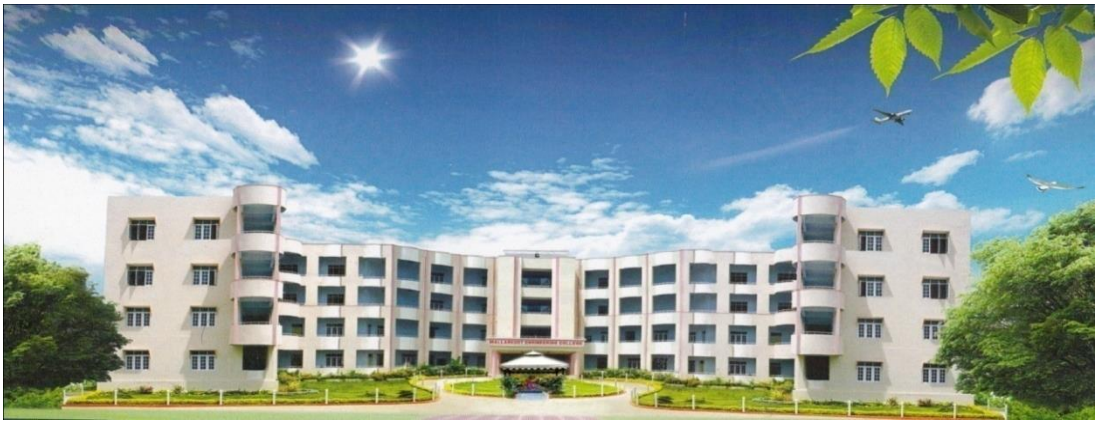
ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABUS

Effective from the Academic Year 2020-21 onwards

Course Structure and
Syllabus for II and III & IV Years
B.Tech. CSE (Cyber Security) Programme.
(MR20 Regulations – Effective from Academic Year 2020-21 onwards)



For

B.Tech. - Four Year Degree Programme

MALLA REDDY ENGINEERING COLLEGE
(Autonomous)

(An UGC Autonomous Institution, Approved by AICTE and Affiliated to JNTUH, Hyderabad)
Recognized under section 2(f) &12 (B) of UGC Act 1956, Accredited by NAAC with 'A' Grade (II Cycle) and NBA
Maisammaguda, Dhulapally (Post Via Kompally), Secunderabad - 500 100.
Website: www.mrec.ac.in E-mail: principal@mrec.ac.in

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)
MR20 – ACADEMIC REGULATIONS (CBCS)
for B.Tech. (REGULAR) DEGREE PROGRAMME

Applicable for the students of B.Tech. (Regular) programme admitted from the Academic Year 2020-21 onwards

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

VISION

To be a premier center of professional education and research, offering quality programs in a socio-economic and ethical ambience.

MISSION

- To impart knowledge of advanced technologies using state-of-the-art infrastructural facilities.
- To inculcate innovation and best practices in education, training and research.
- To meet changing socio-economic needs in an ethical ambience.

DEPARTMENT VISION

To attain global standards in Computer Science and Engineering education, training and research to meet the growing needs of the industry with socio-economic and ethical considerations.

DEPARTMENT MISSION

- To impart quality education and research to undergraduate and postgraduate students in Computer Science and Engineering.
- To encourage innovation and best practices in Computer Science and Engineering utilizing state-of-the-art facilities.
- To develop entrepreneurial spirit and knowledge of emerging technologies based on ethical values and social relevance.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO 1: To impart with a sound knowledge in scientific and engineering technologies necessary to formulate, analyze, design and implement solutions to computer technology related problems.

PEO 2: To carry out research in frontier areas of computer science and engineering with the capacity to learn independently throughout life to develop new technologies.

PEO 3: To train to exhibit technical, communication and project management skills in their profession and follow ethical practices.

PEO 4: To possess leadership and team working skills to become a visionary and an inspirational leader and entrepreneur.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO 1: Apply the knowledge gained during the course of the program from mathematics, basics Computing, Basic Sciences and all computer science courses in particular to identify, formulate and solve real life complex engineering problems faced in industries and /or during research work with due consideration for the public health and safety, in the context of cultural, societal, and environmental situations.

PSO 2: provide socially acceptable technical solutions to complex computer science engineering problem with the application of modern and appropriate techniques for sustainable development relevant to professional engineering practice.

PSO 3: Comprehend and write effective project in multi disciplinary environment in the context of changing technologies.

PROGRAMME OUTCOMES (POs)

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

1. **Malla Reddy Engineering College (Autonomous) (MREC-A)** offers **Four** Year (**Eight** Semesters) **Bachelor of Technology** (**B.Tech**.) with Choice Based Credit System (CBCS) in the following Branches of Engineering.

S. No.	Branch Code	Branch	Intake
1	01	Civil Engineering (CE)	120
2	02	Electrical and Electronics Engineering (EEE)	60
3	03	Mechanical Engineering (ME)	120
4	04	Electronics and Communication Engineering (ECE)	180
5	05	Computer Science and Engineering (CSE)	240
6	12	Information Technology (IT)	60
7	62	Computer Science and Engineering (Cyber Security)	60
8	66	Computer Science and Engineering (AI &ML)	60
9	67	Computer Science and Engineering (Data Science)	60
10	69	Computer Science and Engineering (IOT)	60
11	25	Mining Engineering (Min.E)	60

2. Eligibility for Admission

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

2.2 The medium of instructions for the entire B.Tech. programme will be ENGLISH.

3. B.Tech. Programme Structure & Duration of Study

3.1 A student after securing admission shall pursue the B.Tech. programme in a minimum period of **four** academic years (8 semesters) and a maximum period of **eight** academic years (16 semesters) starting from the date of commencement of first year first semester. Further 2 years of extension is allowed for appearing examinations, failing which student shall forfeit seat in B.Tech. Course. The total credits for the entire B.Tech. programme is 160 as prescribed by AICTE. Each student shall secure 160 credits (with CGPA $\geq$ 5) required for the completion of the B.Tech. programme and award of the B.Tech. degree*.

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

3.2.1 Semester Scheme:

Each B.Tech. programme is of 4 academic years (8 Semesters), with the academic year being divided into two semesters of 22 weeks (≥90 instructional days) each, having **'Continuous Internal Evaluation (CIE)'** and **'Semester End Examination (SEE)'** under Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC. The Curriculum/ Course Structure is defined based on the model curriculum defined by AICTE.

3.2.2 Credit Courses:

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

- One Credit - for one hour/ Week/ Semester of Lecture (L) / Tutorials (T).
- One Credit - for two hours/ Week/ Semester of Practical's (P).

Courses like Environmental Sciences, Induction Programme, Gender Sensitization and students activities like Internship, Sports/Yoga/NSS and courses relevant to emerging technologies are identified as Mandatory/Audit courses. These courses will not carry any credits.

3.2.3 Subject/ Course Classification:

All subjects/ courses offered for the B.Tech. Programmes are broadly classified as follows.

(a) Foundation Courses (FC)
(b) Core Courses (CC)
(c) Elective Courses (EC)
(d) Mandatory Courses (MC)
(e) Audit Courses (AC)

- **Foundation Courses (FC**) are further categorized as:
  (i) Humanities and Social Sciences including Management courses (HSMC)
  (ii) Basic Science Courses (BSC)
  (iii) Engineering Science Courses (ESC).
- **Core Courses (CC) and Elective Courses (EC)** are categorized as
  (i) Professional Core Courses (PCC)
  (ii) Professional Elective Courses (PEC)
  (iii) Open Elective Courses (OEC)
  (iv) Project (PROJ)
- **Mandatory Courses** (**MC** - Non-credit with evaluation).
- **Audit Courses** (**AC** – Non- credit without evaluation).
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3.2.4 Course Nomenclature:

The curriculum nomenclature or course structure grouping for each of the B.Tech. Programmes, is as listed below (along with AICTE specified range of total credits).

