ethernet, Fiber Channel – Wireless LANs: applications,requirements– Architectureof802.11.

ModuleII: Congestion and Traffic Management   **[09 Periods]**

Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks–FrameRelayCongestionControl.

Module III: TCP and ATM Congestion Control   **[09 Periods]**

TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO back off – KARN's Algorithm – Window Management – Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate Control, RM cell formats, ABR Capacity allocations – GFR traffic management.

Module IV: Integrated and Differentiated Services   **[09 Periods]**

Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services.

Module V: Protocols for Qos Support   **[09 Periods]**

RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, and Protocol details – RTP – Protocol   Architecture,   Data   Transfer   Protocol,   RTCP.

Text Book:

1.High-Speed Networks and Internets : Performance and Quality of Service (English) 2nd Edition

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Course Code: 50538   **Credits: 3**

B.Tech.
STORAGE AREA NETWORKS
(Professional Elective)

Prerequisite: Basic Network Communication.

Objective: To understand Storage Area Network characteristics and components.

Module I: Introduction
A: Basics of SAN   **[09 Periods]**
Introduction to Storage Technology Review data creation and the amount of data being created and understand the value of data to a business, challenges in data storage and data management, Solutions available for data storage, Core elements of a data center infrastructure, role of each element in supporting business activities

Module II: Architecture
A: Architecture and RAID Levels   **[09 Periods]**
Storage Systems Architecture, Hardware and software components of the host environment, Key protocols and concepts used by each component ,Physical and logical components of a connectivity environment ,Major physical components of a disk drive and their function, logical constructs of a physical disk, access characteristics, and performance Implications, Concept of RAID and its components , Different RAID levels and their suitability for different application environments: RAID 0, RAID 1, RAID 3, RAID 4,RAID 5, RAID 0+1, RAID 1+0, RAID 6, Compare and contrast integrated and modular storage systems ,High-level architecture and working of an intelligent storage system

Module III: Topologies
A: Components and Topologies   **[09 Periods]**
Introduction to Networked Storage Evolution of networked storage, Architecture, components, and topologies of FC-SAN, NAS, and IPSAN, Benefits of the different networked storage options, understand the need for long-term archiving solutions and describe how CAS fulfills the need, understand the appropriateness of the different networked storage options for different application environments.

Module IV: Transactions of Data
A: San Transactions of data   **[09 Periods]**
Information Availability & Monitoring & Managing Data center List reasons for planned/unplanned outages and the impact of downtime, Differentiate between business continuity (BC) and disaster recovery (DR) ,RTO and RPO, Identify single points of failure in a storage infrastructure and list solutions to mitigate these failures ,Architecture of backup/recovery and the different backup/recovery topologies , replication technologies and their role in ensuring information availability and business continuity, Remote replication technologies and their role in providing disaster recovery and business continuity capabilities

Identify key areas to monitor in a data center, Industry standards for data center monitoring and management, Key metrics to monitor for different components in a storage infrastructure, Key management tasks in a data center

Module V:Security
A: Realistic solution and Storage   **[09 Periods]**
Securing Storage and Storage Virtualization, Information security, Critical security attributes for information systems, Storage security domains, List and analyze the common threats in each domain, Virtualization technologies, block-level and file level virtualization technologies and processes
Case Studies:The technologies described in the course are reinforced with EMC examples of actual solutions. Realistic case studies enable the participant to design the most appropriate solution for given sets of criteria.

Text Book:

1. EMC Corporation, Information Storage and Management, Wiley.

References:

1. Robert Spalding, "Storage Networks: The Complete Reference", Tata McGraw Hill, sborne,2003.
2. Marc Farley, "Building Storage Networks", Tata McGraw Hill ,Osborne, 2001.
3. Meeta Gupta, Storage Area Network Fundamentals, Pearson Education Limited, 2002

Outcomes:
On successful completion of this course the student will be able to
1. Describe the aspects of a Storage Area Network.
2. Explain Technologies such as Fiber Channel (FC), iSCSI, Network Attatched Storage (NAS) and Fiber Channel over Ethernet (FCoE)
3. Install, Configure and Manage a Fibre Channel Storage Area Network (FC SAN)
4. Install, Configure and Manage iSCSI Storage Area Network (iSCSI)

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Course Code: 50539   **Credits: 3**

B.Tech.
Wireless security
(Professional Elective)

Prerequisite: Network security and its basics.
Objective: To understand the wireless network environment and its security issues.

Module I: Wireless network security: [08 Periods]
Wireless security, Wireless network threats, Wireless network measures, mobile device security, security threats, mobile device security strategy, IEEE 802.11 Wireless LAN overview, the Wi-Fi alliance,

Module II: Architecture and Elective Type of Course
A: Architecture   [05 Periods]
IEEE 802 protocol architecture. Security, IEEE 802.11i services, IEEE 802.11i phases of operation, discovery phase, Course Title: Information And Network Security Course Code: 14SSE251 Credits (L:T:P): 4:0:0 Core/Elective:
B:Elective Type of Course   [05 Periods]
Authentication phase, key management phase, protected data transfer phase, the IEEE 802.11i pseudorandom function.

Module III: Web Security Considerations and Cryptographic Computation
A: Web Security Considerations   [05 Periods]
Web Security Threats, Web Traffic Security Approaches. Secure Sockets Layer: SSL Architecture, SSL Record Protocol, Change Cipher Spec Protocol, Alert Protocol, handshake Protocol, Cryptographic Computations. Transport Layer Security: Version Number, Message Authentication Code, Pseudorandom Functions, Alert Codes, Cipher Suites, Client Certificate Types, Certificate Verify And Finished Messages,
B: Cryptographic Computations: [05 periods]
Padding. HTTPS Connection Initiation, Connection Closure. Secure Shell (SSH): Transport Layer Protocol, User Authentication Protocol, and Connection Protocol.

Module IV:
A: Electronic Mail Security   [7 Periods]
Pretty good privacy, notation, operational; description, S/MIME, RFC5322, Multipurpose internet mail extensions, S/MIME functionality, S/MIME messages, S/MIME certificate processing, enhanced security services,
B:Domain keys identified mail, internet mail architecture: [8 Periods]
E-Mail threats, DKIM strategy, DKIM functional flow, .IP Security: IP Security overview, applications of IPsec, benefits of IPsec, Routing applications, IPsec documents, IPsec services, transport and tunnel modes, IP Security policy, Security associations, Security associations database, Security policy database, IP traffic processing,

Module V: Encapsulating Security payload [10 Periods]

ESP format, encryption and authentication algorithms, Padding, Anti replay service, transport and tunnel modes, combining security associations, authentication plus confidentiality, basic combinations of security associations, internet key exchange, key determinations protocol, header and payload formats, cryptographic suits.

Text Book:

1. William Stallings: Cryptography and Network Security, Pearson 6th edition 2013.

References:

1. V k Pachghare: Cryptography and Information Security, 2013.

PROFESSIONAL ELECTIVES

COMPUTING ENVIRONMENT

Malla Reddy Engineering College (Autonomous)

L T P
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Course Code: 50540   **Credits: 3**

B.Tech.
DISTRIBUTED COMPUTING
(Professional Elective)

Prerequisite: Computing Environment and its basics.

Objective: To understand the Distributed computing Environment.

Module I: Basic Concepts   **[09 Periods]**
Characterization of Distributed Systems – Examples – Resource Sharing and the Web – Challenges – System Models – Architectural and Fundamental Models – Networking and Internetworking – Types of Networks – Network Principles – Internet Protocols – Case Studies.

Module II: Processes and Distributed Objects
A: IPC and its APIs   **[09 Periods]**
Inter–process Communication – The API for the Internet Protocols – External Data Representation and Marshalling – Client –Server Communication – Group Communication – Case Study – Distributed Objects and Remote Invocation – Communication Between Distributed Objects – Remote Procedure Call – Events and Notifications – Java RMI – Case Study.

Module III: Operating System Issues I   **[09 Periods]**
The OS Layer – Protection – Processes and Threads – Communication and Invocation – OS Architecture – Security – Overview – Cryptographic Algorithms – Digital Signatures – Cryptography Pragmatics – Case Studies – Distributed File Systems – File Service Architecture – Sun Network File System – The Andrew File System.

Module IV: Operating System Issues II   **[09 Periods]**
Name Services – Domain Name System – Directory and Discovery Services – Global Name Service – X.500 Directory Service – Clocks – Events and Process States – Synchronizing Physical Clocks – Logical Time And Logical Clocks – Global States – Distributed Debugging – Distributed Mutual Exclusion – Elections – Multicast Communication Related Problems.

Module V: Distributed Transaction Processing   **[09 Periods]**
Transactions – Nested Transactions – Locks – Optimistic Concurrency Control – Timestamp Ordering – Comparison – Flat and Nested Distributed Transactions – Atomic Commit Protocols – Concurrency Control in Distributed Transactions – Distributed Deadlocks – Transaction Recovery – Overview of Replication And Distributed Multimedia Systems

Text Books:

1.George Coulouris, Jean Dollimore and Tim Kindberg, "Distributed Systems Concepts and Design", 3rd Edition, Pearson Education, 2002.
2.Andrew S. Tanenbaum, Maartenvan Steen, Distibuted Systems, "Principles and Pardigms", Pearson Education, 2002.

References:

1.Sape Mullender, "Distributed Systems", 2nd Edition, Addison Wesley, 1993.
2.Albert Fleishman, Distributes Systems, "Software Design and Implementation",springer, Verlag, 1994.
3.M. L. Liu, "Distributed Computing Principles and Applications", Pearson Education, 2004.
4.Mugesh Singhal, Niranjan G Shivaratri, "Advanced Concepts in Operating Systems", Tata McGraw Hill Edition, 2001.

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L T P
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Course Code: 50541   **Credits: 3**

B.Tech.
CLOUD COMPUTING
(Professional Elective)

Prerequisite: NIL
Objectives: To Understand the Parallel computing architectures such as vector processing,symmetric multi processing.

Module I: Understanding Cloud Computing   **[09 Periods]**
Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage. – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services

Module II: Developing Cloud Services   **[09 Periods]**
Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds.

Module III: Cloud Computing Security Architecture   **[09 Periods]**
Cloud security fundamentals-Vulnerability assessment tool for cloud- Privacy and Security in cloud. Cloud computing security architecture: Architectural Considerations- General Issues-Trusted Cloud computing- Secure Execution Environments and Communications-Micro-architectures; Identity Management and Access control Identity management-Access control, Autonomic Security

Module IV: Cloud Computing For Everyone   **[09 Periods]**
Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation.

Module V: Cloud Computing Case Studies   **[09 Periods]**
Cloud computing case studies: Google App Engine – IBM Clouds –Windows live – Micro soft dynamic CRM- Salesforce.com CRM- App Exchange – Amazon S3 – Oracle OBIEE.

Text Books:

1. Cloud Computing: Implementation, Management and Security, John W.Rittinghouse, James F.Ransome, CRC Press, rp2012.
2. Cloud Computing a practical approach by Anthony T.Velte, Toby J Velte Robert Elsenpeter, TMH 2010

References:

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way you Work and Collaborate Online, Que Publishing, August 2008.
2. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited.
3. Mastering Cloud computing by Raj Kumar Buyya.

Outcomes:

Upon completion of this course, students should be able to:
1. Articulate the main concepts, key technologies, strengths, and limitations of Cloud computing and the possible applications for state-of-the-art cloud computing.
2. Identify the architecture and infrastructure of cloud computing, including SaaS, PaaS,IaaS, public cloud, private cloud, hybrid cloud, etc.
3. Explain the core issues of cloud computing such as security, privacy, and interoperability.
4. Choose the appropriate technologies, algorithms, and approaches for the related issues.
   Identify problems, and explain, analyze, and evaluate various cloud computing solutions.Attempt to generate new ideas and innovations in cloud computing. Collaboratively research and write a research paper, and present the research online.Knowledge of Governance of Cloud Computing.

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Course Code: 50542   **Credits: 3**

B.Tech.
Pervasive Computing
(Professional Elective)

Prerequisite: NIL

Objective: To understand the knowledge of various networks and its environments.

Module I: Wireless Networks- Emerging Technologies: **[9 Periods]**
Blue tooth, Wi-Fi, WiMAX, 3G ,WATM.- Mobile IP protocols -WAP push architecture-Wml scripts and applications.

Module II: Mobile Computing Environment: **[8 Periods]**
Functions-architecture-design considerations, content architecture -CC/PP exchange protocol, context manager. Data management in WAECoda files system- caching schemes- Mobility QOS. Security in mobile computing.

Module III:Handoff   **[8 Periods]**
Handoff in wireless mobile networks-reference model-handoff schemes. Location management in cellular networks - Mobility models- location and tracking management schemes- time, movement, profile and distance based update strategies. ALI technologies

Module IV:Pervasive Computing- Principles: **[10 Periods]**
Characteristics- interaction transparency, context aware, automated experience capture. Architecture for pervasive computing- Pervasive devices-embedded controls.- smart sensors and actuators -Context communication and access services

Module V: Open Protocols- Service Discovery Technologies: **[10 Periods]**
SDP, Jini, SLP, UpnP protocols–data synchronization- SyncML framework - Context aware mobile services -Context aware sensor networks, addressing and communications. Context aware security.

References:

1. Ivan Stojmenovic, Handbook of Wireless Networks and Mobile Computing, John Wiley & Sons Inc, Canada, 2002.
2. Asoke K Taukder, Roopa R Yavagal, Mobile Computing, Tata McGraw Hill Pub Co. , New Delhi, 2005.
3. Seng Loke, Context-Aware Computing Pervasive Systems, Auerbach Pub., New York,2007.
4. Uwe Hansmann etl , Pervasive Computing, Springer, New York,2001.

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L T P
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Course Code: 50543   **Credits: 3**

B.Tech.
MOBILE COMPUTING
(Professional Elective)

Prerequisite: wireless communication Environment and its basics.
Objective: To understand the Wireless communication Environment, GSM and MANNET.

Module I: Introduction
A: Introduction to Mobile Communications and Computing   **[05 Periods]**
Mobile Computing (MC): Introduction to MC, Novel applications, Limitations, and Architecture.
B: GSM   **[04 Periods]**
Mobile services, System architecture, Radio interface, Protocols, Localizationand calling, Handover, Security, and New data services.

Module II: MAC   **[09 Periods]**
Motivation for a Specialized MAC(Hidden and Exposed Terminals, Near and Far Terminals), SDMA, FDMA, TDMA, CDMA, MAC Protocols for GSM.

Module III: Mobile IP Network Layer   **[09 Periods]**
Mobile IP (Goals, assumptions, entities and terminology, IPpacket delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

Module IV: Mobile IP Transport Layer   **[09 Periods]**
Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP,Fast retransmit/fast recovery, Transmission/ time-out freezing, Selective retransmission, Transaction oriented TCP.

Module V: Data Base issues and Dissemination
A: Database Issues   **[06 Periods]**
Hoarding techniques, caching invalidation mechanisms.
B: Data Dissemination: **[09 Periods]**
Communications asymmetry, classification of new data delivery mechanisms, push based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

Text Books:

1. "Handbook of Wireless Networks and Mobile Computing", Stojmenovic and
       Cacute, Wiley, 2002,
2. "Mobile Communications", Jochen Schiller, Addison-Wesley, Second Edition,2004 .

References:

1. "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", Reza Behravanfar, Cambridge University Press, Oct2004.
2. "Mobile Computing", Raj Kamal, Oxford University Press ,2007
3. "Mobile and Wireless Design Essentials", Martyn Mallick, Wiley DreamTech

Outcomes:

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

1. Learn the different wireless communication technologies, understand the protocolsused in the layered architecture
2. Define WLAN and different WLAN transmission technologies
3. Explain different types of WLANs, learn about GSM
4. Explain different Wireless Medium Access Control Protocols, explain Mobile Network and Transport Layer Protocols
5. Explain database issues and data dissemination and synchronization methods
6. Explain different routing algorithms used in Mobile Ad hoc Networks(MANET).

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Course Code: 50544   **Credits: 3**

B.Tech.
GRID COMPUTING
(Professional Elective)

Prerequisite: Computing Environment and its basics.
Objective: To understand the need for and evolution of Grids in the context of processor- and data-intensive applications.

Module I: Grid Computing Introduction: **[09 Periods]**
Introduction, Grid Computing Anatomy – Architecture, Architecture and relationship to other Distributed Technologies, Grid computing road map.