Sl. No.	Classification		Course Work – Subject Area	Distribution of credits	AICTE Suggested Breakup of Credits (Total 160)
	AICTE	UGC			
1	HSMC	Foundation Courses	Humanities and Social sciences including Management courses.	**11**	12
2	BSC		Basic Sciences (BSC) including Mathematics, Physics, Chemistry and Biology.	**21**	25
3	ESC		Engineering Science Courses (ESC) including Engineering Workshop, Engineering Graphics, Basics of Electrical and Electronics / Mechanical / Computer Engineering.	**39**	24
4	PCC	Core Courses	Professional core Courses are relevant to the chosen specialization/branch; [May be split into Hard (no choice) and Soft (with choice)], if required.	**47**	48
5	PEC	Professional Electives	Professional electives are relevant to the chosen specialization/ branch.	**18**	18
6	OEC	Open Electives	Open electives are the courses from other technical and/or emerging subject areas.	**9**	18
7	PROJ	Project	Mini Project, Project and Seminar	**15**	15
8	MC	Mandatory Courses	These courses are non-credit courses with evaluation.	**-**	-
9	AC	Audit	These courses are non-credit courses	**-**	-

		Courses	without evaluation.		
Total credits for B.Tech. Programme					**160**

4.0 Course Registration

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

4.2 The students have to submit registration form (Online/Offline) to the Academic section of the college within 15 days from the commencement of class work for the first semester. The registration forms for the *subsequent semester* shall be completed before the commencement of SEEs (Semester End Examinations) of the *current semester*.

4.3 A Student has to submit the registration form through the Head of Department (a copy of it being retained with Head of Department).

4.4 A Student may be permitted to register for the Subjects/ Course of CHOICE with a typical deviation of ±3 credits of the semester, based on his PROGRESS and SGPA/CGPA and completion of the 'PRE-REQUISITES' as indicated for various Subjects/ Courses in the department course structure and syllabus contents. It needs specific approval and signature of the Faculty Advisor/Counselor and Head of the Department, 'within a period of 15 days' from the beginning of the current semester.

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

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

4.7 Open Electives: A student has to complete 3 Open Electives during the period of B.Tech. Programme. However, the student cannot opt for an open elective subject offered by their own (parent) department, if it is already listed under any category of the subjects offered by parent department in any semester.

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

4.9 For Audit Courses, a '**Satisfactory Participation Certificate**' from the authorities concerned for the relevant semester is essential. No Marks or Credits shall be awarded for these activities.

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

5.0 Subjects/ Courses to be offered

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

5.2 A Subject/ Course may be offered to the students, only if a minimum of **40 students** opt for the same. The maximum strength of a section is limited to 72.

5.3 More than one teacher may offer the same subject (Lab / Practical may be included with the corresponding theory subject in the same semester) in any semester. However, selection choice for students will be based on 'First Come First Serve' basis and 'CGPA Criterion'(i.e., the first focus shall be on early On-Line Entry from the student for registration in that semester and the second focus, if needed, will be on CGPA of the student).

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

6.0 Attendance Requirements:

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

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

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

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

6.5 Students whose attendance is < 65% are not eligible to register for Semester End Examinations, they get detained and their registration for that semester shall stand cancelled. They will not be promoted to the next semester. They may seek re-registration for all those Subjects registered in that Semester in which he got detained, by seeking re-admission for that semester as and when offered; in case if there are any Professional Electives and/ or Open Electives, the same may also be **re-registered** if offered, however, if those electives are not offered in later semesters, then alternate electives may be chosen from the **same** set of elective subjects offered under that category.

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

7.0 Academic Requirements: The following Academic Requirements have to be satisfied, in addition to the attendance requirements mentioned in item No.**6.**

7.1 A student shall be deemed to have satisfied the Academic requirements and earned the credits allotted to each Subject/ Course, if he / she secures not less than 35% marks in the Semester End Examination and with a minimum of 40% of the total marks allocated for the course; in terms of Letter Grades, this implies securing 'P' Grade or above in that Subject/ Course. If the student secured 'F' grade in any subject he/she can apply for recounting / revaluation by paying prescribed fee. If the student is not satisfied after the results declaration of recounting / revaluation he/she can apply for challenge valuation with the prescribed fee. College appoints a faculty member; student can bring another faculty member who taught the respective subject at least once (proof should be

provided). The faculty member should be from any autonomous college affiliated to JNTUH or JNTUH constituent colleges.

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

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

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

S. No.	Promotion	Conditions to be fulfilled
1.	First year first semester (I Semester) to first year second semester (II Semester)	• Regular course of study of first year first semester. (I Semester)
2.	First year second semester (II Semester) to second year first semester (III Semester)	• Regular course of study of first year second semester (II Semester). • Must have secured at least 50% credits up to first year second semester (II Semester) from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3.	Second year first semester (III Semester) to second year second semester (IV Semester)	• Regular course of study of second year first semester (III Semester)
4.	Second year second semester (IV Semester) to third year first semester (V Semester)	• Regular course of study of second year second semester (IV Semester). • Must have secured at least 60% credits up to second year second semester (IV Semester) from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5.	Third year first semester (V Semester) to third year second semester (VI Semester)	• Regular course of study of third year first semester (V Semester).

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

7.4 A Student shall register for all subjects covering 160 credits as specified and listed (with the relevant Course/ Subject Classifications as mentioned) in the Course Structure, fulfils all the Attendance and Academic requirements for 160 credits securing a minimum of 'P' Grade (Pass Grade) or above in each subject and earn 160 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 B.Tech. Programme.

7.5 After securing the necessary 160 credits as specified for the successful completion of the B.Tech. Programme, the student can avail exemption of two subjects up to 6 credits, that is, one open elective and one professional elective subject or two professional elective/open electives subjects for optional drop out from these 160 credits earned; resulting in 154 credits for B.Tech. Programmeperformance evaluation, i.e., the performance of the student in these 154 credits shall alone be taken into account for the calculation of the final CGPA (at the end of B.Tech. Programme, which takes the SGPA of the IV year II semester into account) and shall be indicated in the grade card of IV year II semester. However, the performance of student in the earlier individual semesters, with the corresponding SGPA and CGPA for which grade cards have already been given will not be altered.

7.6 If a student registers for some more **'Extra Subjects'** (in the parent Department or other Departments/ Branches of Engineering) other than those listed subjects totaling to 160 credits as specified in the Course Structure of his/ her department, the performances in those 'extra Subjects' (although evaluated and graded using the same procedure as that of the required 160 credits) will not be taken into account while calculating the SGPA and CGPA. For such extra subjects registered, Letter Grade alone will be indicated in the Grade Card, as a performance measure, subject to completion of the Attendance and Academic Requirements as stated in items No.6 and 7.1 to7.5.

7.7 When a student is detained due to shortage of attendance in any semester, he/ she may be re-admitted when the same semester is offered in the next academic year for fulfillment of academic requirements. The academic regulations under which student has been readmitted shall be applicable. However, no Grade Allotments or SGPA/ CGPA calculations will be done for that entire semester in which he/ she got detained.

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

7.9 A student eligible to appear in the Semester End Examination in any Subject/ Course, but absent from it or failed (thereby failing to secure 'P' Grade or above) may reappear for that Subject/ Course at the supplementary examination as and when conducted. In such cases, his / her Internal Marks (CIE) assessed earlier for that Subject/ Course will be carried over and added to the marks to be obtained in the SEE supplementary examination, for evaluating his/ her performance in that subject.

8.0 Evaluation, Distribution and Weightage of Marks

8.1.1 The performance of a student in each semester shall be evaluated subject - wise (irrespective of credits assigned) for 100 marks for Theory, Practical's, Seminar, Drawing / Design, Mini Project, Project and Minor Courses etc.,. The Theory / Practical courses are evaluated with two components. 1. Continuous Internal Evaluation (CIE), 2. Semester End Examination (SEE). The distribution of 30 Marks for CIE and 70 Marks for SEE decided in the Academic Council.

8.2 Theory Courses:

8.2.1 Continuous Internal Evaluation (CIE):

CIE shall be carried out for all courses of B.Tech. Programme twice in a semester (2 Midterm examinations) with the help of objective evaluation, subjective evaluation and regular assignments. Each mid-term examination shall consist of objective test with a duration of 20 minutes, subjective paper shall be conducted with a duration of 90 minutes and one assignment. The composition of objective test, subjective test and assignment shall be evaluated for 40%, 50% and 10% of the allocated internal marks.

Mid - Term Examination – UG				
Part	Type of Questions	No. of Questions	Marks per Question	Total
Part - A	Multiple – Choice Questions	20	1	20
Part - B	Internal choice questions (Module-wise)	5	5	25
Mid Term Exam Total				45
Assignment				5
Grand Total				**50**

*The CIE will be conducted for 50 marks and scaled to 30 marks.

The first mid-term examination shall be conducted for the first 50% of the syllabus, and the second mid-term examination shall be conducted for the remaining 50% of the syllabus. First Assignment should be submitted before the conduct of the first mid-term examinations, and the Second Assignment should be submitted before the conduct of the second midterm examinations.

The weightage for the midterm examination shall be given as average of both mid-term examination. The student shall appear for both midterm examinations, in case of any specific reason the student appears only one midterm examination, 50% weightage of that examination shall be considered.

8.2.2 Semester End Examination (SEE):

Semester End Examination (SEE) shall be conducted for all courses of B.Tech. Programmes at the end of the Semester. Duration of the examination is 3 hours. The paper setting and

evaluation of all courses carried out by external examiners. The examiners will be selected by the Chief Controller of Examinations/Principal, from the panel of examiners submitted by the head of the respective department.

Semester End Examination - UG			
Type of Questions	No. of Questions	Marks per Question	Total
Internal choice questions (Module-wise)	5	14	70

8.3 Practical Courses:

8.3.1 Continuous Internal Evaluation (CIE):

CIE marks shall be awarded with a distribution of 40% for day-to-day performance and timely submission of lab records, 40% for internal lab exam (average of the two exams) and 20% for viva-voce. The CIE will be conducted for 50 marks and scaled to 30 marks.

8.3.2 Semester End Examination (SEE):

SEE marks shall be awarded with a distribution of 20% for design/procedure/schematic diagram of the given experiment, 40% for conduction of experiment, 20% for results and 20% for viva-voce. For conducting SEE (with duration of 3hours), one internal examiner and one external examiner will be appointed by the Chief Controller of Examinations/Principal of the college. The external examiner should be selected from the outside college among the autonomous/reputed institutions from a panel of three examiners submitted by the concerned Head of the Department.

8.4 Engineering Graphics:

CIE: There will be 30% of total marks for CIE shall be awarded with a distribution of 40% of the CIE marks for day to day performance and timely submission of drawing sheets and remaining 60% of CIE marks for midterm examinations.

The distribution of marks for CIE is given below

CIE for Engineering Graphics				
Part	Type of Questions	No. of Questions	Marks per Question	Total
Part - A	Day – to – Day Work			20
Mid – Term Examination				
Part - B	Internal choice questions (Module-wise)	5	6	30
Total				50

*The CIE will be conducted for 50 marks and scaled to 30 marks.

The distribution of marks for SEE is given below

SEE for Engineering Graphics			
Type of Questions	No. of Questions	Marks per Question	Total
Internal choice questions (Module-wise)	5	14	70

8.5 Machine Drawing:

CIE: There will be 30% of total marks for CIE shall be awarded with a distribution of 40% of the CIE marks for day to day performance and timely submission of drawing sheets and remaining 60% of CIE marks for midterm examinations.

The distribution of marks for CIE is given below

CIE for Machine Drawing

Type of Questions	No. of Questions	Marks per Question	Total
Day to Day Work			20
I Mid Term Examination			
Part Drawing (4 out of 6)	4	7.5	30
II Mid Term Examination			
Assembly Drawing (1 out of 2)	1	30	30
Total			50

*The CIE will be conducted for 50 marks and scaled to 30 marks.

The distribution of marks for SEE is given below

SEE for Machine Drawing			
Type of Questions	No. of Questions	Marks per Question	Total
Part A - Part Drawing (2 out of 4)	2	15	30
Part B - Assembly Drawing (Compulsory Question)	1	40	40
Total			70

8.6 Projects:

8.6.1 Internship-III/Mini Project:

There shall be an Internship-III/Mini Project, for which the students will register after the completion of III year II semester (VI Semester) end examinations and pursue it during summer vacation. The evaluation of Mini project will be done at the end of IV Year I semester (VII semester). It shall be evaluated internally for 100 marks. The committee consisting Project Coordinator, Supervisor of the project and one senior faculty of the department will evaluate the Internship-III/Mini Projectand award appropriate Grade, based on the report submitted to the department and presentation provided by the student in front of the committee.

8.6.2 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 for 200 marks. Out of total 200 marks allotted for the major project, 60 marks shall be for CIE (Continuous Internal Evaluation) and 140 marks for the SEE (Semester End Viva-voce Examination). CIE marks shall be awarded by a Departmental Committee consisting of Project coordinator, Supervisor of Major Project and a senior Faculty member, from two reviews (average). Review - I will be conducted within a month from the commencement of class work (problem definition, objective, literature survey and brief description - each 10 marks) and Review - II will be conducted before second mid examination (progress of work, results, discussion and presentation - each 10 marks). The Major Project Viva-voce (SEE) shall be conducted by a committee comprising of an External Examiner, Head of the Department and Project Supervisor. In SEE of 140 marks, 70 marks for working model / simulation / data collection, 35 marks for report preparation and 35 marks for presentation and viva - voce. The external examiner should be selected by Chief Controller of Examinations from outside the college among the autonomous / reputed institutions from a panel of three examiners submitted by the concerned Head of the Department / Board of Studies (BOS) Chairman.

The topics for mini project and seminar shall be different from one another.

The student is deemed to be failed, if he/ she (i) does not submit a report on Project, or does not make a presentation of the same before the external examiner as per schedule, or (ii) secures less

than 40% marks in the sum total of the CIE and SEE taken together. A student who has failed may reappear once for the above evaluation, when it is scheduled again; if student fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

8.6.3 Seminar:

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

8.7 Non-Credit Courses:

8.7.1 Mandatory Courses:

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

8.7.2 Audit Courses:

For Audit Courses offered in any Semester, the student must submit a '**Participation Certificate**' from the concerned authorities.Internship program is also conducted under the category of Audit Courses. The student needs to submit a detailed report to the department after internship program. No marks or Letter Grade shall be allotted for these activities.

9.0 Grading Procedure

9.1 Grades will be awarded to indicate the performance of each student in each theory subject, or Lab/ Practical or Seminar or Project or Mini-Project or Minor Course etc., based on the % of marks obtained in CIE + SEE both taken together as specified in Item No. 8 and a corresponding Letter Grade shall be given.

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

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

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

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

9.5 In general, a student shall not be permitted to repeat any Subject/ Course (s) only for the sake of 'Grade Improvement' or 'SGPA / CGPA Improvement'. However, he / she has to repeat all the

Subjects/ Courses pertaining to that semester, when he / she is detained (as listed in Items Nos.7.7 &7.8).

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

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

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

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

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

where 'i' is the subject indicator index (takes into account all subjects in a semester), 'N' is the number of subjects registered for the semester (as specifically required and listed under the Course Structure of the parent department) is the number of credits allotted to the i^{th} subject and represents the Grade Points (GP) corresponding to the Letter Grade awarded for that i^{th} subject.

9.9 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student over all semesters considered for registration. The CGPA is the ratio of the Total Credit Points secured by a student in all registered courses in ALL semesters and the total number of credits registered in all the semesters. CGPA is rounded off to two decimal places. CGPA is thus computed from the II semester onwards, at the end of each semester, as per the formula.

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

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

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

ILLUSTRATION OF CALCULATION OF SGPA

Course/ Subject	Credits	Letter Grade	Grade Points	Credit Points
Course 1	3	A	8	3 x 8 = 24
Course 2	3	O	10	3 x 10 = 30
Course 3	3	C	5	3 x 5 = 15
Course 4	3	B	6	3 x 6 = 18
Course 5	3	A+	9	3 x 9 = 27
Course 6	1.5	B	6	1.5 x 6 = 09
Course 7	1.5	A	8	1.5 x 8 = 12
Course 8	2	A	8	2 x 8 = 16
	Total = 20			Total Credit Points = 151

SGPA = 151/20 = 7.55

ILLUSTRATION OF CALCULATION OF CGPA:

Semester	Credits	SGPA	Credits X SGPA

Semester I	21	7	21 X 7 = 147
Semester II	19	6	19 X 6 = 114
Semester III	22	6.5	22 X 6.5 = 143
Semester IV	20	6	20 X6 = 120
Semester V	22	5.75	22 X 5.75 = 126.5
Semester VI	18	7.25	18 X 7.25 = 130.5
Semester VII	18	8	18 X 8 = 144
Semester VIII	20	8.5	20 X 8.5 = 170
	160		1095

CGPA = 1095/160 = 6.84

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

9.11 For calculations listed in Item Nos.9.6 to 9.10, performance in failed Subjects/ Courses (securing 'F' Grade) will also be taken into account and the credits of such Subjects/Courses will also be included in the multiplications and summations. However, Mandatory Courses will not be taken into consideration.