Module II: Architecture Transitions Services: **[09 Periods]**
Merging the Grid services Architecture with the Web Services Architecture.

Module III: Open Grid Service Architecture: **[09 Periods]**
Introduction, Architecture and Goal, Sample Use cases: Commercial Data Center, National Fusion Collaboratory, Online Media and Entertainment. OGSA platform Components, Open Grid Services Infrastructure.

Module IV: Toolkit   **[09 Periods]**
Globus GT3 Toolkit: Architecture, Programming Model.

Module V: Implementation   **[09 Periods]**
A sample implementation, High Level services, OGSI.NET Middleware Solutions.

Text Books:

   1. Grid Computing, Joshy Joseph and Craig Fellenstein, Pearson education, 2004.

References:
   1. Grid Computing: Making the global infrastructure a reality, Fran Berman, Geoffrey C Fox, Anthony J G Hey, Wiley India, 2010.
   2. A Networking Approach to Grid Computing, D.Minoli, Wiley & sons, 2006.
   3. Grid Computing: A Practical Guide to Technology and Applications, A.Abbas, Firewall Media, 2008.

Outcomes:

   1. Students will understand the key concepts of Grid computing.
   2. Students will understand the Grid computing standards and its toolkits.
   3. Students will be able to understand about Grid computing history, evolution of Grid and its Security issues.
   4. Students will gain a basic knowledge of Data management and transfer in Grid environments and Resource management.

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Course Code: 50545   **Credits: 3**

B.Tech.
UTILITY COMPUTING
(Professional Elective)

Prerequisite: Nil.

Module I   [09 Periods]

Introduction: Potential of Grids as Utility Computing Environments, Challenges of Realizing Utility Computing Models

Module II   [05 Periods]

Utility Grids:Layered Grid Architecture Realization.

Module III   [09 Periods]

Utility-based Resource Allocation at Various Levels: Clusters,Distributed Storage,Computational Grid Brokering,Data Grids.

Module IV   [09 Periods]

Workflow Scheduling,Advanced Reservation,Cooperative Virtual Organizations.

Module V   [09 Periods]

Industrial Solutions for Utility Computing:HP Adaptive Enterprise,IBM E-Business On Demand,racle On Demand, Sun Microsystems Sun Grid.

Text Books:

1. Utility Computing Technologies, Standards, and Strategies,Alfredo Mendoza

Reference Books:

1. Delivering Utility Computing: Business-driven IT Optimization By Guy Bunker, Darren Thomson

PROFESSIONAL ELECTIVES

PROGRAMMING LANGUAGES

Malla Reddy Engineering College (Autonomous)

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Course Code: 50546   **Credits: 3**
B.Tech.
WEB TECHNOLOGIES
(Professional Elective)

Prerequisite: Nil.
Objective: To Giving the students the insights of the Internet programming and how to design and implement complete applications over the web.

Module I: HTML and Java Script   **[09 Periods]**
List, Tables, images, forms, Frames; Cascading Style sheets. Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script.

Module II:XML and Java Beans
A: Introduction to XML   **[04 Periods]**
Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX.
B: Java Beans   **[06 Periods]**
Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizes, Java Beans API, Introduction to EJB's.

Module III: Web Servers and Servlets   **[09 Periods]**
Tomcat web server, Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat, Introduction to Servelets: Lifecycle of a Serverlet, JSDK, The Servelet API, The javax. servelet Package, Reading Servelet 150 parameters, Reading Initialization parameters. The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues.

Module IV: Database and JSP
A: Database Access   **[05 Periods]**
Database Programming using JDBC, JDBC drivers,Studying Javax.sql.* package, Accessing a Database from a Servlet.
B: Introduction to JSP   **[05 Periods]**
The Problem with Servelet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment.

Module V: JSP Application Development   **[09 Periods]**
Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing : Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session and Application Data – Memory Usage Considerations, Accessing a Database from a JSP page, Deploying JAVA Beans in a JSP Page, Introduction to struts framework.

Text Books:
1. Web Programming, building internet applications, Chris Bates 2nd edition,WILEY Dreamtech (UNIT s 1, 2)
2. Core servlets and java server pages volume 1: core technologies By Marty Hall and Larry Brown Pearson (UNITs 3,4,5)

References:
1. Programming world wide web-Sebesta,Pearson
2. Internet and World Wide Web – How to program by Dietel and Nieto PHI/Pearson Education Asia.
3. Jakarta Struts Cookbook, Bill Siggelkow, S P D O'Reilly for chap 8.
4. Murach's beginning JAVA JDK 5, Murach, SPD
5. An Introduction to web Design and Programming –Wang-Thomson
6. Web Applications Technologies Concepts-Knuckles,John Wiley
7. Programming world wide web-Sebesta,Pearson
8. Web Warrior Guide to Web Programmming-Bai/Ekedaw-Thomas
9. Beginning Web Programming-Jon Duckett WROX.
10. Java Server Pages, Pekowsky, Pearson.

Outcomes:
Upon completion of this course, students should be able to:
1. Analyze a web page and identify its elements and attributes.
2. Create web pages using XHTML and Cascading Styles sheets.
3. Build dynamic web pages using JavaScript (client side programming). .
4. Create XML documents.
5. Create XML Schema.
6. Build and consume web services

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Course Code: 50547   **Credits: 3**

B.Tech.
Assembly Language
(Professional Elective)

Prerequisite: Nil.
Objective: To understand the assembly language and its code with basic information.

Module I: : Introduction to Systems Programming: **[8 Periods]**
Introduction to Assembly Language Programming - Introduction to Instruction Formats, Data formats - Role of Base Register, Index Register.

Module II: **[10 Periods]**
A: Introduction to Assembler Databases used in assembler design, Design of Assembler - Single Pass & Double Pass.

Module III: Introduction to Macros: **[11 Periods]**
Various types of Macros, Design of Macro Processor - Single Pass & Double Pass.

Module IV: Introduction to Loaders: **[11 Periods]**
 Types of Loaders, databases used in Loaders, Design of Loaders - Absolute & DLL.

MODULE V: : Introduction to Software Tools: **[6 Periods]**
 Text editors, Interpreters, Program Generators, Debug Monitors.6 Periods

Text Book:

   1. Systems Programming, Donovan, Tata Mc Graw Hill

Reference:

   1. System Programming, Dhamdhere (IInd Revised Edition), Tata Mc Graw Hill

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Course Code: 50548 **Credits: 3**

B.Tech.
LISP AND PROLOG
(Professional Elective)

Prerequisite: Any programming language.

Course Objectives: To become familiar with many of the common procedural languages as well as representative functional, logic oriented and object-oriented languages. To understand components and features of programming languages necessary for program development and maintenance across various applications. '

Module I: [8 Periods]
A:Preliminaries-Introduction; Paradigms; Criteria;Hardware, firmware, translators, virtual machines,Evolution of the major programming languages.
B:Describing syntax and semantics-Syntax and translation stages,Compiler Overview,Unix and C++ review, Makefiles,Pascal Overview

Module II: [8 Periods]
A: Lexical analysis-Lexical,Formal translation models,Formal Languages,Lex Analysis,Lex.
B: Syntactic analysis-More Formal Languages,Context-Free Grammars and bottom up parsing, yacc/bison,Compiler parsing continued

Module III: [8 Periods]
A: Names and binding-Binding,Scope, lifetime, environments,Scoping,Symbol Table Management , Primitive data types-Primitive data types,Structured data types,Arrays-Structured data types: arrays,Other types and type checking,Structures: records,Type Definitions.
B: Arithmetic expressions,Boolean expressions, assignments, mixed mode,FORTRAN, "formula translation" -FORTRAN Overview.Compiler arithmetic expression handling,Compiler array handling.

Module VI: [8 Periods]
A: Statement control: selection,control abstractions,Statement control: iteration, branching,Compiler statement flow control,Subprograms and parameter passing,Procedural abstractions,Subprogram issues-Parameter passing methods,Block structures: Algol and Pascal ;
B:Implementing subprograms-Inheritance,Java issues, Implementing nested subprograms, blocks .

Module V: [8 Periods]
A: Storage Management, Encapsulation,Implementation,Compiler subprogram handling. Abstract data types and encapsulation,Object oriented programming,Object oriented classes and polymorphism,Smalltalk as a pure OO language,Other OO language and constructs,Exception handling,

B: LISP/Scheme -Scheme forms and operators,In class exploration,LISP/Scheme wrap up

C: PROLOG, More PROLOG, Logic Programming, Concurrency overview, Parallel processing:,ynchronization of cooperating processes,Compiler Optimization.

Text Books:
1. Concepts of Programming Languages, 11th ed., Sebesta, ISBN 0-13-394302-X

References:
1. Building Your Own Compiler With C++, Holmes, ISBN 0-13-182106-7.
2. Lex & yacc, Levine/Mason/Brown, O'Reilly & Associates

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Course Code: 50549   **Credits: 3**

B.Tech.

Game Programming

(Professional Elective)

Prerequisite: Nil.

Objective: To understand the Gaming and its environment for creating real-time applications.

Module I: 3d Graphics For Game Programming: **[10 Periods]**
Coordinate Systems, Ray Tracing, Modeling in Game Production, Vertex Processing, Rasterization, Fragment Processing and Output Merging, Illumination and Shaders, Parametric Curves and Surfaces, Shader Models,

B: Mage Texturing, Bump Mapping, Advanced Texturing, Character Animation, Physics-based Simulation.

Module II: GameDesignPrinciples: **[09 Periods]**
Character development, Story Telling, Narration, Game Balancing, Core mechanics,
Principles of level design, Genres of Games, Collision Detection, Game Logic, Game AI,
Path Finding.

Module III: Gaming Engine Design: **[09 Periods]**
Renderers, Software Rendering, Hardware Rendering, and Controller based animation, Spatial Sorting, Level of detail, collision detection, standard objects, and physics.

Module IV: Gaming Platforms And Frameworks: **[09 Periods]**
Flash, DirectX, OpenGL, Java, Python, XNA with Visual Studio, Mobile Gaming for the Android, iOS, Game engines - Adventure Game Studio, DXStudio,Unity.

Module V: Game Development: **[9 Periods]**
Developing 2D and 3D interactive games using OpenGL, DirectX – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi Player games.

Text Books:

1. David H. Eberly, "3D Game Engine Design, Second Edition: A Practical Approach to Real-Time Computer Graphics" Morgan Kaufmann, 2 Edition, 2006.
2. JungHyun Han, "3D Graphics for Game Programming", Chapman and Hall/CRC, 1st edition, 2011.
3. Mike McShaffrfy, "Game Coding Complete", Third Edition, Charles River Media, 2009.
4. Jonathan S. Harbour, "Beginning Game Programming", Course Technology PTR, 3 edition, 2009.

References:

1. Ernest Adams and Andrew Rollings, "Fundamentals of Game Design", Prentice Hall 1st edition, 2006.

2. Roger E. Pedersen, "Game Design Foundations", Edition 2, Jones & Bartlett Learning, 2009 3. Scott Rogers, "Level Up!: The Guide to Great Video Game Design", Wiley, 1st edition, 2010. 4. Jason Gregory, "Game Engine Architecture", A K Peters, 2009.

5. Jeannie Novak, "Game Development Essentials", 3rd Edition, Delmar Cengage Learning, 2011.

6. Andy Harris, "Beginning Flash Game Programming For Dummies", For Dummies; Updated edition, 2005.

7. John Hattan, "Beginning Game Programming: A GameDev.net Collection", Course Technology PTR, 1 edition, 2009.

8. Eric Lengyel, "Mathematics for 3D Game Programming and Computer Graphics", Third Edition, Course Technology PTR, 3rd edition, 2011.

9. Dino Dini, "Essential 3D Game Programming", Morgan Kaufmann, 1st edition 2012.

10. Jim Thompson, Barnaby Berbank-Green, and Nic Cusworth, "Game Design: Principles, Practice, and Techniques - The Ultimate Guide for the Aspiring Game Designer", 1st edition, Wiley, 2007.

PROFESSIONAL ELECTIVES

CORE DATABASES

Malla Reddy Engineering College (Autonomous)

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Course Code: 50550   **Credits: 3 B.Tech.**
ADVANCED DATA BASES
(Professional Elective)

Prerequisite: Database Concepts.
Objective: To understand the distributed database management and real-time application management.

Module I: Introduction of DBMS: **[04 Periods]**
Distributed Data Processing, Distributed Database System, Promises of DDBSs, Problem areas.

B: Overview of Relational DBMS   **[05 Periods]**
Relational Database Concepts, Normalization, Integrity rules, Relational data languages.

Module II: Distributed DBMS Architecture: **[09 Periods]**
Architectural Models for Distributed DBMS, DDBMS Architecture. Distributed Database Design: Alternative Design Strategies, Distributed Database, Design issues, Fragmentation, Allocation.

Module III: Query Processing and Decomposition   **[09 Periods]**
Query Processing objectives, Characterization of query processors, layers of query processing, query decomposition, Localization of distributed data.

Module IV: Query Optimization: **[09 Periods]**
Query optimization, centralized query optimization, Distributed query optimization algorithms.

Module V: Transaction Management and Concurrency Control
A: Transaction Management   **[04 Periods]**
Definition, properties of transaction, types of transactions.

B: Distributed Concurrency Control   **[05 Periods]**
Serializability, concurrency control Mechanisms & Algorithms, Time stamped & Optimistic concurrency control Algorithms, Deadlock Management.

Text Books:
1. M.Tamer OZSU and Patuck Valduriez: Principles of Distributed Database Systems, Pearson Edn. Asia, 2001.
2. Stefano Ceri and Willipse Pelagatti: Distributed Databases, McGraw Hill.

References:
1. Henry F Korth, A Silberchatz and Sudershan : Database System Concepts, MGH.
2. Raghuramakrishnan and Johhanes Gehrke: Database Management Systems, MGH.

Outcomes:

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

1. Understand the role of a distributed database management system in an Enterprise/organization.
2. Design queries of a distributed database management system
3. Apply the principles of query optimization techniques to a database schema.
4. Understand the concept of a database transaction including concurrency control, backup and recovery, and data object locking and protocols.
5. Explain the various types of locking mechanisms used in within database management systems.
6. Explain the different types of database failures and the methods used to recover from different failures

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Course Code:50551   Credits: 3 B.Tech.

DATABASE SECURITY
(Professional Elective)

Prerequisite: Database and security issues.
Objectives: To learn the secure practices for schema design and to learn the appropriate settings of database parameters with the best practices for secure database coding.

Module I: Introduction and Security Models -1
A: Introduction   **[04 Periods]** Introduction to Databases Security Problems in Databases Security Controls Conclusions
B: Security Models -1   **[05 Periods]**
Introduction Access Matrix Model Take-Grant Model Acten Model PN Model Hartson and Hsiao's Model Fernandez's Model Bussolati and Martella's Model for Distributed databases.

Module II: Security Module 2 and Security Mechanisms
A: Security Models -2   **[04 Periods]**
Bell and LaPadula's Model Biba's Model Dion's Model Sea View Model Jajodia and Sandhu's Model The Lattice Model for the Flow Control conclusion.
B: Security Mechanisms   **[05 Periods]**
Introduction User Identification/Authentication Memory Protection Resource Protection Control Flow Mechanisms Isolation Security Functionalities in Some Operating Systems Trusted computer System Evaluation Criteria.

Module III: Security Software Design   [09 Periods]
Introduction A Methodological Approach to Security Software Design Secure Operating System Design Secure DBMS Design Security Packages Database Security Design.

Module IV: Statistical Database Protection &Intrusion Detection Systems[09 Periods]
Introduction Statistics Concepts and Definitions Types of Attacks Inference Controls evaluation Criteria for Control Comparison .Introduction IDES System RETISS System ASES System Discovery.

Module V: Model for the Protection
A: Models For The Protection Of New Generation Database Systems -1 [05 Periods]
Introduction A Model for the Protection of Frame Based Systems A Model for the Protection of Object-Oriented Systems SORION Model for the Protection of Object-Oriented Databases.

B: Models For The Protection Of New Generation Database Systems -2   [04Periods]

A Model for the Protection of New Generation Database Systems: the Orion Model Jajodia and Kogan's Model A Model for the Protection of Active Databases Conclusions.