9.12 Passing Standards:

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

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

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

9.13 After the completion of each semester, a Grade Card or Grade Sheet (or Transcript) shall be issued to all the registered students of that semester, indicating the Letter Grades and credits earned. It will show the details of the courses registered (Course Code, Title, No. of Credits and Grade Earned etc.), Credits earned, SGPA and CGPA.

10 Declaration of Results

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

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

% of Marks = (final CGPA – 0.5) x 10

11 Award of Degree

11.1 A student who register for all the specified courses as listed in the Course Structure, satisfies all the course requirements, passes all the examinations prescribed in the entire B.Tech. Programme within the specified period (refer 4.1) and secures the required 160 Credits (with CGPA ≥ 5.0) shall be declared to have '**Qualified'** for the award of the B.Tech. Degree in the chosen branch of engineering as selected at the time of admission.

11.2 A student who qualifies for the award of the degree as listed in Item 11.1, shall be placed in one of the following classes:

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

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

11.4 Students will be eligible for the award of '**Gold Medal**', if he/she should have passed all the subjects/courses in first appearance within the first academic years (or eight sequential semesters) from the date of commencement of first year first semester and should have secure CGPA ≥ 8.00 at the end of eight sequential semesters.

11.5 A student will be eligible to get under graduate with honours or additional minor engineering if he/she completes an additional 20 credits through MOOCs.

12 Withholding of Results

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

13 Transitory Regulations

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

1. A student who has been detained in I year of MR15 (2016 admitted)/ MR17/MR18 regulations due to lack of attendance, shall be permitted to join I year I Semester of MR20 regulations and he / she is required to complete the study of B.Tech Programme within the stipulated period of eight academic years from the date of first admission in I Year.
2. A student who has been detained in any semester of II, III and IV years of MR15/MR17/MR18 regulations for want of attendance shall be permitted to join the corresponding semester of MR20 regulations and is required to complete the study of B.Tech., within the stipulated period of eight academic years from the date of first admission in I Year. The MR20 academic regulations under which a student has been readmitted shall be applicable to that student from that semester. See rule (C) for further transitory regulations.

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

1 A student of MR15/MR 17/MR18 regulations, who has been detained due to lack of credits, shall be promoted to the next semester of MR20 regulations only after acquiring the required credits as per the corresponding regulations of his/her first admission. The student is required to complete the B.Tech. Programme within the stipulated period of eight academic years from the year of first admission. The MR20 academic regulations are applicable to a student from the year of readmission onwards. See rule (C) for further Transitory Regulations.

C. **For readmitted students in MR20 regulations**:

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

2 The maximum credits that a student acquires for the award of degree, shall be the sum of the total number of credits secured in all the regulations of his/her study including MR20 regulations. The performance evaluation of the student will be done after the exemption of two subjects if total credits acquired are ≤ 160, (see item 7.5).

3 If a student readmitted to MR20 regulations, has any subject with 80% of syllabus common with his/her previous regulations, that particular subject in MR20 regulations will be substituted by another subject to be suggested by the College Academic Committee (CAC).

Note: If a student readmitted to MR20 regulations, has not studied any subjects/topics in his/her earlier regulations of study which is prerequisite for further subjects in MR20 regulations, the departments concerned shall conduct remedial classes to cover those subjects/topics for the benefit of the students.

14 Student Transfers

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

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

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

15 Scope

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

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

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

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

Academic Regulations for B.Tech.(Lateral Entry Scheme)
w.e.f. the A Y 2021-22

1. **Eligibility for award of B. Tech. Degree (LES)**

   The LES students after securing admission shall pursue a course of study for not less than three academic years and not more than six academic years.

2. The student shall register for 120 credits and secure 120 credits with CGPA ≥ 5 from II year to IV year B.Tech. Programme (LES) for the award of B.Tech. degree. **Out of the 120 credits secured, the student can avail exemption up to 6 credits**, that is, one open elective subject and one professional elective subject or two professional elective subjects resulting in 114 credits for B.Tech. Programme performance evaluation**.**

3. The students, who fail to fulfill the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech. Programme.

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

5. **Promotion Rule:**

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

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

MALPRACTICES RULES

DISCIPLINARY ACTION FOR IMPROPER CONDUCT IN EXAMINATIONS

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

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

	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	
7	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred for two consecutive semesters from class work and all SEE. The continuation of the programme by the student is subject to the academic regulations in connection with forfeiture of seat.
8	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred and forfeits the seat.
9	If student of the college, who is not a student 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 student has appeared including practical examinations and project work of that SEE.
12	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the CCE for further action toward suitable punishment.	

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

Malpractices identified by squad or special invigilators

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

MALLA REDDY ENGINEERING COLLEGE (Autonomous)

COURSE STRUCTURE – B.Tech. CSE (Cyber Security) Programme
(MR20 Regulations - Effective from Academic Year 2020 – 21 onwards)

III SEMESTER							
S. No	**Category**	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	PCC	A0507	Discrete Mathematics	3	-	-	3
2	PCC	A0508	Computer Organization and Architecture	3	-	-	3
3	PCC	A0509	Data Structures	3	-	-	3
4	PCC	A0510	Object Oriented Programming	3	-	-	3
5	PCC	A0511	Operating Systems	3	-	-	3
6	PCC	A0512	Data Structures Lab	-	-	3	1.5
7	PCC	A0513	Object Oriented Programming Lab	-	-	3	1.5
8	PCC	A0514	Operating Systems Lab	-	1	2	2
9	MC	A00M1	Gender Sensitization	-	-	2	-
10	AC	A00A2	INTERNSHIP – I	-	-	-	-
Total				**15**	**1**	**10**	**20**
Total Contact Hours				**26**			

IV SEMESTER							
S. No	**Category**	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	BSC	A0B23	Number Theory	3	-	-	3
2	PCC	A6201	Computer Networks	3	-	-	3
3	PCC	A0515	Database Management Systems	3	-	-	3
4	PCC	A1202	Web Technologies	3	-	-	3
5	PEC-I	A0517	Mobile Application Development	3	-	-	3
		A0518	Free and Open Source Technologies				
		A6601	Fundamentals of Artificial Intelligence				
6	PCC	A0520	Database Management Systems Lab	-	1	2	2
7	PCC	A1203	Web Technologies Lab	-	-	3	1.5
8	PCC	A6202	Computer Networks Lab	-	-	3	1.5
9	MC	A00M2	Environmental Science	2	-	-	-
Total				**17**	**1**	**8**	**20**
Total Contact Hours				26			

V SEMESTER							
S.No	**Category**	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	HSMC	A0H09	Management Fundamentals	3	-	-	3
2	PCC	A6203	Cryptography and network Security	3	-	-	3
3	PCC	A0521	Automata and Compiler Design	3	-	-	3
4	PCC	A0522	Software Engineering & Modeling	3	-	-	3
	PEC-II	A6204	Network coding Theory	3	-	-	3
		A0523	Advanced Databases				
		A0524	Advanced Artificial Intelligence				
		A0525	Semantic Web				
		A0516	Design and Analysis of Algorithms				
	PEC-III	A0526	Internet of Things	3	-	-	3
		A0527	Distributed Systems				
		A6205	Essentials of Network Security				
		A0528	Data Science				
		A0529	Multimedia and Animation Techniques				
7	PCC	A6206	Cryptography and network Security Lab	-	-	3	1.5
8	PCC	A0530	Automata and Compiler Design Lab	-	-	3	1.5
9	MC	A00M3	Quantitative Aptitude & Verbal Reasoning – I	2	-	-	-
Total				**20**	**-**	**6**	**21**
Total Contact Hours :26							

VI SEMESTER							
S.No	**Category**	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	HSMC	A0H08	Engineering Economics and Accountancy	3	-	-	3
2	PCC	A6209	Ethical Hacking	3	-	-	3
3	PCC	A0545	Data Mining	3	-	-	3
	PEC-IV	A6210	Internet Technologies and Services	3	-	-	3
		A0534	Mobile Computing				
		A0519	Cloud Computing				
		A1213	Information Retrieval Systems				
		A6912	Software Quality Assurance and Testing				
5	PEC-V	A6211	Advanced wireless networks	3	-	-	3
		A0537	Natural Language Processing				
		A0546	Block chain Technologies				
		A6212	Crypt Analysis				
		A6213	IT Security Metrics				
6	OEC-I	A0159	Green Building	3	-	-	3
7	HSMC	A0H03	English Communication and Presentation Skills Lab	-	-	2	1
8	PCC	A6214	Ethical Hacking Lab	-	-	3	1.5
9	PCC	A0544	Data Mining Lab	-	-	3	1.5
10	MC	A00M4	Quantitative Aptitude and Verbal Reasoning - II	2	-	-	-
Total				**20**	**-**	**8**	**22**
Total Contact Hours :28							

VII SEMESTER							
S. No.	**Category**	**Course Code**	**Name of the Course**	**Contact Hours / week**			**Credits**
				L	**T**	**P**	
1	PCC	A6215	Digital forensics	3	-	-	4
2	PCC	A0551	Machine Learning	3	-	-	3
3	PCC	**A6217**	**Cyber Security**	3	-	-	3
4	**Professional Elective-VI**						
	PEC-VI	A0554	Data Science	3	-	-	3
			Deep learning				
		A0556	Social Networking				
		A0557	**Human Computer Interaction**				
		A0558	Software Quality Assurance and Testing				
5	OEC-II		**Open Elective-II**	3	-	-	3
			5G Technologies				
		A0540	Ad-hoc & Sensor Networks				
		A6219	**Software Project Management**				
			IOT Cloud Processing and Analytics				
6	OEC-III		**Open Elective-III**	3	-	-	3
		A6915	Edge Analytics				
		A0363	**Renewable Energy Recourses**				
		A6604	Image Processing				
		AB203	Human Resource Management				
7	PCC	A6216	Digital forensics Lab	-	1	2	1.5
8	PCC	A0560	Machine Learning Lab	-	1	2	1.5
9	PRJ	A00P1	Industry Oriented Mini Project			4	2
Total				18	2	8	24
Total Contact Hours				28			

VIII SEMESTER							
S. No.	**Category**	**Course Code**	**Name of the Course**	**Contact Hours / week**			**Credits**
				L	**T**	**P**	
1	PRJ	A00P3	Seminar	-	-	2	1
2	PRJ	A00P2	Major Project	-	-	24	12
Total				-	-	26	13
Total Contact Hours				26			

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: A0507	Discrete Mathematics (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE(DS), CSE(IOT) and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:

This course provides the concepts of mathematical logic demonstrate predicate logic and Binary Relations among different variables, discuss different type of functions and concepts of Algebraic system and its properties. It also evaluates techniques of Combinatorics based on counting methods and analyzes the concepts of Generating functions to solve Recurrence equations.

MODULE I: Mathematical Logic [10 Periods]

Basic Logics - Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology.

Implications and Quantifiers - Equivalence implication, Normal forms, Quantifiers, Universal quantifiers.

MODULE II: Predicate Logic and Relations [10 Periods]

Predicate Logic - Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Proof of automatic Theorem.

Relations - Properties of Binary Relations, equivalence, transitive closure, compatibility and partial ordering relations, Lattices, Hasse diagram.

MODULE III: Functions and Algebraic Structures [10 Periods]

A: Functions - Inverse Function, Composition of functions, recursive Functions - Lattice and its Properties.

B: Algebraic structures - Algebraic systems Examples and general properties, Semi-groups and monoids, groups, sub-groups, homomorphism, Isomorphism, Lattice as POSET, Boolean algebra.

MODULE IV: Counting Techniques and Theorems [09 Periods]

Counting Techniques - Basis of counting, Combinations and Permutations with repetitions, Constrained repetitions

Counting Theorems - Binomial Coefficients, Binomial and Multinomial theorems, principles of Inclusion – Exclusion. Pigeon hole principle and its applications.

MODULE V: Generating functions and Recurrence Relation [09 Periods]

Generating Functions - Generating Functions, Function of Sequences, Calculating Coefficient of generating function.

Recurrence Relations - Recurrence relations, Solving recurrence relation by substitution and Generating functions. Method of Characteristics roots, solution of Non-homogeneous Recurrence Relations.

TEXTBOOKS:

1. J P Tremblay & R Manohar, "**Discrete Mathematics with applications to Computer Science**", Tata McGraw Hill.
2. J.L. Mott, A. Kandel, T.P.Baker "**Discrete Mathematics for Computer Scientists & Mathematicians**", PHI.

REFERENCES:

1. Kenneth H. Rosen, "**Discrete Mathematics and its Applications**", TMH, Fifth Edition.
2. Thomas Koshy, "**Discrete Mathematics with Applications**", Elsevier.
3. Grass Man & Trembley, "**Logic and Discrete Mathematics**", Pearson Education.
4. C L Liu, D P Nohapatra, "**Elements of Discrete Mathematics - A Computer Oriented Approach**", Tata McGraw Hill, Third Edition.

E-RESOURCES:

1. http://www.cse.iitd.ernet.in/~bagchi/courses/discrete-book/fullbook.pdf
2. http://www.medellin.unal.edu.co/~curmat/matdiscretas/doc/Epp.pdf
3. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7xPG734QA9tMJN2ncqS12ZbN7pUSSlWCxSgPOZJEokyWJlxQLYsrFyeITA70W9C8Pg
4. http://nptel.ac.in/courses/106106094/

Course Outcomes:

At the end of the course, a student will be able to

1. **Apply** the concepts of connectives and normal forms in real time applications.
2. **Summarize** predicate logic, relations and their operations.
3. **Describe** functions, algebraic systems, groups and Boolean algebra.
4. **Illustrate** practical applications of basic counting principles, permutations, combinations, and the pigeonhole methodology.
5. **Analyze** techniques of generating functions and recurrence relations.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs)												PSOs		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	
CO1	3	2	2									2			
CO2		2	3									1			
CO3	2	2	3	2	2							2			
CO4	3														
CO5	3														

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: A0508	Computer Organization and Architecture (Common for CSE, CSE(DS), CSE (AI and ML), CSE(Cyber Security), CSE(IOT) and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: No prerequisites

Objectives

1. The purpose of the course is to introduce principles of Digital fundamentals computer organization and the basic architectural concepts.
2. It begins with basic organization, design, and programming of a simple digital computer and introduces simple register transfer language to specify various computer operations.
3. Topics include computer arithmetic, instruction set design, microprogrammed control unit, pipelining and vector processing, memory organization and I/O systems, and multiprocessors.

UNIT – I **[10 Periods]**

Sequential Circuits Fundamentals: Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.

Registers and Counters: Shift Registers – Left, Right and Bidirectional Shift Registers, Applications of Shift Registers - Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters.

UNIT – II **[10 Periods]**

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.

Register Transfer Language and Micro Operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro Operations, Logic Micro Operations, Shift Micro Operations, Arithmetic Logic Shift Unit.

Basic Computer Organization and Design: Instruction Codes, Computer Registers Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input – Output and Interrupt.

UNIT – III **[9 Periods]**

Micro Programmed Control: Control Memory, Address Sequencing, Micro Program Example, Design of Control Unit.

Central Processing Unit: General Register Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control.

UNIT – IV **[10 Periods]**

Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation.

Computer Arithmetic: Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating Point Arithmetic Operations. Decimal Arithmetic Unit, Decimal Arithmetic Operations.

UNIT – V **[9 Periods]**

Input-Output Organization: Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associate Memory, Cache Memory.

Textbook:

1. Computer System Architecture, M. Moris Mano, 3rd Edition, Pearson/PHI.

References:

1. Computer Organization, Car Hamacher, ZvonksVranesic, SafeaZaky, 5th Edition, McGraw Hill.
2. Computer Organization and Architecture, William Stallings 6th Edition, Pearson/PHI.
3. Structured Computer Organization, Andrew S. Tanenbaum, 4th Edition, PHI/Pearson.