Text Books:

1. Database Security and Auditing, Hassan A. Afyouni, India Edition, CENGAGE Learning,2009.
2. Database Security, Castano, Second edition, Pearson Education.

References:

1. Database security by Alfred bastes, Melissa zgola, CENGAGE learning.

Outcomes:

1. Identify security threats in database systems
2. Understand the concepts and security mechanisms in the protection of data
3. Design and implement secure database system
4. Present a disaster recovery plan for recovery of database assets after an incident.
5. To understand methods for database intrusion detection

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Course Code:50552   **Credits: 3**

B.Tech.
INFORMATION RETRIEVAL SYSTEMS
(Professional Elective)

Prerequisite: Database concepts and data accessing techniques.
Objectives: To study fundamentals of DBMS, Data warehouse and Digital libraries.

Module I: Introduction   [09 Periods]
Definition, Objectives, Functional Overview, Relationship to DBMS,Digital libraries and Data Warehouses. Information Retrieval System Capabilities, Search, Browse, Miscellaneous.

Module II: Cataloging and Indexing   [09 Periods]
Objectives, Indexing Process, Automatic Indexing,Information Extraction. Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure. Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages.

Module III: Document and Term Clustering   [09 Periods]
Introduction, Thesaurus generation, Item clustering,Hierarchy of clusters. User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, weighted searches of Boolean systems, Searching the Internet and hypertext.

Module IV: Information Visualization   [09 Periods]
Introduction, Cognition and perception, Informationvisualization technologies. Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems. Information System Evaluation: Introduction, Measures used in system evaluation, Measurement example – TREC results.

Module V: Multimedia Information Retrieval   [09 Periods]
Multimedia Information Retrieval, Models and Languages, Data Modeling, Query Languages, Indexing and Searching. Libraries and Bibliographical systems, online IR system, OPACs, Digital Libraries.

Text Books:

1. Information Storage and Retrieval systems Theory and Implementation Second Edition
2. Modern Information Retrival By Ricardo Baeza-Yates, Pearson Education,2007.

References:

1. Information Retrieval: Algorithms and Heuristics By David A Grossman and Ophir Frider, 2nd Edition, Springer.
2. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
3. Modern Information Retrival By Yates Pearson Education.
4. Information Storage & Retieval By Robert Korfhage – John Wiley & Sons
5. Natural Language Processing and Information Retrieval, T.Siddiqui and U.S.Tiwary.

Outcomes:

Upon completion of the course, the students are expected to:
1. Recognize the Boolean Model, Vector Space Model, and Probabilistic Model.
2. Understand retrieval utilities.
3. Understand different formatting tags
4. Understand cross-language information retrieval
5. Understand the clustering techniques
6. Determine the efficiency.

Malla Reddy Engineering College (Autonomous)

L T P
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Course Code:50553   **Credits: 3**

B.Tech.
BIG DATA
(Professional Elective)

Prerequisite: Mathematics and Analytics.

Objective: To understand the Big data refers to a collection of large and complex data sets those are difficult to process using traditional data processing applications.

Module I:Introduction   **[09 Periods]**

Small and big data, statistics and machine learning, statistical data mining; Providing structure to unstructured data – machine translation, auto coding, indexing, term extraction; Identification, de identification and re identification; ontologies and semantics; introspection;

Module II: Data Integration   **[09 Periods]**

Data integration and software interoperability; immutability and immortality; measurement; big data and healthcare. Big data techniques – data range, denominator, frequency distributions, mean and standard deviation, estimation-only analysis; big data analysis – clustering, classifying, recommending and modeling, data reduction, normalizing and adjusting data; special considerations – theory in search of data, data in search of a theory.

Module III: Data Analysis   **[09 Periods]**

Over fitting, bigness bias, too much data, fixing data; stepwise approach to big data analysis – formulate a question, resource evaluation, reformulate a question, query output adequacy, data description and reduction, algorithm selection, results review; failure, legalities and societal issues.

Module IV: Data Stream   **[09 Periods]**

Variable assessment - correlation coefficient, scatter plots; paired-variable assessment – CHAID based data mining; summarizing ranked data – scales of measurement, steam and leaf display, Box and Whiskers plot; many-variable assessment – principle component analysis; logistic regression; ordinary regression; regression coefficient; predictive contribution coefficient

Module V: Data Modeling   **[09 Periods]**

R language – data modeling in R, importing data into R, Hadoop – different Hadoop modes, Hadoop Distributed File System (HDFS) – fundamentals and architecture, Map Reduce – fundamentals and architecture, Hadoop security, Hadoop programming in Java, Integrating R and Hadoop – RHIPE, RHadoop, data analytics with R and Hadoop, importing and exporting data from various databases, Hive, RBase, Apache Pig- large data analysis platform, automating data processing with Oozie.

Text Books:

1. Jules J Berman, Principles of Big Data: Preparing, Sharing, and Analyzing Complex Information, Morgan Kaufman-Elsevier, 2013.
2. Bruce Ratner , Statistical and Machine-Learning Data Mining: Techniques for Better Predictive Modeling and Analysis of Big Data, 2nd Edition, CRC Press, 2011.

References:

1. Michael Milton, Head First Data Analysis: A learner's guide to big numbers, statistics, and good decisions, O'Reilly Media Inc., 2009.
2. Big Data Now: 2012 Edition, O'reilly Media Inc., 2012.
3. Vignesh Prajapati , Big Data Analytics with R and Hadoop, Packt Publishing, 2013.

Outcomes:

Upon completion of this course, student shall be able to:
1. Understand the concepts of big data
2. The student able to know the machine learning techniques
3. The student can formulate the solutions on big data for queries
4. Apply data mining concepts on big data
5. The student to know the concepts like Hadoop security and data modeling on R

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Course Code:50554   **Credits: 3**
B.Tech.
Mobile Databases
(Professional Elective)

Prerequisites: DBMS.

Objective: The course introduces the different knowledge discovery issues in Mobile data in World Wide Web to analyze the different algorithms commonly used by Mobile application.

Module-I: Mobile Database System.   **[09 Periods]**
Types of Mobility. Wireless Network Communication- Introduction, Continuous Connectivity. Location and Handoff Management- Introduction

Module-II:Fundamentals of Database Technology   **[09 Periods]**
Conventional Database Architecture, Database Processing, Serialization of Transactions, Advanced Transaction Models.

Module-III:Concurrency Control Mechanisms   **[04 Periods]**
Introduction, Data Processing and Mobility-Introduction, Effect of Mobility on the management of Data.
B: Transaction Management in Mobile Database Systems   **[03 Periods]**
Mobile Database System, Transaction Execution in MDS,

Module-IV:Mobile Transaction Model   **[09 Periods]**
Execution Model Based on ACID Transaction Framework,Pre-write Transaction Execution Model, Mobile Transaction Model, Data Consistency in Intermittent Connectivity,consistency Model, Weak Connectivity Operation, A Consistency Restoration Schema, Concurrency Control Mechanism,Transaction Commit,Commitment of Mobile Transactions, Transaction Commitment in Mobile Database Systems.

Module-V:Mobile Database Recovery and Wireless Information Broadcast
A: Mobile Database Recovery   **[04 Periods]**
Introduction, Log Management in Mobile Database Systems, Mobile Database Recovery Schemes.
B: Wireless Information Broadcast   **[05 Periods]**
Introduction, Broadcast Disk, Broadcast Infrastructure, Exponential Index, Location-Based Indexing, On-Demand Data Scheduling, Data Dissemination System.

References:

1. Vijay Kumar,"Mobile Database Systems",Wiley ,2006.
Outcomes:
1. The student will learn various models in mobile databases.
2. The knowledge is useful to make data retrieval for the mobile database.

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Course Code:50555   **Credits: 3**
B.Tech.
WEB MINING
(Professional Elective)

Prerequisites: DataMining.

Objective: The course introduces the different knowledge discovery issues in data mining from the World Wide Web to analyze the different algorithms commonly used by Web application. To apply the role played by Web mining in Information retrieval and extraction, structures and grouping.

Module I: Introduction   **[09 Periods]**
Overview of Data mining – Data mining from a Business Perspective – Data types, Input and output of data mining algorithms- Decision Tree- Classification and Regression Trees – Preprocessing and Post processing in Data mining.

Module II: Information Retrieval   **[09Periods]**Information
Retrieval and Text Mining - Keyword Search - Nearest-Neighbor Methods – Measuring
Similarity - Web-Based Document Search - Document–Matching - Inverted Lists -
Evaluation of Performance - Structure in a Document Collection - Clustering Documents by
Similarity- Evaluation of Performance - Information Extraction - Patterns and Entities from
Text- Co reference and Relationship Extraction - Template Filling and Database Construction

Module III: Web Search   **[09 Periods]**
Crawling the web – HTML and HTTP Basics – Crawling Basics – Engineering Large Scale ,Crawlers- Putting together a Crawler- Boolean Queries and the Inverted Index – Relevance Ranking – Similarity Search.

Module IV: Learning   **[09 Periods]**
Similarity and Clustering – Formulations and approaches- Bottom up and Top down Partitioning Paradigms – Clustering and Visualization via Embeddings – Probabilistic Approaches to clustering – Collaborative Filtering – Supervised Learning – Semi Supervised Learning.

Module V: Applications   **[09 Periods]**
Social Network Analysis- Social Sciences and Bibliometry – Page Rank and HITS – Short comings of coarse Grained Graph model- Enhanced Models and Techniques- Evaluation of Topic Distillation- Measuring and Modeling the Web – Resource Discovery – Collecting Important Pages Preferentially – Similarity Search Using Link Topology – Topical Locality and Focused Crawling – Discovering Communities- The Future of Web Mining.

References :
1. Sholom Weiss, "Text Mining: Predictive Methods for Analyzing Unstructured Information", Springer, 2005

2. Hercules Antonio do Prado, Edilson Fernada, " Emerging Technologies of Text Mining: Techniques and Applications", Information Science Reference (IGI), 2008
3. Min Song, Yi-fang Brrok Wu, "Handbook of Research on Text and Web Mining Technologies", Vol I & II, Information Science Reference (IGI),2009
4. Soumen Chakrabarti " Mining the Web : Discovery Knowledge from Hypertext Data" Elsevier Science 2003
5. K.P.Soman,Shyam Diwakar, V.Ajay " Insight into Data Mining Theory and Practice " Prentice Hall of India Private Ltd 2006
6. Anthony Scime, "Web Mining Applications and Techniques", Idea Group Publishing, 2005
7. Margret H.Dunham "DATA MINING - Introductory and Advanced Concepts", Pearson Education,2003.

Outcomes:

At the end of the course the student should be able to:
1. Identify the application areas for web content mining, web structure mining and web usage mining.
2. Design to retrieval the web data
3. Develop schemes to crawl the web data, organize and index
4. Cluster the documents for fast access
5. Develop algorithms used by web mining applications.
6. Select between different approaches and techniques of web mining

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Course Code: 50556   **Credits: 3**
B.Tech.
TEXTMINING
(Professional Elective)

Prerequisites: Basic Engineering Mathematics.

Objectives: This course teaches how to build text mining application to manage vast amountsof text and turn into useful data. Different tools to manage high volume information, organize, analyze and monitor. How the search engine work and how they present information.

Module I: Introduction
A: Introduction   **[05 Periods]**
Origin of Text Mining - Understanding Text – Applications – Information Visualization - Architecture for Text Mining Applications.
B: Mathematics Background   **[05 Periods]**
Probability-Bayes's Rule-Probability Distribution-Sampling Distribution-Hypothesis Testing-Matrices.

Module II: Exploring Text   **[05 Periods]**
Words-Sentences-Indexing Document Text

Module III: Markov Models and Postagging   **[08 Periods]**
Hidden Markov Models - POS Taggers - Word Sense disambiguation.
Exercises: creation of text statistics, entity extraction, POS tags for words (using Text Mine).

Module IV: Information Extraction
A: Information Extraction   **[04 Periods]**
IE Application - Entity Extraction - IE Systems - Phrase Extraction.
B: Search Engines   **[07 Periods]**
Early Search Engines-Indexing text for Search-Indexing Multimedia-Queries-Searching an index-Viewing search results.
Exercises: index scripts search and create an index for local files (using Text Mine).

Module V: Searching the Web
A: Searching the Web   **[11 Periods]**
Web Structure-Search Engine Coverage-A distributed Search-Crawlers-Visualization Summarization: Training a summarizer- Sentence Selection-Information Monitor.
Exercises: Implementation of crawler in text mine – News collection using RSS

Text Book

1. Manu Konchady "Text Mining Application Programming", Cengage Learing,Fourth Indian Reprint, 2009.

Reference Books:

1. Thomas W. Miller,Prentice Hall, "Data and Text Mining-A Business Applications Approach", Second impression, 2011.

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Course Code: 50557   **Credits: 3**
B.Tech.
MULTIMEDIA DATA BASES
(Professional Elective)

Prerequisites: The knowledge of theory of relational DBMS and SQL language.

Objectives : The main course objective is the knowledge of the fundamentals of creation, management, access and optimization of multimedia databases and of other types of collection of multimedia data, such as, images, video and audio. It is mandatory to understand the differences between the management of textual data and multimedia data; besides, it is important to focus the resolved problems and the open challenges of the algorithms available today.

Module I: **[8 Periods]**
Introduction: An introduction to Object-oriented Databases; Multidimensional Data Structures: k-d Trees, Point Quad trees, The MX-Quad tree, R-Trees, comparison of Different Data Structures.

Module II: **[8 Periods]**
A: Image Databases : Raw Images, Compressed Image Representations, Image Processing: Segmentation, Similarity-Based Retrieval, Alternative Image DB Paradigms, Representing Image DBs with Relations, Representing Image DBs with R-Trees, Retrieving Images By Spatial Layout, Implementations
B: Text/Document Databases: Precision and Recall, Stop Lists, Word Stems, and Frequency Tables, Latent Semantic Indexing, TV-Trees, Other Retrieval Techniques

Module III: **[8 Periods]**
A: Video Databases : Organizing Content of a Single Video, Querying Content of Video Libraries, Video Segmentation, video Standards
B: Audio Databases : A General Model of Audio Data, Capturing Audio Content through Discrete Transformation, Indexing Audio Data

Module IV: **[8 Periods]**
A: Multimedia Databases : Design and Architecture of a Multimedia Database, Organizing Multimedia Data Based on The Principle of Uniformity, Media Abstractions, Query Languages for Retrieving Multimedia Data, Indexing SMDSs with Enhanced Inverted Indices, Query Relaxation/Expansion
B: Creation of Distributed Multimedia Presentations : Objects in Multimedia Presentations, Specifying Multimedia Documents with Temporal Constraints, Efficient Solution of Temporal Presentation Constraints, Spatial Constraints.

Module V: **[8 Periods]**
A: Spatial Concepts and Data Models: Models of spatial information, Design extending the ER model with spatial concepts, Extending the ER model pictograms, Object oriented data model with UML.

B: Spatial Query Languages: Extending the SQL for spatial data, Examples of queries that emphasis spatial data, Object relational schema examples querries.

TEXT BOOKS:

1. Principles of Multimedia Database Systems, V.S. Subrahmanian, Elseveir(Morgan Kauffman).
2. Spatial Databases, Shashi Shekhar, Sanjiv Chawla, Pearson Education.

REFERENCE BOOKS:

1. Multimedia Databases: An object relational approach, Lynne Dunckley, Pearson Education.
2. Multimedia Database Systems, Prabhakaram, Springer.

PROFESSIONAL ELECTIVES

SOFTWARE ENGINEERING

Malla Reddy Engineering College (Autonomous)

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Course Code: 50558   **Credits: 3 B.Tech.**

SOFTWARE TESTING METHODOLOGIES
(Professional Elective)

Prerequisite: Software Engineering and Testing basics.

Objective: To understand the types of Bugs, Testing levels and Flow graph and Path testing, application of path testing

Module I: Introduction   [09 Periods]

Purpose of testing-Dichotomies-Software Testing Principles- Bugs,consequences of bugs, Taxonomy of bugs -The Tester's Role in a Software Development Organization-Black box testing and white box testing- Defects -Cost of defects- Defect Classes- Defect Examples, software testing life cycle.

Module II: Flow Graph and Path Testing
A: Flow graphs and Path Testing: [04 Periods]

Basics concepts of path testing-predicates-pathpredicates and achievable paths- path sensitizing- path instrumentation, application of path testing.