E-Resources:

1. https://books.google.co.in/books?isbn=8131700704
2. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7Eh9eBOsT1ELoYpKlg_xngrkluevXOJLs1TbxS8q2icgUs3hL4_KAi5So5FgXcVg
3. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7xAYUzYSlXl4zudlsolr-e7wQNrNXLxbgGFxbkoyx1iN3YbHuFrzI2jc_70rWMEwQ
4. http://nptel.ac.in/courses/106106092/

Outcomes:

1. Understand the basics of instructions sets and their impact on processor design.
2. Demonstrate an understanding of the design of the functional units of a digital computer system.
3. Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory and computer arithmetic operations of binary number system.
4. Design memory organization and control unit operations.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs)												PSOs		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	
CO1	3	2	2									2			
CO2		2	3									1			
CO3	2	2	3	2	2							2			
CO4	3														
CO5	3														

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: A0509	**Data Structures** (Common for CSE, CSE (DS), CSE (AI and ML), CSE (Cyber Security), CSE (IOT) and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: A course on "Programming for Problem Solving "

Course Objectives:

- Exploring basic data structures such as linked list, stacks and queues.
- Introduces a variety of data structures such as dictionaries and hash tables
- To learn non linear data structures i.e. Binary search trees and height balanced trees.
- To understand the graph traversal algorithms and heap sort.
- Introduces the pattern matching and tries algorithms

MODULE-I: **[10 Periods]**

Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

MODULE-II: **[09 Periods]**

Dictionaries: linear list representation, skip list representation, operations - insertion, deletion and searching.

Hash table representation: hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

MODULE-III: **[10 Periods]**

Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, Definition and example of Red –Black, Splay Trees.

MODULE-IV: **[10 Periods]**

Graphs: Graph Implementation Methods. Graph Traversal Methods.

Sortings: Max Heap, Min Heap,Heap Sort. External Sorting: Model for external sorting, Merge sort.

MODULE-V: **[09 Periods]**

Pattern matching and Tries: Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

TEXT BOOKS:

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

REFERENCES:

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.

E-RESOURCES:

1. http://gvpcse.azurewebsites.net/pdf/data.pdf
2. http://www.sncwgs.ac.in/wp-content/uploads/2015/11/Fundamental-Data-Structures.pdf
3. http://www.learnerstv.com/Free-Computer-Science-Video-lectures-ltv247-Page1.htm
4. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7-3lcmoMApVUMmjlExpIb1zste4YXX1pSpX8a2mLgDzZ-E41CJ6PVmY4S0MqVbxsFQ
5. http://nptel.ac.in/courses/106102064/1

Course Outcomes:

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

1. **Implement** the linear data structures such as linked list, stacks and queues.
2. **Understand** the Dictionaries and Hash table representation.
3. **Analyze** the various non linear data structures with its operations
4. **Develop** the programs by using Graph Traversal and heap sort
5. **Apply** data structure concepts for the implementation of pattern matching and tries.

CO- PO,PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs)												PSOs		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	2										2	3	
CO2	2	2	3										3	2	
CO3		2	2											2	1
CO4		2	3										2	3	
CO5	2	3	3										2	3	

2020-221 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: A0511	Object Oriented Programming through Java (Common for CSE, CSE (DS), CSE (AI and ML), CSE (Cyber Security), CSE (IOT) and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: Computer Programming

Course Objectives:

- To understand the basic object-oriented programming concepts and apply them in problem solving.
- To illustrate inheritance concepts for reusing the program.
- To demonstrate multitasking by using multiple threads and event handling
- To develop data-centric applications using JDBC.
- To understand the basics of java console and GUI based programming

MODULE-I: [9 Periods]

Object oriented thinking and Java Basics- Need for oop paradigm, summary of oop concepts, coping with complexity, abstraction mechanisms. A way of viewing world – Agents, responsibility, messages, methods, History of Java, Java buzzwords, data types, variables, scope and lifetime of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, method binding, inheritance, overriding and exceptions, parameter passing, recursion, nested and inner classes, exploring string class.

Module II: [11 Periods]

Inheritance, Packages and Interfaces – Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism- method overriding, abstract classes, the Object class. 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. Exploring java.io.

MODULE III: [10 Periods]

Exception handling and Multithreading- Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception subclasses. String handling, Exploring java.util. Differences between multithreading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, inter thread communication, thread groups, daemon threads. Enumerations, autoboxing, annotations, generics.

MODULE IV: [09 Periods]

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes. The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, checkbox groups, choices, lists panels – scrollpane, dialogs, menubar, graphics, layout manager – layout manager types – border, grid, flow, card and grid bag.

MODULE V: [09 Periods]

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets. Swing – Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

TEXT BOOKS:

1. Herbert Schildt, “Java The complete reference”, TMH, 8th edition
2. T. Budd, “Understanding OOP with Java”, updated edition, Pearson Education.
3. Joyce Farrell, Cengage, “Object Oriented Programming C++”, 4th Edition, 2013.

REFERENCES:

1. P.J. Deitel and H.M. Deitel, “Java for Programmers”, Pearson education.
2. P. Radha Krishna, “Object Orientd Programming through Java”, Universities Press.
3. S. Malhotra and S. Choudhary, “Programming in Java”, Oxford Univ. Press.
4. Bruce Eckel, “Programming in Java”, Pearson Education.
5. Herbert Schildt, “The Complete Reference, C++”, TMH, 4th edition.

E-RESOURCES:

1. http://ndl.iitkgp.ac.in/document/xttk-4kfhvUwVlXBW-RPf64_TFk2i4LJhgQFPQ WAEt-Zobbm3twyubjRA1YOe9WVwkN2qGcxBwdHaPdi_mMQ
2. https://ndl.iitkgp.ac.in/result?q={"t":"search","k":"object%20oriented%20programming","s":["type=\"video\""],"b":{"filters":[]}}
3. http://www.rehancodes.com/files/oop-using-c++-by-joyce-farrell.pdf
4. http://www.nptel.ac.in/courses/106103115/36

Course Outcomes:

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

- Demonstrate the behavior of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection.
- Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by using extend and implement keywords
- Use multithreading concepts to develop inter process communication.
- Understand the process of graphical user interface design and implementation using AWT or swings.
- Develop applets that interact abundantly with the client environment and deploy on the server.

COs	**ProgrammeOutcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1															
CO2															
CO3															
CO4															
CO5															

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: B0516	Operating Systems (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:

This course enable the students to interpret main components of operating system and their working, identify the role of Operating System in process scheduling and synchronization, analyze the way of addressing deadlock, understand memory management techniques and I/O systems, describes the way of handling files and security.

MODULE I: Computer System and Operating System Overview [10 Periods]

Basic System and Process Operations - Overview of Computer System hardware, Operating System Objectives and services, Operating System Structure, System Calls, System Programs.

Process Management - Process Description, Process Control Block, Process States, Inter-process Communication.

MODULE II: SchedulingandConcurrency [9 Periods]

CPU Scheduling - Basic Concepts, Scheduling Criteria, Scheduling Algorithms and evaluation,ThreadsOverview,Threadingissues.

Concurrency - Process synchronization, the critical- section problem, Peterson's Solution, synchronization Hardware, semaphores, monitors, classic problems of synchronization.

MODULE III: Deadlocks [10 Periods]

A: Deadlocks - System Model, Deadlock Characterization, Methods for handling Deadlocks, Deadlock Prevention.

B: Detection and Recovery - Deadlock avoidance, Deadlock detection, Recovery from Deadlocks.

MODULE IV: Memory [10 Periods]

Memory Management -Basic concepts, Swapping, Contiguous memory allocation, Paging,Segmentation,Virtualmemory,Demandpaging,Page-replacementalgorithms, Thrashing.

Secondary Storage Structure and I/O Systems - Disk structure; Disk scheduling, Disk management, Swap space Management, RAID structure, Stable storage Implementation, Tertiary Storage Structure, I/O hardware, Application I/O interface, Kernel I/O subsystem.

.

MODULE V: Files [08 Periods]

File Management - 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.

Security - Protection, Security threats, Viruses, Cryptography as a security tool.

TEXT BOOKS:

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, **"Operating System Principles"** 7th Edition, John Wiley.
2. Stallings, **"Operating Systems Internal and Design Principles",** 5th Edition, 2005, Pearson education/PHI

REFERENCES:

1. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Addison Wesley, 2001.
2. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Education", 1996.
3. D M Dhamdhere, "Operating Systems: A Concept-based Approach", Second Edition, Tata McGraw-Hill Education, 2007.
4. William Stallings, "Operating Systems: Internals and Design Principles", Seventh Edition, Prentice Hall, 2011.
5. Pramod Chandra P. Bhat**, "An Introduction to Operating Systems, Concepts and Practice"**, PHI, 2003

Course outcomes

1. **Determine** the role of Operating System in a computer.
2. **Relate** the methods for providing concurrency, communication and synchronization among concurrent tasks.
3. **Illustrate** the schemes used to address the issues of deadlocks.
4. **Contrast** different memory management techniques.
5. **Examine** various file management strategies and security issues.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		1									2	1		2
CO2	2	2										2	1		
CO3	2														
CO4	2	2	1										2		
CO5	2	2	1										1		

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: A0512	**Data Structures Lab** (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT) and IT)	L	T	P
Credits: 1.5		-	-	3

Prerequisites: A Course on "Programming for problem solving"

Objectives:

1. To learn linear data structures such as linked list, stack and queues with its operations
2. Ability to learn programs on binary search tree and graph traversal strategies.
3. To understand the pattern matching and hashing techniques.

Software Requirements: C

List of Programs:

1 Write a program that uses functions to perform the following operations on singly linked list.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
2 Write a program that uses functions to perform the following operations on doubly linked list.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
3 Write a program that uses functions to perform the following operations on circular linked list.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
4 Write a program that implement stack (its operations) using
   i) Arrays ii) Pointers
5 Write a program that implement Linear Queue (its operations) using
   i) Arrays ii) Pointers
6 Write a program that implement Deque (its operations) using
   i) Arrays ii) Pointers
7 Write a program to implement all the functions of a dictionary using hashing.
8 Write a program that implement Binary Search Trees to perform the following operations
   i) Creation ii) Insertion iii) Deletion iv) Traversal
9 Write a program to implement the tree traversal methods using recursion.
10 Write a program that implements the following sorting methods to sort a given list of integers in ascending order
   i) Heap sort ii) Merge sort
11 Write a program to implement the graph traversal methods such as BFS and DFS.
12 Write a program to implement the Knuth-Morris- Pratt pattern matching algorithm.

TEXT BOOKS

1. Fundamentals of data structures in C, E.Horowitz, S.Sahni and Susan Anderson Freed, 2nd Edition, Universities Press.
2. Data structures using C, A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/pearson education.

REFERENCES

1. Data structures: A Pseudocode Approach with C, R.F.Gilberg And B.A.Forouzan, 2nd Edition, Cengage Learning.
2. Introduction to data structures in C, Ashok Kamthane, 1st Edition, PEARSON.

Outcomes:

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

1. Develop C programs for computing and real life applications using basic data structures like stacks, queues, linked lists, Binary Search Trees.
2. Make use of basic data structures implementing various tree and graph traversal operations and algorithms.
3. Apply the concepts of basic data structures and implement advanced operations AVL Trees, Red – Black Trees, and Splay Trees concepts.

CO- PO, PSO Mapping **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**															
COs	**Programme Outcomes (POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	2										3	2	
CO2	2	2	3										2	3	
CO3		2	3										2	3	1

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: A0513	Object Oriented Programming Through Lab (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT) and IT)	L	T	P
Credits: 2		-	1	2

Prerequisites: NIL

Course Objectives:

This course will make students able to learn and understand the concepts and features of object-oriented programming and the object-oriented concept like inheritance and will know how to make use of interfaces and package, to acquire the knowledge in Java's exception handling mechanism, multithreading, to explore concepts of Applets and event handling mechanism. This course makes students to gain the knowledge in programming using Layout Manager and swings.

Software Requirements: Java

List of Programs:

1. Write Java Programs that implement the following.
   a) Constructor
   b) Parameterized constructor
   c) Method Overloading
   d) Constructor overloading
2. Write a Java program
   a) checks whether a given string is a palindrome or not.
   b) for sorting a given list of names in ascending order.
   c) that reads a line if integers and then displays each integer and the sum of all integers(use string tokenizer class of java.util).
3. Write Java programs that uses the following keywords…
   a) this
   b) super
   c) static
   d) final
4. Write a Java program to implement
   a) Method Overriding.
   b) dynamic method dispatch.
   c) multiple inheritance.
   d) access specifiers.
5. Write a Java program that
   a) reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
   b) reads a file and displays the file on the screen, with a line number before each line.
   c) displays the number of characters, lines and words in a test file.
6. Write a Java program for handling
   a) Checked exceptions.
   b) unchecked exceptions.
7. Write a Java program
   a) Creates three threads. First threads displays "Good Morning "for every one Second, the second thread displays "Hello" for every two seconds, the third thread Displays "Welcome" for every three seconds.
   b) that correctly implements producer consumer problem using concept of inter thread communication.
8. Write a Java program which demonstrates the use of following collection classes
   a) Array List

b) Hash Set
c) Deque

9. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +,-,*,/ operations. Add a text field to displaythe result.
10. Write a Java program for handling
    a) mouse events.
    b) key events.
11. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields num1 and num2. The division of num1 and num2 is displayed in the result field when the divide button is clicked. If num1 or num2 were not an integer, the program would throw number format exception. If num2 were zero, the program would throw an arithmetic exception and display the exception in the message dialogue box.
12. Write a Java program that
    a) Simulates traffic light. The program lets the user select one of three lights: red, yellow or green. When a radio button is selected, the light is turned on and only one light can be on at a time. No light is on when the program starts.
    b) Allows the user to draw lines rectangles and ovals.

TEXT BOOKS:

1. Herbert Schildt, "**Java The complete reference**", TMH, 8th edition, 2011.
2. T. Budd, "**Understanding OOP with Java**", Pearson Education, updated edition, 1998.

REFERENCES:

1. P.J. Deitel and H.M. Deitel, "**Java for Programmers**", Pearson education.
2. P. Radha Krishna, "**Object Oriented Programming through Java**", Universities Press.
3. Bruce Eckel," **Programming in Java**", Pearson Education.
4. S. Malhotra and S. Choudhary," **Programming in Java**", Oxford Univ. Press.

Course Outcomes:

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

1. **Build** simple java progras using the basic concepts of OOP
2. **Create** user defined packages to build real time applications
3. **Develop** applications on files, exceptions, threads and applets.
4. **Construct** GUI based applications.
5. **Design** Interactive applications for use on internet.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	ProgrammeOutcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2	3										3	2	
CO2			3		2								2	3	
CO3		2	2		2									2	

2022-23 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: B**0520**	**Operating Systems Lab** **(Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)**	**L**	**T**	**P**
Credits: 2		**-**	**1**	**2**

Prerequisites: A course on "Programming for Problem Solving", A course on "Computer Organization and Architecture".

Co-requisite: A course on "Operating Systems".

Course Objectives:

- To provide an understanding of the design aspects of operating system concepts through simulation
- Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

Course Outcomes:

- Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.
- Able to implement C programs using Unix system calls

List of Experiments:

1. Write C programs to simulate the following CPU Scheduling algorithms a) FCFS b) SJF c) RoundRobin d) priority

2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close,fcntl, seek, stat, opendir, readdir)

3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.

4. Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.

5. Write C programs to illustrate the following IPC mechanisms a) Pipes b) FIFOs c) Message Queues d) Shared Memory

6. Write C programs to simulate the following memory management techniques a) Paging b) Segmentation

7. Write C programs to simulate Page replacement policies a) FCFS b) LRU c) Optimal

TEXT BOOKS:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the Unix environment, W.R.Stevens, Pearson education.

REFERENCE BOOKS:

1. Operating Systems – Internals and Design Principles, William Stallings, Fifth Edition– 2005,Pearson Education/PHI
2. Operating System - A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum, 2nd edition, Pearson/PHI
4. UNIX Programming Environment, Kernighan and Pike, PHI/Pearson Education
5. UNIX Internals: The New Frontiers, U. Vahalia, Pearson Education

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	1									2	1		
CO2	2	2										2	2		
CO3	1	2										1	1		

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: A00M1	GENDER SENSITIZATION (An Activity-based Course) (Common for CE, EEE, ME, ECE, MiE, CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT) and IT)	L	T	P
Credits: NIL		-	-	2

Prerequisites: NIL

COURSE DESCRIPTION

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

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

Objectives of the Course:

- 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]

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

MODULE II: GENDER ROLES AND RELATIONS [06 Periods]

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles-Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences-Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

MODULE III: GENDER AND LABOUR [07 Periods]

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

MODULE IV: GENDER - BASED VIOLENCE [07 Periods]

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "*Chupulu".*

Domestic Violence: Speaking Out Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

MODULE V: GENDER AND CULTURE [06 Periods]

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals

Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks-The Brave Heart.