B: Transaction Flow Testing   [02 Periods]

Transaction flows- transaction flow testing techniques-

C: Dataflow testing   [04 Periods]

Basics of dataflow testing - strategies in data flow testing–application of data flow testing.

Module III: Design strategies
A: Test Case Design Strategies   [05 Periods]

Using Black Box Approach to Test Case Design -Random Testing – Requirements based testing – Boundary Value Analysis – Equivalence Class Partitioning– Compatibility testing – User documentation testing – Domain testing.

B: Alpha, Beta Tests   [04 Periods]

Usability and Accessibility testing – Configuration testing - Compatibility testing – Testing the documentation.

Module IV: Path Product and Regular Expression
A: Paths, Path products and Regular Expressions   [03 Periods]

Path products & path expression-reduction procedure- applications- regular expressions & flow anomaly detection.

B: Logic Based Testing   [03 Periods]

Overview decision tables-path expressions, k-v charts- State- State Graphs and Transition testing: State graphs- good & bad stategraphs-statetesting.

C: State, state graphs and transition testing   [03 Periods]

state graphs, good and bad state graphs,state testing, testability tips

Module V:Graph Metrics and People Organizational Issues
A: Graph Matrices and Applications   [04 Periods]

Motivational over view, matrix of graph, relations,power of matrix, node reduction algorithm.

B: People and Organizational Issues in Testing   **[05 Periods]**

Organization structures for testingteams – testing services - Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management – test process- bug detection life cycle.

Text Books:

1. "Software Testing – Principles and Practices", Srinivasan Desikan and Gopalaswamy Ramesh, Pearson education, 2006.
2. "Software Testing Techniques", Boris Beizer, 2nd Edition, Van Nostrand Reinhold, New York, 1990

References:

1. "Software Testing", Ron Patton, Second Edition, Sams Publishing, Pearson education, 2007
2. "Software Testing – Effective Methods, Tools and Techniques", Renu Rajani, Pradeep Oak, Tata McGraw Hill, 2004.
3. "Software Testing in the Real World – Improving the Process", Edward Kit, Pearson Education, 1995.
4. "Foundations of Software Testing – Fundamental algorithms and techniques", Aditya P. Mathur, Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008

Outcomes:

1. Apply fundamental knowledge of Testing in Real time scenarios.
2. Test a simple application.
3. Understand and Applying the Techniques in Software Development Life cycle

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Course Code: 50559   **Credits: 3**

B.Tech.

SOFTWARE PROCESS MANAGEMENT
(Professional Elective)

Prerequisite: Software Engineering.

Objective: A basic knowledge of software process management principles and the ability to come up with a project schedule and assign resources.

Module I:Software Process Modeling and Prescriptive Process   Models: [05 Periods]
Introduction, Software Process Modeling, and Improvement, Process, Modeling, Goal and Benefits.
Introduction Prescriptive Process Model Classes, Process Standards Process Representations in Organizations Deploying Prescriptive Process Models

Module II: Descriptive Process Models   [05 Periods]
Descriptive Process Models, Goals of Descriptive Process Modeling, Creating a Descriptive, Process Model Descriptive Process Modeling Alternatives, Managing Risk in Descriptive, Process Modeling Efforts

Module III:Process Modeling Notations and Tool   [05 Periods]
 Process Modeling Notations and Tool,Criteria for Assessing Process Modeling Notations, Multi view Process Modeling Language, Software Engineering Meta model, Tools for Software Process Modeling

Module IV:Process Improvement Model   [05 Periods]
Process Improvement Model, Based Improvement Approaches, Continuous Improvement Approaches Process Improvement and Measurement: The GQM Approach, Aligning, Improvement Goals and Strategies with Business

Module V:Software Process Simulation   [05 Periods]
Software Process Simulation, Software Process Simulation, A Method for Developing Simulation Models Plug &play Process Models Combining Process Simulation and Empirical Studies

TEXT BOOKS:
   1. SOFTWARE PROCESS DEFINITION AND MANAGEMENT, BY JÜRGEN MÜNCH, OVE ARMBRUST, MARTIN KOWALCZYK, MARTÍN SOTO

REFERENCE BOOKS:
   1. MANAGING THE SOFTWARE PROCESS BY WATTS S.HUMPHREY,PEARSON EDUCATION,LPE

Outcomes:

Upon completion of the course, the students are expected to:

1. Identify and describe how different process models and contexts will impact upon all aspects of a modeling notations and tools.

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Course Code: 50560   **Credits: 3**   **B.Tech.**

SOFTWARE PROJECT MANAGEMENT
(Professional Elective)

Prerequisite: Software Engineering.

Objective: A basic knowledge of software project management principles and the ability to come up with a project schedule and assign resources.

Module I:Software Management

A: Conventional Software Management   **[04 Periods]**

The waterfall model, conventional softwareManagement performance. Overview of Project Planning – Stepwise Project Planning.

B: Improving Software Economics   **[05 Periods]**

Reducing Software product size, improvingsoftware processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

Module II: SPM Phases

A: The old way and the new way   **[03 Periods]**

The principles of conventional software Engineering,principles of modern software management, transitioning to an iterative process.

B: Life cycle phases   **[03 Periods]**

Engineering and production stages, Inception, Elaboration,Construction, Transition phases.

C: Artifacts of the process   **[03 Periods]**

The artifact sets, Management artifacts, Engineeringartifacts, programmatic artifacts.

Module III: Process

A: Work Flows of the process   **[03 Periods]**

Software process workflows, Iteration workflows.

B: Checkpoints of the process   **[03 Periods]**

Major mile stones, Minor Milestones, Periodic statusassessments.

C: Iterative Process Planning   **[03 Periods]**

Work breakdown structures, planning guidelines, costand schedule estimating, Iteration planning process, Pragmatic planning.

Module IV: Automation

A: Process Automation   **[02 Periods]**

Automation Building blocks.

B: Project Control and Process instrumentation   **[05 Periods]**

The seven core Metrics,Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

C: Tailoring the Process   **[02 Periods]**

Process discriminants.

Module V: Responsibilities and Case Study
A: Project Organizations and Responsibilities   **[04 Periods]**
Line-of-Business Organizations, Understanding Behavior – Organizational Behavior.
B: Future Software Project Management   **[03 Periods]**
Modern Project Profiles, Next generationSoftware economics, modern process transitions.
C: Case Study   **[02 Periods]**
The command Center Processing and Display system-Replacement(CCPDS-R)

Text Books:
> 1. Software Project Management, Walker Royce: Pearson Education, 2005

References:
1. Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw- Hill Edition.
2. Software Project Management, Joel Henry, Pearson Education.
3. Software Project Management in practice, Panka

Outcomes:
Upon completion of the course, the students are expected to:
1. Identify and describe how different project contexts will impact upon all aspects of a software development project
2. identify and describe the key phases of project management and the key skills associated with each
3. Determine an appropriate project management approach through an evaluation of the business context and project scope and knowledge of agile and traditional project management approaches.
4. Demonstrate through application, knowledge of the key project management skills, such as product and work break-down structure, schedule; governance including progress reporting, risk and quality management as part of a small team research and produce a concise piece of writing suitable for presentation to senior management.

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Course Code: 50561   **Credits: 3**

B.Tech.

SOFTWARE METRICS
(Professional Elective)

Prerequisite: Software Engineering.

Objective: Understand why measurement is important, basic metrics approaches used in industry and Knowhow and how to extract and apply relevant metrics

Module I: **Fundamentals of measurement and experimentation [8 Periods]**
A:Measurement- Measurement in everyday life, Measurement in software engineering, The scope of software metrics.
B:Basics of measurement-representational theory of measurement, Measurement and models, Measurement scales and scale types, Meaning filialness in measurement

Module II: **[8 Periods]**
A:Goal-Based Framework for Software Measurement-Classifying software measures, Determining what to measure ,Applying the framework, Software measurement validation, Software measurement validation in practice.
B:Empirical investigation-Four principles of investigation, Planning formal experiments, Planning case studies.

Module III: **[8 Periods]**
A:Software-metrics data collection-What is good data, How to define the data, How to collect data, When to collect data, How to store and extract data.
B:Analyzing software-measurement data-Introduction, Analyzing the results of experiments, Examples of simple analysis techniques.

Module IV: **[8 Periods]**
A: Software-Engineering Measurement -Measuring internal product attributes-Aspects of software size, Length ,Reuse, Functionality, Complexity.
B:Structure-Types of structural measures, Control-flow structure, Modularity and information flow attributes, Object-oriented metrics, Data structure, Difficulties with general "complexity" measures.

Module V: **[8 Periods]**
A: Measuring External Product Attributes-Modeling software quality, Measuring aspects of quality.
B:Software Reliability: measurement and prediction-Basics of reliability theory, The software reliability problem, Parametric reliability growth models, Predictive accuracy, The recalibration of software-reliability growth predictions, The importance of the operational environment, Wider aspects of software reliability.

TEXT BOOKS
1. Second Edition,Softwai Metrics,A Rigorous & Practical Approach Norman E.Fenton Shari Lawrence Pfleeger

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Course Code: 50562   **Credits: 3**

B.Tech.

DESIGN PATTERNS
(Professional Elective)

Prerequisite: Patterns and Design

Objective: To understand and design patterns are a systematic approach that focus and describe abstract systems of interaction between classes, objects, and communication flow.

Module I: Introduction
A: Introduction   **[09 Periods]**

What Is a Design Pattern? Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

Module II: Case Study
A: A Case Study   **[09 Periods]**

Designing a Document Editor: Design Problems, Document Structure,Formatting, Embellishing the User Interface, and Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary.

Module III: Creation and Structural Patterns
A:Creational Patterns   **[05 Periods]**

Abstract Factory, Builder, Factory Method, Prototype, Singleton,Discussion of Creational Patterns.

B: Structural Pattern Part-I   **[04 Periods]**

Adapter, Bridge, and Composite

Module IV: Structural and Behavioral Pattern
A: Structural Pattern Part-II: **[05 Periods]**

Decorator, Façade, Flyweight, Proxy.

B: Behavioral Patterns Part-I: **[04 Periods]**

Chain of Responsibility, Command,

Module V: Behavioral Pattern
A: Behavioral Patterns Part-II   **[09 Periods]**

Mediator, Memento, Observer, State, Strategy, TemplateMethod, Visitor, Discussion of Behavioral Patterns. What to Expect from Design Patterns, A Brief History, The Pattern Community An Invitation, A Parting Thought.

Text Book:

1. Design Patterns by Erich Gamma, Pearson Education

Reference:

1. Design patterns :elements of reusable Object Oriented-Software by ErichGamma, Richard Helm.

Outcomes:

Upon completion of this course, students should be able to:
1. Have a deeper knowledge of the principles of object-oriented design
2. Understand the design patterns that are common in software applications.
3. Understand how these patterns related to object-oriented design.
4. Will be able to document good design pattern structures.
5. Will able to use patterns and have deeper knowledge of patterns.

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Course Code: 50563   **Credits: 3**
B.Tech.
SYSTEM ANALYSIS AND DESIGN
(Professional Elective)

Prerequisite: NIL

Objective: To understand the system analysis and design with maximum resources utilization.

Module I: Data and Information and Systems Analysis and Design Life Cycle
A: Data and Information   **[03   Periods]**
Types of information: operational, tactical, strategic and statutory – why do we need information systems – management structure – requirements of information at different levels of management – functional allocation of management – requirements of information for various functions – qualities of information – small case study

B: Systems Analysis and Design Life Cycle   **[03 Periods]**
Requirements determination – requirements specifications – feasibility analysis – final specifications – hardware and software study – system design – system implementation – system evaluation – system modification. Role of systems analyst – attributes of a systems analyst – tools used in system analysis .

C: Information gathering   **[03 Periods]**
 strategies – methods – case study – documenting study – system requirements specification – from narratives of requirements to classification of requirements as strategic, tactical, operational and statutory. Example case study .

Module II:
A: Feasibility analysis   **[03 Periods]**
Deciding project goals – examining alternative solutions – cost – benefit analysis – quantifications of costs and benefits – payback period – system proposal preparation for managements – parts and documentation of a proposal – tools for prototype

B: Tools for systems analysts   **[02 Periods]**
Data flow diagrams – case study for use of DFD, good conventions – leveling of DFDs – leveling rules – logical and physical DFDs – software tools to create DFDs.

C: Structured systems analysis and design   **[03 Periods]**
Procedure specifications in structured English – examples and cases – decision tables for complex logical specifications – specification oriented design vs procedure oriented design

Module III:
A: Data oriented systems design   **[03 Periods]**
Entity relationship model – E-R diagrams – relationships cardinality and participation – normalizing relations – various normal forms and their need – some examples of relational data base design.

B: Data input methods   [03 Periods]

Coding techniques – requirements of coding schemes – error detection of codes – validating input data – input data controls interactive data input

C: Designing outputs   [02 Periods]

Output devices – designing output reports – screen design – graphical user interfaces – interactive I/O on terminals.

Module IV:

A: Object oriented systems modeling   [04 Periods]

what are objects? – why objects? – objects and their properties – classes – inheritance – polymorphism – how to identify objects in an application – how to model systems using objects – some cases of object oriented system modeling

B: Control   [03 Periods]

Audit and security of information systems – why controls are needed – objectives of control – techniques used in control – auditing information systems – auditing around, through and with the computer – testing information systems – types of tests – how to generate tests – security of information systems – disaster recovery – business process continuity

C: Systems analysis and design in the era of electronic commerce   [03 Periods]

B2B, B2C and C2C e-commerce – advantages and disadvantages of e-commerce. E-commerce system architecture – physical networks, logical network, world wide web, web-services – html, XML.

Module V:

A: Electronic data interchange   [02 Periods]

 EDI standards – virtual private networks – XML and EDI.   (2 lectures).

B: Security of e-commerce transactions   [03 Periods]

Firewalls – encryption methods – symmetric and asymmetric encryption – digital signature – certifying authorities for signatures – legal status of e-commerce transactions

C: Payment systems in e-commerce   [02 Periods]

Cheque payment, credit card payments, e-cash payments.

D: Complete system analysis and design case studies   [05 Periods]

A system for journal acquisition in libraries – walk through the entire life

References:

1. "Systems Analysis and Design" Alan Dennis, Barbara Haley Wixom, Roberta M. Roth
2. "Analysis and Design of Information Systems" by Rajaraman V
3. Systems Analysis and Design, Global Edition, 9/E: Kenneth Kendall: Julie Kendall Pearson ninth edition

PROFESSIONAL ELECTIVES

ARTIFICIAL INTELLIGENCE

Malla Reddy Engineering College (Autonomous)

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Course Code: 50564   **Credits: 3**

B.Tech.
ARTIFICIAL INTELLIGENCE
(Professional Elective)

Perquisite: NIL

Objective: This course contributes to the development of the following capabilities Enabling Knowledge, Problem Solving: and Critical Analysis.

Module I :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 – Waserman

References:

1. Artificial Intelligence Structures and Strategies complex problem Solving – George F. Lugar Pearson Education

Outcomes:

Upon completion of this course students can 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 min-max 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

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Course Code: 50565   **Credits: 3**

B.Tech.
EXPERT SYSTEMS
(Professional Elective)

Prerequisites: Data Structure and Programming, Design & Analyzed Algorithm, Symbolic Logic and Logic Programming.

Objectives : The major objectives of this course is to provide students with a view of various models of expert systems, its design, Implementation methods for Knowledge extraction and representation, Fuzzy and connectionist systems.

Module I:Introduction to Expert Systems   [05 Periods]
Expert Systems, Definitions types, components, Expert System Development Process

Module II :Knowledge Representation Techniques   [06 Periods]
Knowledge Representation Techniques-Logic Frames, Semantic Nets, etc.

Module III :Domain Exploration Knowledge   [09 Periods]
Domain Exploration Knowledge elicitation. Conceptualization, bathering Formlizations Methods of Knowledge Acquisition; Interviewing Sensor Data Capturing.

Module IV :   [09 Periods]
Learning, Planning and Explanation in Expert System: Neural Expert System, Fuzzy Expert System, Real Time Expert Systems.

Module V:Implementation Tools :   [07 Periods]
Implementation Tools : Prolog, Expert System Shell Expersys, etc. Study of existing expert systems- TIERES, As Mycin & AM.

Text Books :

1. Patterson, Introduction to AI Expert System, PHI, 1993

2. Jackson, Building Expert System, John-Wiley 1991.

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Course Code: 50566   **Credits: 3**

B.Tech.
MACHINE LEARNING
(Professional Elective)

Prerequisite: NIL

Objective: To be able to formulate machine learning problems corresponding to different applications and a range of machine learning algorithms along with their strengths and weaknesses.

Module I: Concept learning and the general to specific ordering
A: Introduction   **[03 Periods]**

Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning.

B: Concept learning and the general to specific ordering   **[06 Periods]**

Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias.

Module II : Decision Tree learning and Artificial Neural Networks
A: Decision Tree learning   **[03 Periods]**

Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning.

B: Artificial Neural Networks   **[04 Periods]**

Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition Advanced topics in artificial neural networks

C: Evaluation Hypotheses   **[03 Periods]**

Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms

Module III : Bayesian learning and Computational learning theory
A: Bayesian learning   **[03 Periods]**

Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm.

B: Computational learning theory [03 Periods]

Introduction, Probability learning an approximately correct hypothesis, Sample complexity for Finite Hypothesis Space, Sample Complexity for infinite Hypothesis Spaces, The mistake bound model of learning

C: Instance-Based Learning [03 Periods]

Introduction, k -Nearest Neighbour Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning.

D: Genetic Algorithms [03 Periods]

Motivation, Genetic Algorithms, An illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

Module IV : Learning Sets of Rules and Analytical Learning

A: Learning Sets of Rules [04 Periods]

Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First Order Rules, Learning Sets of First Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution

B: Analytical Learning [05 Periods]

Introduction, Learning with Perfect Domain Theories: Prolog-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge

Module V: Combining Inductive and Analytical Learning

A: Combining Inductive and Analytical Learning [05 Periods]

Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operators,

B: Reinforcement Learning [04 Periods]

Introduction, The Learning Task, Q Learning, Non-Deterministic, Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming

Text Books:
1. Machine Learning – Tom M. Mitchell, - MGH
2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis
References:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William WHsieh.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc., 2001
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995

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Course Code: 50567   **Credits: 3**

B.Tech.

NEURAL NETWORKS
(Professional Elective)

Perquisite: NIL

Objective: To understand the neural activities and learning process.

Module I:

Basic Learning Algorithms   **[09 Periods]**

Biological Neuron – Artificial Neural Model – Types of Activation Functions – Architecture – Feed Forward and Feedback – Learning Process – Error Correction Learning – Memory Based Learning – Hebbian Learning – Competitive Learning – Boltzman Learning – Supervised and Unsupervised Learning – Learning Tasks – Pattern Space– Weight Space – Pattern Association – Pattern Recognition – Function Approximation – Control – Filtering – Beam forming – Memory – Adaptation – Statistical Learning Theory – Single Layer Perception – Perception Learning Algorithm– Perception Convergence Theorem – Least Mean Square Learning Algorithm – Multilayer Perception – Back Propagation Algorithm – XOR problem – Limitations of Back Propagation Algorithm

Module II:

A: Radial Basis Function Networks and Support Vector Machines   **[09 Periods]**

Cover's Theorem on the Separability of Patterns – Exact Interpolator – Regularization Theory – Generalized Radial Basis Function Networks – Learning in Radial Basis Function Networks – Applications – XOR Problem – Image Classification

B: Support Vector Machines   **[09 Periods]**

Optimal Hyperplane for Linearly Separable Patterns and Nonseparable Patterns – Support Vector Machine for Pattern Recognition – XOR Problem – –insensitive Loss Function – Support Vector Machines for Nonlinear Regression

Module III:

A: Committee Machines   **[09 Periods]**

Ensemble Averaging – Boosting – Associative Gaussian Mixture Model – Hierarchical Mixture of Experts Model (HME) – Model Selection using a Standard Decision Tree – Apriori and Posteriori Probabilities – Maximum Likelihood Estimation – Learning Strategies for the HME Model – EM Algorithm – Applications of EM Algorithm to HME Model

B:Neurodynamics Systems   **[09 Periods]**

Dynamical Systems – Attractors and Stability – Non–linear Dynamical Systems – Lyapunov Stability – Neurodynamical Systems – The Cohen–Grossberg Theorem

Module IV:

A: Attractor Neural Networks   **[06 Periods]**

Associative Learning – Attractor Neural Network Associative Memory – Linear Associative Memory – Hopfield Network – Content Addressable Memory – Strange Attractors and Chaos

– Error Performance of Hopfield Networks – Applications of Hopfield Networks – Simulated Annealing – Boltzmann Machine – Bidirectional Associative Memory – BAM Stability Analysis – Error Correction in BAMs – Memory Annihilation of Structured Maps in BAMS – Continuous BAMs – Adaptive BAMs – Applications

B: Adaptive Resonance Theory   **[03 Periods]**

Noise – Saturation Dilemma – Solving Noise – Saturation Dilemma – Recurrent On–center – Off– surround Networks – Building Blocks of Adaptive Resonance – Substrate of Resonance Structural Details of Resonance Model – Adaptive Resonance Theory – Applications

Module V:

Self Organizing Maps   **[09 Periods]**

Self–organizing Map – Maximal Eigenvector Filtering – Sanger's Rule – Generalized Learning Law – Competitive Learning – Vector Quantization – Mexican Hat Networks – Self–organizing Feature Maps – Applications PULSED NEURON MODELS – Spiking Neuron Model – Integrate–and–Fire Neurons– Conductance Based Models – Computing with Spiking Neurons

Text Books:

1.Satish Kumar, "Neural Networks, A Classroom Approach", Tata McGraw -Hill, 2004.
2.Simon Haykin, "Neural Networks, A Comprehensive Foundation", 2nd Edition, Addison Wesley Longman,2001.

References:

1.Martin T.Hagan, Howard B. Demuth and Mark Beale, "Neural Network Design", Thomson Learning, 2003.
2.James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications and Programming Techniques", Pearson Education, 2003.

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Course Code: 50568   **Credits: 3**

B.Tech.
FUZZY LOGIC
(Professional Elective)

Perquisite: NIL
Objective: To understand the neural activities and learning process.

Module I :Introduction to Neural Networks   [10 Periods]
Biological neural - Neural processing - Supervised and unsupervised learning - Neural network learning rules. Single layer perception - discrete and continuous perception - multi layer feed forward network – Back propagation Networks - feed back networks - Training Algorithms

Module II: Unsupervised Networks   [09 Periods]
Unsupervised Learning – Competitive Learning Networks – Kohonen self organising networks – Learning Vector Quantization – Hebbian Learning – Hopfield Network –Content Addressable Nature – Binary Hopfield Network – Continuous Hopfield Network

Module III: Associative Memeories and Som   [09 Periods]
Bidirectional Associative Memory – Principle Component Analysis. Auto associative memories - Bidirectional Associative memory (BAM) - Self Organization Maps (SOM) and ART1.

Module IV:Fuzzy Logic   [08 Periods]
Fuzzy sets - Fuzzy Rules: Extension Principle, fuzzy measures - fuzzy relations - fuzzy functions-Fuzzy Reasoning.

Module V:Fuzzy Systems and Applications   [09 Periods]
Representation of fuzzy knowledge - fuzzy inference systems- Mamdani Model – Sugeno Model – Tsukamoto Model– Fuzzy decision making – Multi Objective Decision Making – Fuzzy Classification– Fuzzy Control Methods – Application.

References:
1. Jang J S R Sun C T and Mizutani E, "Neuro Fuzzy and Soft computing", Pearson Education, (Singapore), 2004.
2.S Rajasekaran and G A Vijayalakshmi Pai, "Neural networks Fuzzy logics and Genetic algorithms", Prentice Hall of India, 2004
3.Derong Liu , "Advances in Neural Networks--ISNN 2007 ", Springer, 2007
4.Timothy J Ross, "Fuzzy Logic Engineering Applications", John Wiley and Sons, 2004
5.James A. Anderson, "An Introduction to Neural Networks", Prentice Hall, 2002

Outcomes:
        Upon completion of this course students can able to:
        1.Describe and apply knowledge representation and list the key aspects of planning
        2.Describe and apply probability theorem and Bayesian networks.

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Course Code: 50569   **Credits: 3**

B.Tech.
ROBOTICS
(Professional Elective)

Perquisite: Artificial Intelligence and neural networks basics.

Objective: To understand the basic concepts associated with the design and functioning and applications of Robots To study about the drives and sensors used in Robots.

Module I :Fundamentals of Robots   **[07 Periods]**

Robot – Definition – Robot Anatomy – Co-ordinate Systems, Work Envelope, types and classification – Specifications – Pitch, Yaw, Roll, Joint Notations, Speed of Motion, Pay Load – Robot Parts and Functions – Need for Robots – Different Applications

Module II: Robot Drive Systems and End Effectors   **[10 Periods]**

Pneumatic Drives – Hydraulic Drives – Mechanical Drives – Electrical Drives – D.C. Servo Motors, Stepper Motor, A.C. Servo Motors – Salient Features, Applications and Comparison of Drives End Effectors – Grippers – Mechanical Grippers, Pneumatic and Hydraulic Grippers, Magnetic Grippers, Vacuum Grippers; Two Fingered and Three Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations

Module III:Sensors and Machine Vision   **[10 Periods]**

Requirements of a sensor, Principles and Applications of the following types of sensors – Position of sensors (Piezo Electric Sensor, LVDT, Resolvers, Optical Encoders, Pneumatic Position Sensors), Range Sensors (Triangulation Principle, Structured, Lighting Approach, Time of Flight Range Finders, Laser Range Meters), Proximity Sensors (Inductive, Hall Effect, Capacitive, Ultrasonic and Optical Proximity Sensors), Touch Sensors, (Binary Sensors, Analog Sensors), Wrist Sensors, Compliance Sensors, Slip Sensors. Camera, Frame Grabber, Sensing and Digitizing Image Data – Signal Conversion, Image Storage, Lighting Techniques. Image Processing and Analysis – Data Reduction: Edge detection, Segmentation Feature Extraction and Object Recognition - Algorithms. Applications – Inspection, Identification, Visual Serving and Navigation.

Module IV:Robot Kinematics and Robot Programming   **[10 Periods]**

Forward Kinematics, Inverse Kinematics and Differences; Forward Kinematics and Reverse Kinematics of Manipulators with Two, Three Degrees of Freedom (In 2 Dimensional), Four Degrees of Freedom (In 3 Dimensional) – Deviations and Problems. Teach Pendant Programming, Lead through programming, Robot programming Languages – VAL Programming – Motion Commands, Sensor Commands, End effecter commands and Simple programs

Module V: Implementation and Robot Economics   **[08 Periods]**

RGV, AGV; Implementation of Robots in Industries – Various Steps; Safety Considerations for Robot Operations; Economic Analysis of Robots – Pay back Method, EUAC Method, Rate of Return Method.

Text Books:

1. M.P.Groover, "Industrial Robotics – Technology, Programming and Applications", McGraw-Hill,2001

References:

1. Fu.K.S. Gonzalz.R.C., and Lee C.S.G., "Robotics Control, Sensing, Vision and Intelligence", McGraw-Hill Book Co., 1987
2. Yoram Koren, "Robotics for Engineers", McGraw-Hill Book Co., 1992
3. Janakiraman.P.A., "Robotics and Image Processing", Tata McGraw-Hill, 1995

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Course Code: 50571   **Credits: 3**

B.Tech.
NATURAL LANGUAGE PROCESSING
(Professional Elective)

Perquisite: Neural Networks.

Objective: To acquire basic understanding of linguistic concepts and natural language complexity, variability.

Module I : Introduction and Regular Expressions
A: Introduction and Overview   **[03 Periods]**
What is Natural Language Processing, hands-on demonstrations.Ambiguity and uncertainty in language. The Turing test.
B: Regular Expressions   **[03 Periods]**
Chomsky hierarchy, regular languages, and their limitations. Finite-state automata. Practical regular expressions for finding and counting language phenomena. A little morphology. Exploring a large corpus with reg lex tools.
C: Programming in Python   **[04 Periods]**
An introduction to programming in Python. Variables, numbers, strings, arrays, dictionaries, conditionals, iteration. The NLTK (Natural Language Toolkit)
D:String EditDistance andAlignmentKey algorithmic tool: dynamic programming, a simple example, use inoptimal alignment of sequences. String edit operations, edit distance, and examples of use in spelling correction, and machine translation.

Module II: Context Free Grammars and Non-probabilistic Parsing
A:Context Free Grammars   **[04 Periods]**
Constituency, CFG definition, use and limitations. Chomsky Normal Form.Top-down parsing, bottom-up parsing, and the problems with each. The desirability of combining evidence from both directions
B:Non-probabilistic Parsing   **[05 Periods]**
Efficient CFG parsing with CYK, another dynamic programming algorithms. Early parser. Designing a little grammar, and parsing with it on some test data.
C:Probability Introduction to probability theory Joint and conditional probability, marginals, independence, Bayes rule, combining evidence. Examples of applications in natural language.
D:Information Theory The "Shannon game"--motivated by language! Entropy, cross-entropy, information gain. Its application to some language phenomena.

Module III:Language modeling and Naive Bayes   **[04 Periods]**
Probabilistic language modeling and its applications. Markov models. N-grams. Estimating the probability of a word, and smoothing. Generative models of language. Part of Speech Tagging and Hidden Markov Models**,** Viterbi Algorithm for Finding Most Likely HMM Path Dynamic programming with Hidden Markov Models, and its use for part-of-speech tagging,

Chinese word segmentation, prosody, information extraction, etc.

Module IV: Probabilistic Context Free Grammars

A:Probabilistic Context Free Grammars [03 Periods]

Weighted context free grammars. Weighted CYK. Pruning and beam search.

B:Parsing with PCFGs [03 Periods]

A tree bank and what it takes to create one. The probabilistic version of CYK. Also: How do humans parse? Experiments with eye-tracking. Modern parsers.

C:Maximum Entropy Classifiers [04 Periods]

The maximum entropy principle and its relation to maximum likelihood. Maximum entropy classifiers and their application to document classification, sentence segmentation, and other language tasks

Module V:

A:Maximum Entropy Markov Models & Conditional Random Fields [04 Periods]

Part-of-speech tagging, noun-phrase segmentation and information extraction models that combine maximum entropy and finite-state machines. State-of-the-art models for NLP.

B:Lexical Semantics [03 Periods]

Mathematics of Multinomial and Dirichlet distributions, Dirichlet as a smoothingfor multinomial's.

C:Information Extraction & Reference Resolution [03 Periods]

Various methods, including HMMs. Models ofanaphora resolution. Machine learning methods for co reference.

Text Books:

1. "Speech and Language Processing": Jurafsky and Martin, Prentice Hall
2. "Statistical Natural Language Processing"- Manning and Schutze, MIT Press
3. *"Natural Language Understanding"*. James Allen. The Benajmins/Cummings Publishing Company

References:

1. Cover, T. M. and J. A. Thomas: Elements of Information Theory. Wiley.
2. Charniak, E.: Statistical Language Learning. The MIT Press.
3. Jelinek, F.: Statistical Methods for Speech Recognition. The MIT Press. Lutz and Ascher - "Learning Python", O'Reilly

Outcomes:

Upon completion of this course students can able to:

1. Describe and apply knowledge representation
2. Describe and list the key aspects of planning
3. Describe the key aspects of intelligent agents

PROFESSIONAL ELECTIVES

COMPUTER GRAPHICS

Malla Reddy Engineering College (Autonomous)

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Course Code: 50571 **Credits: 3**

B.Tech.
COMPUTER GRAPHICS
(Professional Elective)

Prerequisites: NIL

Objective: 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,viewingcoordinatereferenceframe,window toview-portcoordinatetransformation,viewingfunctions,Cohen-Sutherlandand Cyrus-beck line clipping 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: Visiblesurfacedetectionmethods [05 Periods]

Classification,back-facedetection,depth-buffer,scan-line, depth sorting,BSP-treemethods,areasub-divisionandoctreemethods.

B: Computer Animation [04 Periods]

Design of animation sequence, generalcomputer animationfunctions,rasteranimation,computeranimationlanguages,keyframe systems,motionspecifications

TEXT BOOKS:

1. "ComputerGraphicsCversion",DonaldHearnandM.PaulineBaker,PearsonEducatio.
2. "Computer Graphics Principles &practice", second edition in C, Foley,VanDam,Feinerand Hughes, PearsonEducation.

REFERENCES :

1. "ComputerGraphics",secondEdition,DonaldHearnandM.PaulineBaker, PHI/PearsonEducation.
2. "ComputerGraphicsSecondedition",Zhigandxiang,RoyPlastock,Schaum's outlines,TataMc-Grawhilledition.
3. ProceduralelementsforComputerGraphics,DavidFRogers,TataMcGrawhill, 2nd edition.
4. "PrinciplesofInteractive Computer Graphics",NeumanandSproul, TMH.
5. PrinciplesofComputerGraphics,ShaliniGovil, Pai,2005, Springer.
6. Computer Graphics,Steven Harrington,TMH

Outcomes:

Upon completion of the course, the students are expected to:

1. Upon successful completion of the course, students will- 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

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Course Code: 50572   **Credits: 3**

B.Tech.
MULTIMEDIA APLICATION AND DEVELOPMENT
(Professional Elective)

Prerequisite: Computer graphics.

Objective: To Know the Multimedia concepts to develop real-time applications development.

Module I : A:Fundamental concepts in Text and Image   **[09 Periods]**

Multimedia and hypermedia, world wide web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

Module II: Fundamental concepts in video and digital audio   **[09 Periods]**

Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio.

Module III: Action Script I & II
A:Action Script I: **[05 Periods]**

ActionScript Features, Object-Oriented ActionScript, Datatypes and Type Checking, Classes, Authoring an ActionScript Class.

B:Action Script II :   **[04 Periods]**

Inheritance, Authoring an ActionScript 2.0 Subclass, Interfaces, Packages, Exceptions.

Module IV: Application Development and Multimedia data compression
A:Application Development   **[03 Periods]**

An OOP Application Frame work, Using Components with ActionScript MovieClip Subclasses.

B: Multimedia data compression   **[05 Periods]**

Lossless compression algorithm: Run-Length Coding, Variable Length Coding, Dictionary Based Coding, Arithmetic Coding, Lossless Image Compression, Lossy compression algorithm: Quantization, Transform Coding, Wavelet-Based Coding, Embedded Zerotree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT).

Module V: Video Compression Techniques and Multimedia Networks
A: Basic Video Compression Techniques   **[04 Periods]**

Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, Basic Audio Compression Techniques.

B:Multimedia Networks   **[05 Periods]**

Basics of Multimedia Networks, Multimedia Network Communications and Applications : Quality of Multimedia Data Transmission, Multimedia over IP, Multimedia over ATM Networks, Transport of MPEG-4, Media-on-Demand(MOD).

Text Books:

1. Fundamentals of Multimedia by Ze-Nian Li and Mark S. Drew PHI/Pearson Education.
2. Essentials ActionScript 2.0, Colin Moock, SPD O,REILLY.

References:

1. Digital Multimedia, Nigel chapman and jenny chapman, Wiley-Dreamtech

2. Macromedia Flash MX Professional 2004 Unleashed, Pearson.

3. Multimedia and communications Technology, Steve Heath, Elsevier(Focal Press).

4. Multimedia Applications, Steinmetz, Nahrstedt, Springer.

5. Multimedia Basics by Weixel Thomson

6. Multimedia Technology and Applications, David Hilman , Galgotia

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Course Code: 50573   **Credits:3**

B.Tech.
DIGITAL IMAGEPROCESSING
(Professional Elective)

Perquisite: Computer graphics

Objective: Tostudytheimagefundamentalsandmathematical transformsnecessaryfor image processing and theimageenhancementtechnique,imagerestorationprocedures.

Module I :DigitalImageFundamentals   **[09 Periods]**
Elements ofdigitalimageprocessingsystems,Vidicon andDigitalCameraworking principles,Elementsofvisual perception, brightness,contrast, hue,saturation,mach bandeffect,Colorimage fundamentals-RGB,HSImodels,Imagesampling, Quantization, dither,Two-dimensionalmathematicalpreliminaries, 2Dtransforms-DFT, DCT, KLT,SVD.

Module II: ImageEnhancement   **[09 Periods]**
Histogram equalizationandspecificationtechniques,Noisedistributions,Spatial averaging,Directional Smoothing,Median,Geometricmean,Harmonicmean, Contraharmonicmeanfilters,Homomorphicfiltering,Color imageenhancement.

Module III: ImageRestoration   **[09 Periods]**
ImageRestoration- degradationmodel,Unconstrainedrestoration- Lagrangemultiplier andConstrainedrestoration,Inversefiltering-removalofblurcausedbyuniformlinear motion,Wienerfiltering,Geometric transformations-spatial transformations.

Module IV:ImageSegmentation   **[09 Periods]**
Edge detection,EdgelinkingviaHough transform–Thresholding-Region based segmentation– Regiongrowing –RegionsplittingandMerging–Segmentationby morphological watersheds – basic concepts – Dam construction – Watershed segmentationalgorithm.

Module V:ImageCompression   **[09 Periods]**
Needfordatacompression,Huffman,RunLengthEncoding,Shiftcodes, Arithmetic coding,VectorQuantization,Transform coding,JPEGstandard,MPEG.

Text Books:

1. Rafael C.Gonzalez,RichardE.Woods,,Digital ImageProcessing',Pearson, Second Edition, 2004.
2.AnilK.Jain,,FundamentalsofDigital ImageProcessing',Pearson2002.

References:

1.KennethR.Castleman,Digital ImageProcessing,Pearson,2006.

2. Rafael C.Gonzalez,RichardE.Woods,StevenEddins,'Digital ImageProcessing usingMATLAB',PearsonEducation,Inc.,2004.

3.D,E.Dudgeonand RM.Mersereau,,Multidimensional Digital Signal Processing',PrenticeHall Professional Technical Reference,1990.

4. William K. Pratt,,Digital ImageProcessing',JohnWiley,New York,2002

5. MilanSonkaetaI,'IMAGEPROCESSING, ANALYSISAND MACHINEVISION', Brookes/Cole, VikasPublishingHouse,2ndedition, 1999,

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Course Code: 50574   **Credits: 3**

B.Tech.
COMPUTER VISION
(Professional Elective)

Perquisite: NIL.

Objectives: To review image processing techniques for computer vision and understand shape and region analysis and Transform and its applications to detect lines, circles, ellipses.

Module I : Image Processing Foundations   **[09 Periods]**
Review of image processing techniques – classical filtering operations – thresholding techniques –edge detection techniques – corner and interest point detection – mathematical morphology – texture

Module II:Shapes and Regions   **[09 Periods]**
Binary shape analysis – connectedness – object labeling and counting – size filtering – distance functions – skeletons and thinning – deformable shape analysis – boundary tracking procedures –active contours – shape models and shape recognition – centroidal profiles – handling occlusion –boundary length measures – boundary descriptors – chain codes – Fourier descriptors – region descriptors – moments

Module III: Hough Transform   **[09 Periods]**
Line detection – Hough Transform (HT) for line detection – foot-of-normal method – line localization –line fitting – RANSAC for straight line detection – HT based circular object detection – accurate centerlocation – speed problem – ellipse detection – Case study: Human Iris location – hole detection –generalized Hough Transform – spatial matched filtering – GHT for ellipse detection – object location– GHT for feature collation

Module IV: 3D Vision and Motion   **[09 Periods]**
Methods for 3D vision – projection schemes – shape from shading – photometric stereo – shape from texture – shape from focus – active range finding – surface representations – point-based representation – volumetric representations – 3D object recognition – 3D reconstruction – introduction to motion – triangulation – bundle adjustment – translational alignment – parametric motion – splinebased motion – optical flow – layered motion

Module V:Applications   **[09 Periods]**
Application: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians

References:

1. E. R. Davies, "Computer & Machine Vision", Fourth Edition, Academic Press, 2012.
2. R. Szeliski, "Computer Vision: Algorithms and Applications", Springer 2011.
3. Simon J. D. Prince, "Computer Vision: Models, Learning, and Inference", Cambridge University Press, 2012.
4. Mark Nixon and Alberto S. Aquado, "Feature Extraction & Image Processing for Computer Vision", Third Edition, Academic Press, 2012.
5. D. L. Baggio et al., "Mastering OpenCV with Practical Computer Vision Projects", Packt Publishing, 2012.
6. Jan Erik Solem, "Programming Computer Vision with Python: Tools and algorithms for analyzing images", O'Reilly Media, 2012.

Outcomes:

Upon completion of this course students can able to:
1. To implement fundamental image processing techniques required for computer vision
2. To perform shape analysis
3. To implement boundary tracking techniques
4. To apply chain codes and other region descriptors
5. To apply Hough Transform for line, circle, and ellipse detections
6. To apply 3D vision techniques
7. To implement motion related techniques
8. To develop applications using computer vision techniques

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Course Code: 50575   **Credits: 3**

B.Tech.
PATTERN RECOGNITION
(Professional Elective)

Perquisite: Design patterns.

Objective: This course contributes to the development of the following capabilities: Enabling Problem Solving, Critical Analysis.

Module I : Introduction   **[09 Periods]**
Definition of AI, Intelligent agents, perception and language processing, problem solving, searching, heuristic searching, game playing, logics, logical reasoning.

Module II: Basic Problems Solving Methods   **[09 Periods]**
Forward Vs background, knowledge representation, frame problems, heuristic functions, weak methods of matching.

Module III: Principles of Pattern Recognition   **[09 Periods]**
Patterns and features, training and learning in pattern recognition approach, different types of pattern recognition.

Module IV: Decision Making   **[09 Periods]**
Baye's theorem, multiple features, decision boundaries, estimation of error rates, histogram, kernels, window estimaters, nearest neighbour classification, maximum distance pattern clssifiers, adaptive decision boundaries.

Module V: Cluster Analysis and Feature Extraction   **[09 Periods]**
Unsupervised learning, heirarchial clustering, graph theories approach to pattern clustering, fuzzy pattern classifiers, application of pattern recognition in medicine.

References:

1. Elain Rich and Kevin Knight, "Artificial Intelligence" Tata McGraw-Hill, 2 nd Edition,Edition-1993.
2. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", PrenticeHallofIndia,Delhi,Edition-2001.
3. Earl Gose, Richard Johnsonbaugh, Steve Jost, "Pattern Recognition and Image Analysis", Prentice Hall of India Pvt. Ltd., New Delhi, Edition- 1999.
4. G.F. Luger & W.A Stubble Field, "Artificial intelligence structures and Strategies f orcomplexproblem solving," 3rdEdition, PearsonEducation, Edition- 1998.
5. Efrain Turban and Jay E Aranson: "Decision support systems and Intelligent Systems," 5th Edition, Pearson Education, 1998

Outcomes:

Upon completion of this course students can able to:
1. Describe and list the key aspects of planning
2. Describe and apply probability theorem and Bayesian networks.
3. Describe the key aspects of intelligent agents

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Course Code: 50576   **Credits: 3**

B.Tech.
SPEECH RECOGNITION
(Professional Elective)

Prerequisite: Digital signal processing.

Objective: This course contributes to the development of the following capabilities of the basic characteristics of speech,algorithms, techniques and limitations of state of the art speech systems.

Module I : BASIC CONCEPTS   **[09 Periods]**

Speech fundamentals: Articulatory phonetics- Production and Classification of Speech Sounds;Acoustic Phonetics – acoustics of speech production; Review of Digital Signal Processing concepts;Short-time Fourier transform, Filter Bank and LPC Methods

Module II: SPEECH ANALYSIS   **[09 Periods]**

Features, Feature Extraction and Pattern Comparison Techniques; Spectral distortion measures mathematical and perceptual – Log Spectral Distance, Cepstral Distances, Weighted Cepstral Distances and Liftering, Likelihood Distortions, Spectral Distortion using a Warped frequency Scale, LPC, PLP and MFCC Coefficients, Time Alignment and Normalization – Dynamic Time Warping, multiple Time – Alignment Paths.

Module III: SPEECH MODELLING   **[09 Periods]**

Hidden Markov Models: Markov Processes, HMMs – Evaluation, Optimal State Sequence – Viterbi search, Baum – Welch Parameter Re-estimation, Implementation issues.

Module IV:SPEECH RECOGNITION   **[09 Periods]**

Large Vocabulary Continuous Speech Recognition: Architecture of a large vocabulary Continuous Speech Recognition system – acoustics and language models, Sub-word units-models for phonemes, syllables, triphones, Language models, n-grams, context dependent sub-word units.

Module V: SPEECH SYNTHESIS   **[09 Periods]**

Text-to-speech synthesis: Concatenative and waveform synthesis methods, sub-word units for TTS,intelligibility and naturalness-role of prosody, Applications.

References:

1. Lawrence Rabiner and Biiing – Hwang Juang, "Fundamentals of Speech Recognition", Pearson Education, 2003.
2. Daniel Jurafsky and James H Martin, "Speech and Language Processing – An introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition", Pearson Education 2002.

3. Steven W. Smith, "The Scientist and Engineer's Guide to Digital Signal Processing", California Technical Publishing, 1997.

4. Thomas F Quatieri, " Discrete- Time Speech Signal Processing- Principles and Practice", Pearson Education, 2004.

5. Claudio Becchetti and Lucio Prina Ricotti, " Speech Recognition", John Wiley and Sons, 1999.

6. Bengold & Neoban margom " Speech and Audio Signal Processing: Processing and Perception of Speech and Music", John Wiley and Sons 2002.

7. Donglos O shanhnessy "Speech Communication: Human and Machine", 2nd Edition. University Press 2001.

8. F. Jebinek, "Statistical Methods for Speech Recognition", MIT press, 1998.

Outcomes:

Upon completion of this course students can able to:
1. To be able to analyze speech signal
2. To design speech recognition systems
3. To design speech synthesis systems

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Course Code: 50577   **Credits: 3**

B.Tech.
ANIMATION TECHNIQUE
(Professional Elective)

Perquisite: Nil.

Objective: This course will teach the students about current techniques in computer animation.

Module I: **[09 Periods]**
What is mean by Animation – Why we need Animation – History of Animation– Uses of Animation – Types of Animation – Principles of Animation – SomeTechniques of Animation – Animation on the WEB – 3D Animation – Special Effects -Creating Animation?

Module II: Creating Animation in Flash: **[09 Periods]**
Introduction to Flash Animation – Introductionto Flash – Working with the Timeline and Frame-based Animation - Working with theTimeline and Twin-based Animation Understanding Layers – Actionscript.

Module III: **[09 Periods]**
3D Animation & its Concepts – Types of 3D Animation – Skeleton & Kinetic3D Animation – Texturing & Lighting of 3D Animation – 3D Camera Tracking –Applications & Software of 3D Animation.

Module IV: **[09 Periods]**
Motion Caption – Formats – Methods – Usages – Expression – Motion Capture Software's – Script Animation Usage – Different Language of Script Animation among the Software.

Module V: **[09 Periods]**
Concept Development –Story Developing –Audio & Video – Color Model –Device Independent Color Model – Gamma and Gamma Correction - Production Budgets- 3D Animated Movies.

OPEN ELECTIVES

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2 2 -

Course Code: 50102   **Credits: 3**

SURVEYING
(Open Elective)

Prerequisites: Nil
Objectives:

Student will be able to learn and understand the various basic concept and principles used in surveying like Chain Surveying, Compass Surveying, Plane Table Surveying, Leveling and to calculate Horizontal Angle, Vertical Angle, Horizontal distance and Vertical distance to study the area of ground profile

MODULE-I
A: INTRODUCTION BASIC CONCEPTS   [6 Periods]

Introduction, Objectives, classifications and Principles of surveying, Scales, Shrinkage of maps, conventional symbols and code of signals, Surveying Accessories, phases of surveying.

B: MEASUREMENT OF DISTANCES AND DIRECTIONS[6 Periods]

Linear distances: Approximate methods, Direct methods-chains – tapes, ranging- tape corrections, Indirect methods- optical methods –E.D.M methods.

Prismatic Compass:Bearings, Included Angles, Local Attraction, Magnetic Declination and Dip.

MODULE-II
A: LEVELING[6 Periods]

Basic definitions, types of levels and leveling staves,Temporary and permanent adjustments-method of leveling. Booking and determination of levels-HI method – Rise and fall method, effect of curvature if earth and refraction

B: CONTOURING[6 Periods]

Characteristics and Uses of contours, Direct and indirect methods of contour surveying, interpolation and sketching of Contours.

MODULE-III
A: COMPUTATION OF AREAS AND VOLUMES   [6 Periods]

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

B: THEODOLITE SURVEYING [6 Periods]

Types of Theodolite, description, uses and adjustments – temporary and permanent, measurement of horizontal and vertical angles. Principles of Electronic Theodolite. Trigonometrical leveling when the base is accessible and in accessible

MODULE-IV
A: TRAVERSING [6 Periods]

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

B: TACHEOMETRIC SURVEYING [6 Periods]

Principles of tacheometry,Stadia and tangential methods of Tacheometry.

MODULE-V
A: CURVES [6 Periods]
Types of curves, design and setting out – simple and compound curves.

B: INTRODUCTION TO MODERN SURVEYING METHODS [6 Periods]

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

TEXT BOOKS:

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

REFERENCES:

1. Arror K R "**Surveying Vol 1, 2 & 3**", Standard Book House, Delhi, 4th Edition, 2004
2. Chandra A M, "**Plane Surveying**", New age International Pvt. Ltd., Publishers, New Delhi, 4th Edition 2002.
3. Chandra A M, "**Higher Surveying**", New age International Pvt. Ltd., Publishers, New Delhi, 4th Edition2002.

WEBREFERENCES:

1. http://v5.books.elsevier.com/bookscat/samples/9780750669498/9780750669498.PDF
2. http://www.whycos.org/fck_editor/upload/File/Pacific
3. HYCOS/Surface_Waters/Levelling_and_surveying.pdf

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

• Student will be able to prepare Map and Plan for required site with suitable scale

- Student will be able to prepare contour Map and Estimate the Quantity of earthwork required for formation level for Road and Railway Alignment.
- Student will be able to prepare LS & CS, contour maps and carryout surveying works related to land and civil engineering projects

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Course Code: 50123   **Credits: 3**

AIR POLLUTION AND CONTROL
(Open Elective)

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 SOx, NOx, 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.

MODULEIV: 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, SO; NO and CO Emission Standards.

Text Books:

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

References:

1. Wark and Warner, "**Air Pollution**" Harper & Row Publicatons, 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:

By the end of the course, the student has the capacity

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.

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Course Code: 50124 **Credits: 3**

DISASTER MANAGEMENT
(Open Elective)

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 MEASURESIN DISASTER MANAGEMENT
A: EMERGING APPROACHES[4 periods]

Three Stages:1. Pre- disaster stage [preparedness]2. Emergency Stage3. 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:

The student will acquire the knowledge

- To analyze, evaluate and manage the environmental, social, cultural, economical, legal and organizational aspects influencing vulnerabilities and capacities to face disasters.
- To assessthe different public health aspects at local and global levels as a result of disaster, and can well plan to mitigate them.

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Course Code: 50150   **Credits: 3**

GREEN BUILDINGS
(Open Elective)

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]**

Building energy system strategies, Water cycle strategies, Materials selection strategies, Indoor Environmental Quality [IEQ].

MODULE – III

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:

1. http://www.ncrec.gov/Pdfs/bicar/GreenBuilding.pdf

OUTCOMES:
The benefits of green building – quality, healthy and safe environments that are cost effective – should be available to all.

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Course Code: 50208   **Credits: 3**

CONTROL SYSTEMS
(Open Elective)

PREREQUISITES: Basic of Mathematics, Laplace Transforms and Matrices.

OBJECTIVE: 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 it's 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.

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Course Code: 50229   **Credits: 3**

ENERGY AUDITING & CONSERVATION
(Open Elective)

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

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Course Code: 50241   **Credits: 3**

PRINCIPLES OF ELECTRICAL ENGINEERING
(Open Elective)

PREREQUISITES: Electrical Circuits.

OBJECTIVE: 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 3Ø 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 able to do the conceptual things to real-world problems and applications.

Malla Reddy Engineering College (Autonomous)

L T P
2 2 -

Course Code: 50303   **Credits: 3**

ENGINEERING MECHANICS
(Open Elective)

Prerequisites: Fundamental concepts of Physics

Objective: The objective of this subject is to provide the basic concepts of effect of systemof 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-curvilinear 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. Fedinand . 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 D'Alembert"s principle, work-energy method and Impulse Momentum principle to solve dynamics problems.

MALLA REDDY ENGINEERING COLLEGE(*Autonomous*)

Course Code: 50305   **L TP**

2 2 -

Credits: 3

MECHANICS OF SOLIDS
(Open Elective)

Pre-requisite: Engineering Mechanics, Material Science

Objective:

1**.** The objective of this subject is to provide the basic concepts of mechanical behavior of the different materials under various loads.

2. To provide knowledge on shear force and bending moment diagrams of different beams.

3. To provide knowledge about stress distribution across various cross sections of beams

MODULE – I: Simple Stresses & Strains   **[15 Periods]**

Simple Stresses & Strains : Elasticityandplasticity–Typesof stresses&strains–Hooke'slaw – stress–strain diagramfor ductile and brittle material–Workingstress–Factorofsafety–Lateralstrain,Poisson'sratio   &volumetricstrain–Elasticmodulii& therelationshipbetweenthem–Barsofvaryingsection–composite bars–Temperaturestresses . Strainenergy–Resilience–Gradual,sudden,impactandshockloadings.

MODULE – II: Shear Forceand Bending Moment   **[12 Periods]**

Shear ForceAnd Bending Moment: Definitionofbeam–Typesofbeams–Concept ofshear forceandbendingmoment–S.F andB.Mdiagramsforcantilever,simplysupportedandoverhanging beamssubjectedto pointloads, U.D.L.,uniformly varying loadsand combinationofthese loads–Pointof contraflexure–RelationbetweenS.F.,B.Mandrateofloading atasectionofabeam.

MODULE - III: BendingStresses&Shear Stresses   **[14 Periods]**

A: BendingStresses: Theoryof   simplebending–Assumptions–Derivationofbending equation:M/I=f/y=E/R   -   Neutralaxis–Determinationbendingstresses–sectionmodulusofrectangularandcircular   sections(SolidandHollow),I,   T,   Angle andChannelsections–Designofsimplebeamsections.

B: Shear   Stresses: Derivation   offormula–Shearstressdistributionacrossvariousbeamssections likerectangular,circular,triangular,I,T and angle sections.

MODULE - IV: Deflection ofBeams&Torsion   **[17 Periods]**

A: Deflection ofBeams: Bendingintoacircular arc–slope, deflectionandradiusofcurvature–Differentialequationfortheelasticlineofabeam–   DoubleintegrationandMacaulay'smethods–Determinationofslope   and   deflectionforcantileverandsimplysupportedbeamssubjectedto pointloads, -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 ofPin-JointedPlane Frames&Thin Cylinders[12 Periods]

A: Analysis ofPin-JointedPlane Frames: Determination of forces in the members of varioustypesof cantilever&simply–supportedtrusses-by(i) Method ofJoints   (ii)

MethodofSections.

B: Thin Cylinders: Thin seamlesscylindricalshells–Derivationofformulafor longitudinal and circumferentialstresses– hoop, longitudinalandvolumetricstrains– changesindia,andvolume ofthin cylinders.

TEXTBOOKS:

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 OUTCOME:

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.

MALLA REDDY ENGINEERING COLLEGE(*Autonomous*)

Course Code: 50342   **L T P**

2 2 -

Credits: 3

RENEWABLE ENERGY SOURCES
(Open Elective)

Pre-requisite: Thermal Engineering
Objective: 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 titled 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 Krieth & 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 EnergyTechnologies",** Narosa Publications

COURSE OUTCOME:

The students shall be able know different types of energy sources which are available naturally.

MALLA REDDY ENGINEERING COLLEGE(*Autonomous*)
Course Code: 50353   **L T P**
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                                                            Credits: 3

MECHANICAL TECHNOLOGY
(Open Elective)

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 – Typesof follower motion - Uniform velocity – Simple harmonic motion and uniform acceleration. Maximum velocity and maximum acceleration during outward and return strokes in the above 3 cases.

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

MODULE – III: Toothed gears, Introduction to Conventional Machine Tools&Introduction to NC & CNC machines   [15 Periods]
Toothed gears: types – law of gearing, condition for constant velocity ratio for transmission of motion, Formof 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 stoke cycle spark ignition and compression ignition engines. Application of IC Engines study of fuel supply systems in SI and CI Engines, study of fuel ignition, cooling and lubrication systems. Simple calculations of indicated power, brake power, mechanical efficiency, thermal efficiency and fuel consumption. Coal diesel, coal water, slurries as alternate fuels. Simple maintenance techniques.

MODULE – V: Air Compressors   **[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 Combution Engines",** Tata McGraw-Hill.
2. Rattan**"Theory Machines",** Tata McGraw-Hill.
3. Prof. Yahya**"Turbines Compressors and Fans",** Tata McGraw-Hill.
4. Prof. D.J. Deshmukh**"Elements of Mining Technology"** (Vol- I & II), Tata McGraw-Hill
5. 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**

OUTCOMES: Mining engineering students are expected to know about the mechanism, parts involved in machinery used in mining engineering. This course gives Opportunity to learn 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.

MALLA REDDY ENGINEERING COLLEGE(*Autonomous*)

Course Code: 50355   **L TP**
2 2 -

Credits: 3

BASICS OF THERMODYNAMICS
(Open Elective)

Pre-requisite: Applied Physics
Objective: The objective of this subject is to provide the basic concepts of work done & energy of different processes and their applications.
Codes/Tables: Steam Tables and Mollier charts, Refrigeration tables

MODULE – I: Introduction:BasicConcepts   **[13 Periods]**
Introduction:BasicConcepts: System,ControlVolume,Surrounding,Boundaries,Universe,Typesof Systems,MacroscopicandMicroscopicviewpoints,ConceptofContinuum,ThermodynamicEquilibrium, State,Property,Process,Cycle–Reversibility–Quasi–staticProcess,IrreversibleProcess,Causesof Irreversibility–EnergyinStateandinTransition,Types,WorkandHeat,Point andPathfunction.

MODULE – II: Zeroth& First LawofThermodynamics   **[13 Periods]**
Zeroth& First LawofThermodynamics–Concept ofqualityofTemperature–PrinciplesofThermometry– ReferencePoints–Const.VolumegasThermometer– ScalesofTemperature,IdealGasScale–PMM I- Joule'sExperiments– FirstlawofThermodynamics–Corollaries–FirstlawappliedtoaProcess– appliedtoaflowsystem– SteadyFlowEnergyEquation

MODULE – III: Second Law of Thermodynamics&Perfect GasLaws   **[15 Periods]**
A: Second   Law   of   Thermodynamics–ThermalReservoir,HeatEngine,Heatpump,Parametersofperformance, Second LawofThermodynamics,Kelvin-PlanckandClausiusStatementsandtheirEquivalence/Corollaries, PMMofSecondkind,Carnot'sprinciple,Carnotcycleanditsspecialties,Entropy,Principle ofEntropyIncrease–EnergyEquation,Availability andIrreversibility.
B: Perfect GasLaws–EquationofState,specificandUniversalGasconstants– variousNon-flowprocesses, properties, end states,HeatandWorkTransfer,changesinInternalEnergy–ThrottlingandFreeExpansion Processes–Flowprocesses

MODULE – IV: Power Cycles   **[13 Periods]**
Power   Cycles: Otto,Diesel,DualCombustion cycles,SterlingCycle,AtkinsonCycle,EriccsonCycle, LenoirCycle–Description andrepresentation   onP–V   andT-S   diagram,ThermalEfficiency,Mean EffectivePressuresonAirstandardbasis–comparisonofCycles.

MODULE – V:RefrigerationCycles&Introduction to Psychrometry   **[15 Periods]**
A: RefrigerationCycles: Brayton   andRankinecycles–PerformanceEvaluation–combinedcycles,Bell- Coleman cycle,Vapourcompressioncycle-performanceEvaluation.

B: Introduction to Psychrometry: PsychrometricProperties–DrybulbTemperature, WetBulbTemperature,DewpointTemperature,ThermodynamicWetBulbTemperature,Spec ificHumidity, RelativeHumidity,saturatedAir,Vapour pressure,Degreeofsaturation– AdiabaticSaturation, Carrier's Equation–Psychrometricchart.

TEXTBOOKS:
1.ThermodynamicsanEngineeringApproach/YunusCengel&Boles/TMH
2. EngineeringThermodynamics/PKNag/TMH,IIIEdition

REFERENCE BOOKS:
1.EngineeringThermodynamics/Jones& Dugan/Prentice Hall Publisher
2.Thermodynamics/J.P.Holman/McGrawHill
4.AnintroductiontoThermodynamics/YVC Rao/NewAge Publications
5. EngineeringThermodynamics/K.Ramakrishna/AnuradhaPublishers.
6.   FundamentalsofThermodynamics/Sonntag,Borgnakkeandvanwylen/JohnWiley&sons (ASIA)Pte Ltd.

Outcome: The students shall be able to know the conversion of energy to mass and vice versa of different processes

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3 1 -

Course Code: 50433
Credits: 3

B.Tech.
VLSI DESIGN
(Open Elective)

PREREQUISITES: Electronic circuits.

OBJECTIVE: This course introduces the IC Fabrication steps and various IC technologies. This course also introduces the basics of VLSI technology, design concepts, electrical properties and modeling of Very Large Scale Integrated circuits, Gate-Level circuit Design, Data path subsystem design, Architectures of ASIC's, CPLD`s and FPGA`s.

MODULE-I: IC Fabrication and Technologies [12 Periods]
IC Fabrication: Steps in Fabrication-Oxidation, Lithography, Diffusion, Ion implantation, Encapsulation and Metallization.
IC Technologies – Review of Enhancement and Depletion MOS transistors, NMOS, PMOS & CMOS fabrications, Comparison of NMOS, CMOS & BiCMOS technologies.

MODULE -II: Basic Electrical Parameters [12 Periods]
I_{ds}-V_{ds} relationships, MOS transistor threshold Voltage (Vt), transconductance(gm), output conductance(gds) & figure of merit(wo).
Pass transistor, NMOS Inverter, Determination of pull-up to pull-down ratios, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters, Latch-up in CMOS circuits.

MODULE-III: VLSI Circuit Design Processes [12 Periods]
VLSI Design Flow, MOS Layers, Stick Diagrams, Lambda based Design Rules and Layout, 2 µm CMOS Design rules for wires, Contacts and Transistors, Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits- Scaling models, Scaling function for device parameters, Limitations of Scaling.

MODULE-IV: Basic Circuit Concepts and Gate Level Design [12 Periods]
Basic Circuit Concepts: Sheet Resistance R_s and Gate Capacitance C_g, Wiring Capacitances, Fan-in and fan-out, Choice of layers.
Gate Level Design: Logic Gates using CMOS and complex gates, Switch logic, Alternate gate circuits – Pseudo NMOS logic, Dynamic CMOS logic, Clocked CMOS logic(C^2MOS) and Cascaded Voltage Switch logic(CVSL).

MODULE-V: Data Path Subsystems, ASIC's and PLD's [12 Periods]
Data Path Subsystems: Subsystem Design – Barrel Shifter, Carry Select and Carry look Ahead Adder, Serial-Parallel and Braun Array Multiplier.
Application Specific Integrated Circuits – Channel gate array, Channel less gate array and structured gate array.
Programmable Logic Devices - Architectures of CPLDs and FPGAs.

TEXT BOOKS:

1. Kamran Eshraghian, Douglas A. Pucknell, **"Essentials of VLSI circuits and systems"**, PHI, 1st Edition, 2005.(Modules I, II & III)
2. K. Lal Kishore, VSV. Prabhakar, **"VLSI Design"**, I. K international Publishing House Private Ltd, 2009.(Modules IV & V)

REFERENCE BOOKS:
1. Neil H. E Weste, David Harris, Ayan Banerjee, **"CMOS VLSI Design - A circuits and systems perspective"**, Pearson Education, 3rd Edition, 2009.

OUTCOMES:
After completion of the course, students will be able to:
1. Understand the steps involved in IC fabrication and various IC technologies.
2. Draw the layout of any logic circuit using the design rules.
3. Design various adders and multipliers.
4. Understand the Architectures of FPGA and CPLD's.

Malla Reddy Engineering College (Autonomous)

L T P
3 - -

Course Code: 50448   **Credits: 3**

B.Tech.
PRINCIPLES OF COMMUNICATION ENGINEERING
(Open Elective)

PREREQUISITES: Basic Electronic Circuits.

OBJECTIVE: 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"**, 4thEdition, 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:

At the end of the course students are 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.

Malla Reddy Engineering College (Autonomous)

L T P
3 - -

Course Code: 50449   **Credits: 3**

B.Tech.
EMBEDDED SYSTEM DESIGN
(Open Elective)

PREREQUISITES: Microprocessors and Microcontrollers.

OBJECTIVE: 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 ofEmbedded 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 SynchronizationTechniques, 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:

At the end of the course students are 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.

Malla Reddy Engineering College (Autonomous)

L T P
3 --

Course Code: 52501   Credits: 3

FUNDAMENTALS OF GEOLOGY
(Open Elective)

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: **[12 Periods]**
Mineralogy :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-A:Structural Geology   **[6 Periods]**
Strike and Dip, Fundamental types, characteristic features and mechanics of folds.
PART-B: **[6 Periods]**
Faults, joints (fractures) and unconformities. Foliation and Lineation.

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: Mining engineering students are expected to know about the geology of the ground in which miningactivity is proposed or in vogue. This course gives opportunity to 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.

Malla Reddy Engineering College (Autonomous)

L T P
3 --

Course Code: 52511   **Credits: 3**

MINE CONSTRUCTION ENGINEERING
        (Open Elective)
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 heap stead.
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. Underground 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. Rzhevsky- Mir Publications.
REFERENCE BOOKS:
    1. Working of Mineral Deposits—G. Popov, International Law & Taxation Publishers
    2. Bokey ―Mining.

OUTCOMES: Students can get knowledge of selection of suitable site for mines, different sinking methods, procedureof laying lining, Scheduling for mine construction.

Malla Reddy Engineering College (Autonomous)

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3 --

Course Code: 52528   **Credits: 3**

INTRODUCTION TO MINERAL PROCESSING
(Open Elective)
PRE-REQUISITE: Development of Mineral Deposits

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

MODULE-I: Introduction   **[12 Periods]**
Scope, objectives and limitations of mineral processing, liberation and beneficiation characteristics ofminerals and coal.
Comminution:
Theory and practies of crushing and grinding; different types of crushing an grinding equipments – their applications and limitations.

MODULE-II: Size Separation   **[12 Periods]**
Laboratory size analysis and interpretation; settling of solids in fluids; industrial screens,
Gravity Concentration Methods:
Jigging, Heavy media separation, flowing film concentrators–theory, applicationsand limitations.

MODULE-III:
PART-A: **[6 Periods]**
Mechanicalclassifiers and hydro cyclones.
PART-B: Froth Floatation   **[6 Periods]**
Physico-chemical principles, reagents, machines, floatation of sulphides, oxides and coal.

MODULE-IV: Electrical Methods of Concentration   **[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 AWills, Elsevier.

REFERENCE BOOKS:

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

OUTCOMES:
Student can understand characteristics and processing of minerals and size separation after crushing,different methods of separation, flow charts for coal, zinc, iron and manganese.

Malla Reddy Engineering College (Autonomous)

L T P
2 2 -

Course Code: 50H08   **Credits: 3**

B.Tech
INTERPRETATION OF LITERATURE AND ANALYTICAL WRITING
(Open Elective)

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 skillswhile   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 :

- Students are capable of critical thinking and analytical writing.

- Learners would get real life experiences through interpretation of literature.

- Students learn strategies for becoming accurate readers and critical analysts

- Students are capable of logical thinking towards social, political, economical, legal and technological issues.

- They are capable of drawing their career vision and mission independently.

Malla Reddy Engineering College (Autonomous)

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2 2 -

Course Code: 50H09   **Credits: 3**

B.Tech
BUSINESS COMMUNICATION
(Open Elective)

Objectives

- To upgrade the learner's communication and presentation skills and to make the student'scompetent 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

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

Informal and Formal conversation , Verbal and Non-verbal communication.Barriers to effective communication- Kinesics

MODULE – III :Reading skills

Types of reading –reading for facts, guessing meaning from context, strategies of reading-scanning, skimming, inferring meaning, critical reading,.

MODULE – IV: Writing and compositionII

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

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

- The learner will understand the importance of non-verbal signals in communication.
- The learner will be confident to participate in business meetings
- The learner will be encouraged in all- round development by focusing on soft skills
- The learner will be aware of importance of soft skills in the real time situations.

Malla Reddy Engineering College (Autonomous)

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2 2 -

Course Code: 50H10   **Credits: 3**

B.Tech
WORLD LITERATURES
(Open Elective)

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 :ChimamandaNgoziAdichie, Wole Soyinka, E. C. OsonduStoryAfrica.inc, America, 2010
Our Non-veg Cow and Other Stories MahāśvetāDebī, 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**/indian**poetry**anthology/**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.theliftedbrow.com/post/.../an-australian-**short-story**-by-**ryan**-**oneill**
www.universeof**poetry**.org/australia.shtml
www.famouspoetsandpoems.com › Poets › Wole Soyinka
www.goodreads.com
www.africanwriterstrust.org

Outcomes:

- The students would have learnt about the literatures of different nations and continents.
- The students are 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.

Malla Reddy Engineering College (Autonomous)

L T P
2 2 -

Course Code: 50B20   **Credits: 3**

B.Tech
ADVANCED PHYSICS FOR ENGINEERS
(Open Elective)

Prerequisites: Applied Physics – I & II

Objectives: Theobjective of this course is to make the students familiar with the recent advanced concepts in physics.

Module-I: Special Theory of Relativity: **[9 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   **[9 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   **[7 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   **[7 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   **[9 Periods]**
Important features of photonic crystals, Presence of photonic band gap, anomalous group velocity dispersion, Microcavity, 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   **[9 Periods]**
Single, poly and amorphous silicon, GaAs, CdS, Cu_2S, CdTe; Origin of photovoltaic effect, Homo and hetero junction, working principle of solar cell, Evaluation ofSolar cell parameters, I-V, C-V and C-fcharacteristics.

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. BEA 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

Malla Reddy Engineering College (Autonomous)

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2 2 -

Course Code: 50B21   Credits: 3

B.Tech
NANO MATERIALS: SYNTHESIS AND CHARACTERIZATION
(Open Elective)

Prerequisites: Applied Physics – I & II

Objectives: The objective is to provide different methods of synthesis and characterizationof nano material.

Module-I: Physical Methods   **[9 periods]**
Bottom-up approachand Top-down approach, Inert gas condensation, Arc Discharge, lasers ablation, laser pyrolysis, ball milling, molecular beam epitaxial, and electro deposition.

Module-II: Chemical methods   **[8 periods]**
Nanocrystals by chemical reduction, photochemical synthesis, electrochemical synthesis,Nano crystals of semiconductors.

Module-III: Thermal Methods
III A-Thermal Methods: **[8 periods]**
Thermolysisroute – spray pyrolysis and solved metal atom dispersion, sol-gel method solvothermal and hydrothermal routes, solution combustion synthesis, CVD method.

III B: Surface Characterization   **[8 periods]**
Scanning electron microscopy (SEM), Transmission electron microscopy (TEM). Photo luminescence Spectroscopy.

Module-IV: Compositional and structural Characterization techniques
                                                        [8 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[8 periods]
Carbon Nano Tube (CNT) – Single-Wall Carbon Nano Tube (SWCNT), Multi-wall carbon Nano tube (MWCNT), Activated carbon, Fullerene, Graphene, Quantum wire and Quantum dots

Text Books:

1. C N R Rao, A Muller and A K Cheetham "**The chemistry of Nanomaterials: Synthesis, Properties   and Appliocations**" John Wiley, First Edition, 2004
2. Hari Singh Nalwa, "**Nanostructured Materials and Nanotechnology**", Academic Press, First Edition, 2002.

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 andNanophysics**", 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 andNanotechnology**". Tata McGraw-HillPublishing 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.

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L T P
2 2 -

Course Code: 50B22   **Credits: 3**

B.Tech
NDT AND VACUUM TECHNOLOGY
(Open Elective)

Prerequisites: 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   [6 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   [9 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   [8 Periods]
Molar flow, Mass flow and throughput; Rota meters and chokes; differential pressure techniques;

Module – IV: Pressure gauges   [8 Periods]
Classification, Direct and indirect gauges, Indirect gauges – Pirani gauge, Thermocouple gauge, Ionization gauge, hot cathode gauge, Penning gauge

Module – V: Vacuum Pumps   [9 Periods]
Introduction, Pumping speed, Rotary vane pump, Turbo molecular pump, Diffusion pumps

Text Books:

1. B K Pandey, S Chaturvedi, **"Engineering Physics"**, Cengage learning, 1st Edition, 2014
2. John. F. O'Hanlon, **"A User's guide to Vacuum technology",** Wiley, 3rd Edition, 2003

Reference Books:

1. M R Srinivasan, **"Physics for Engineers"**, New Age international, 1st reprint, 2007
2. R K Gaur and S L Gupta, "**Engineering Physics**", Dhanpat rai, Reprint, 2006

3. Krishna Seshan, "**Hand Book of Thin film deposition**", Noyes, 2nd Edition, 2002

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.

Malla Reddy Engineering College (Autonomous)

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22 -

Course Code: 50B17   **Credits: 3**

B.Tech
CHEMISTRY OF ENGINEERING MATERIALS
(Open Elective)

Objectives:

The objective is to make the students know about the Concept of phase rule and alloys, phase diagrams of different systems. To give knowledge to the students regarding lubricants, abrasives, glass, ceramics, re-fractories and adhesives. To make the students to understand the basic concepts of chemistry to develop futuristic materials for high-tech applications in the area of engineering.

Module-IPhase Rule and alloys   **periods:10**

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-IILubricants, Abrasives and Adhesives   **periods:9**

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-IIICement and Concrete   **periods:8**

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   **periods:9**

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-VPolymers and Composite materials   **periods:9**

Structure and properties of polymers-rubber –classification-vulcanization of rubber – preparation properties and application of Buna-S and Buna-N and Thiokol rubber. Biogradable polymers- poly vinyl acetate and poly lactic acid. Liquid crystals-Introduction-structure of liquid crystal forming compounds-classification-chemical properties-importance and applications.

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:

- Ability to practice professional chemical - polymer engineering knowledge for sustainabledevelopment.
- Be able to apply core concepts in Materials Science to solve engineering problems.

Malla Reddy Engineering College (Autonomous)

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2 2 -

Course Code: 50B18   **Credits: 3**

B.Tech
NANO CHEMISTRY
(Open Elective)

<u>Objectives:</u>

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   **Periods: 8**
NANO CHEMISTRY-I
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   **Periods: 9**
NANO CHEMISTRY-II
Properties of nano materials-Electronic properties, Energy bands and gaps in semiconductors, Fermi   surfaces-Optical   properties-   Fluorescence/luminescence, photoluminescence/fluorescence, electroluminescence, quantum dot. Magnetic properties-mechanical properties-thermal properties.

MODULE-III   **Periods: 9**
INSTRUMENTAL ANALYSIS
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   **Periods: 10**
 CARBON NANO TUBES AND APPLICATION
Carbon Nano structures ,types and preparation of Carbon Nano tubes.Nano structured crystals. Graphene, Carbonnano-fibers- Carbon clusters and Fullerenes- optical and telecommunication applications. Organic Nano Solar cells and its applications.

MODULE-V   **Periods: 9**
ENVIRONMENTAL NANOTECHNOLOGY
Implications of Nanotechnology & Research needs-Nanostructured Catalysts TiO2 Nanoparticles for Water purification- Nanomembranes in Drinking water treatment and desalination, Nanomembranes in Sea desalination-Nanoparticles 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 - Pearsoneducation.

3. Hand book of Nano structured materials; Vol I to V Bio Ethics Readings and cases by Branch.

4. Nano: The Essentials – Understanding Nano Scinece 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:
- The students become aware about the synthesis of nanostructure materials.
- The learners get knowledge about the properties of nano materials and instrumental analysis.
- The students can come to know about the Carbon nano tubes, Carbon nano-fibers, nano structured Catalysts and Organic nano solar cells.

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2 2 -

Course Code: 50B19   Credits: 3

B.Tech
PHOTOCHEMISTRY AND SPECTROSCOPY
(Open Elective)

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: **Periods:9**
Introduction   to photochemistry, atomic orbitals,molecular orbitals,thermal and photochemical reactions. Fundamental principles of photochemistry-Interaction of light with chemical substances.absortion spectra, electronic transition. spin multiplicity, singlet and triplet of excited state

Module –II: Photochemistry II: **Periods:8**
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: **Periods:10**
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: Periods:9
Introduction- basic principles, Instrumentation. Identification of some functional groups applications for qualitative and quantitative analysis.

Module –V: Nuclear magnetic resonance spectroscopy: **Periods:9**
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,

(**6thedition**).

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 Pu8blishers and distributors.

8. **Instrumental methods of chemical analysis** – By Scoog and West .

Outcomes:

- The students become aware about the light matter interaction.
- The learners get knowledge about the usage of UV-Visible, IR & NMR radiations for structural identification of matter.

Malla Reddy Engineering College (Autonomous)

L T P
2 2 -

Course Code: 50B23   **Credits: 3**

B.Tech

ADVANCED OPTIMIZATION TECHNIQUES

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 Optimition: **[8Periods]**
One dimensionalOptimization 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 – unconstrainedG.P
Dynamic Programming: **[8 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: **[8Periods]**
Formulation – Sensivity analysis. Change in the constraints, costcoefficients, coefficients of the constraints, addition and deletion of variable, constraints. Simulation – Introduction

MODULE V
Stochastic Programming: **[8 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. Kasan & Kumar / **Introductory to operation research** /Springar/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:

- By the end of the course student will be able to develop models of optimization

- By the end of the course the student should have developed the skills to consider real-world problems and determine whether or not linear programming is an appropriate modeling framework.
- Solve the models for their optimal solutions; interpret the models' solutions and infer solutions to the real-world problems

Malla Reddy Engineering College (Autonomous)

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2 2 -

Course Code: 50B24   Credits: 3

B.Tech
MATHEMATICAL MODELLING
(Open Elective)

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:
Mathematical Model, types of Mathematical models, Procedure of modeling, Linear Growth and
Decay Models, Non-Linear Growth and Decay Models, Mathematical Modeling in DynamicsThrough Ordinary Differential Equations of First Order,

MODULE-II: Mathematical Modeling through Systems of Ordinary Differential Equations of the First Order
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 OrdinaryDifferential Equations of First Order.

MODUELE-III: Mathematical Modelling Through Ordinary Differential Equations of Second Order
Mathematical Modeling of Planetary Motions, Mathematical Modeling of CircularMotion and Motion of Statellites, 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
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 Equations
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:
- Types of models (static, discrete time, continuous time, stochastic) with case studies chosen from population dynamics and other fields can to be determined.
- Identify the most important processes governing the problem (theoretical assumptions)
- Identify the state variables (quantities studied)
- Identify the basic principles that govern the state variables (physical laws, interactions)
- Express mathematically these principles in terms of state variables (choice of formalism)

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2 2 -

Course Code: 50B25
Credits: 3

B.Tech
DIFFERENTIAL EQUATIONS AND DYNAMICAL SYSTEMS
(Open Elective)

Course Objectives:

- *The aim* is to give a self contained introduction to the field of or- dinary *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* to

MODULE-I : Linear Systems , Uncoupled Linear Systems , Diagonalization , Exponentials of Operators , Linear Systems .

MODULE-II: Complex Eigen values, Multiple Eigen values, Jordan Forms , Stability Theory Non homogeneous Linear Systems.

MODULE-III: The Stable Manifold Stability and Liapunov Functions , Saddles, Nodes, Foci and Centers Global Theory, Dynamical Systems and Global Existence Theorems .

MODULE-IV: Limit Sets and Attractors, The Stable Manifold Theorem for Periodic , Global Phase Portraits and Separatrix Configurations Structural Stability , Higher Codimension Bifurcations at Nonhyperbolic Equilibrium Points.

MODULE-V: 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, 6ht Edi, 2013, Chapman & Hall/ CRC
2. Advanced Engineering Mathematics, Michael Greenberg, Second Edition. Pearson Education.

Course Outcomes:

- By the end of the course the student develops the theory of *dynamicalsystems* systematically
- The students will learn to analyze non-linear systems described for diagonalization.
- The student has knowledge of basic concepts and methods from the theory of differential equations and *dynamical systems.*