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 from engineering departments.**

- ***Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender".***

- **ESSENTIAL READING**: The Textbook, "*Towards a World of Equals: A Bilingual Textbook onGender" written* by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote,Vasudha Nagaraj, Asma Rasheed, GoguShyamala, Deepa Sreenivas and Susie Tharu**published by Telugu Akademi, Telangana Government in 2015.**

ASSESSMENT AND GRADING:

- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%

TEXT BOOKS:

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

REFERENCES:

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. TriptiLahiri. "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? FlookCndet,3732
4. Vimata. "Vantillu (The Kitchen)". Women Writing in India: 600 BC to the Present. Volume II: The 20th Century. Ed. Susie Thaw and K. Lalita. Delhi: Oxford University Press 1995. 599-601.
5. Shatrughna, Veena et al. Women's Work and its Impact on Child Health end Nutrition, Hyderabad, National Institute of Nutrition, Indian Council of Medical Research. 1993.
6. Stree Shakti Sanghatana. 'We Were Making I listory ....' Life Stories of Women in the Telangana People's Struggle. New Delhi: Kali for Women, 1989.

E-RESOURCES:

1. http://www.actforyouth.net/resources/rf/rf_gender1_1213.cfm (UNDERSTANDING GENDER)
2. https://www.simplypsychology.org/gender-biology.html(GENDERAND BIOLOGY)
3. http://www.yourarticlelibrary.com/essay/essay-on-gender-issues-in-labour-market-in-india/40442/ (GENDER AND LABOUR)
4. http://journals.sagepub.com/doi/abs/10.1177/1077801200006007004 (ISSUES OF VIOLENCE)
5. http://www.nordiclabourjournal.org/emner/likestilling (GENDER AND BIOLOGY)

Course Outcomes:

At the end of the course,

- Students will 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.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs)												PSOs		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1						3		3	3		2	3	1		
CO2						3		3	3		2	3	2		
CO3						3		3	3		2	3	1		

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: A0B23	Number Theory CSE (Cyber Security)	L	T	P
Credits: 3		3	-	-

Pre-requisite: Basics of Number theory

Course Objectives:

1. To learn linear Diophantine equation and Fundamental theorem of Arithmetic
2. To learn linear congruence and applications of congruence
3. To learn Arithmetic functions
4. To learn primitive roots and determination of integers having primitive roots
5. To learn Quadratic Congruences and Quadratic Reciprocity Law

MODULE-I: Divisibility [12 Periods]

Greatest Common divisor, Least common multiple, linear Diophantine equation Fundamental theorem of Arithmetic, Some questions regarding primes.

Module -II: Congruences [12 Periods]

Definition, Residue system, tests of divisibility, linear congruences, solving polynomial congruences, An application of congruences to Diophantine equations.

Module -III: Arithmetic Functions [12 Periods]

The function τ and, The Mobius function, Multiplicative Arithmetic functions, Inversion formula, Greatest integer function

Module -IV: Primitive Roots [12 Periods]

Exponents, Primitive roots modulo a prime, determination of integers having primitive roots, Indices.

Module -V: Quadratic Congruences and Quadratic Reciprocity Law [12 Periods]

Euler's criterion, Legendre symbol and its properties, Gauss lemma, Quadratic reciprocity law, some applications of quadratic reciprocity, Jacobi symbol.

Text Books.

1. Burton, David M. Elementary number theory. Second edition. *W. C. Brown* Publishers, Dubuque, IA, 1989.
2. S B Malik Basic Number theory Second revised edition,Vikas publishing house pvt. Ltd.

Reference Books:

1. Baker, Alan. A concise introduction to the theory of numbers. Cambridge University Press, Cambridge, 1984.

2. Silverman, Joseph. A friendly introduction to number theory, 4th edition, Pearson Education, Inc., 2012.

E Resources

a) **Concerned Website links**
   1. **https://www.youtube.com/watch?v=19SW3P_PRHQ**
   2. **https://www.youtube.com/watch?v=qvxKlbdRUyM**

b) **Concerned Journals/Magazines links**
   1. **https://www.journals.elsevier.com/journal-of-number-theory/most-downloaded-articles**
   2. **https://www.journals.elsevier.com/journal-of-number-theory#:~:text=this%20field...-,The%20Journal%20of%20Number%20Theory%20(JNT)%20features%20selected%20research%20articles,original%20research%20in%20this%20field.**

c) **NPTEL Videos**
   1. **https://nptel.ac.in/courses/111/103/111103020/**
   2. **https://nptel.ac.in/courses/111/101/111101137/**

Course Outcomes:

At the end of the course Student can able to

1. Understand linear Diophantine equation and Fundamental theorem of Arithmetic
2. Apply linear congruence and applications of congruence
3. Understand Arithmetic functions
4. Find primitive roots and determination of integers having primitive roots
5. Understand Quadratic Congruences, Quadratic Reciprocity Law and applications

2020-21 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: A6201	Computer Networks	L	T	P
Credits: 3		3	-	-

Course Objectives:
This course provides students to understand the fundamental concepts of computer networking and communications make use of IEEE standards in the construction of LAN, build the skills of subnettingand supernetting, explain the concepts of protocols ofTransportLayer,QoSandCongestioncontrolmechanismsanddemonstratedifferent protocols of ApplicationLayer.

MODULE I: Basics of Networking andPhysicallayer [10 Periods] Basics of Networking - Components – Direction of Data flow – Networks – Components and Categories – Types of Connections – Topologies –Protocols and Standards – ISO / OSI model, TCP/IPmodel.**Physical layer -** Digital transmission, Multiplexing, Transmission Media, Switching, Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks.

MODULEII: Datalinklayer[11 Periods] Functionalities of Data link layer - Introduction, Framing, Error Detection and Correction – Parity– LRC – CRC- Hamming code, Flow and Error Control, Noiseless Channels, Noisy Channels, HDLC, Point to Point Protocols. Random access, Controlled access, Channelization,Collision Free Protocols.

LAN - LAN - Ethernet IEEE 802.3 - IEEE 802.4 - IEEE 802.5 - IEEE 802.11

MODULEIII:NetworkLayer[09 Periods] A: Basics of Network Layer - Logical Addressing, Internetworking, Tunneling, Addressmapping,
B:CommunicationProtocols-ICMP,IGMP,Forwarding,UnicastRoutingProtocols, Multicast RoutingProtocols.

MODULEIV: Transport Layer [09 Periods] Connection Oriented and Connectionless Protocols -Process to Process Delivery, UDP and TCP protocols,SCTP.
Congestion Control - Data Traffic, Congestion, Congestion Control, QoS, Integrated Services, Differentiated Services, QoS in Switched Networks.

MODULE V: Application layer [09 Periods] DNS - Domainnamespace,DNSininternet,Electronicmail
Protocols and Network Security - FTP, WWW, HTTP, SNMP, Network Security, Cryptography.

TEXT BOOKS:

1. BehrouzA. Forouzan, **"Data Communications and Networking"**, 4thEdition, TMH,2006.
2. AndrewSTanenbaum,**"ComputerNetworks"**,4thEdition,Pearson Education/PHI.

REFERENCES:

1. P.C.Gupta,**"Data communications and computer Networks"**, PHI.
2. S.Keshav, **"An Engineering Approach to Computer Networks"**,2nd Edition, Pearson Education.
3. W.A. Shay, **"Understanding communications and Networks"**,3rd Edition, CengageLearning.
4. James F.Kurose& Keith W. Ross, **"Computer Networking: ATop-Down Approach Featuring the Internet"**, 3rdEdition, Pearson Education.

E-RESOURCES:

1. https://www.saylor.org/site/wp-content/uploads/2012/02/Computer-Networking- Principles-Bonaventure-1-30-31-OTC1.pdf
2. http://ebook-dl.com/downloadbook/230
3. https://doi.org/10.1016/0169-7552(89)90019-6
4. http://nptel.ac.in/courses/106105081/

COURSE OUTCOMES: AT THE END OF THE COURSE, STUDENTS WILL BE ABLE TO

1. **UNDERSTAND** THE LAYERED ARCHITECTURE OF COMPUTER NETWORKS.
2. **Conceptualize** the protocols of Data Link Layer and can build Local area networks.
3. **Apply** Sub net and Super net concepts in the construction of computer network**.**
4. **Summarize** the protocols used in Transport Layer, QoS and Congestion control mechanisms.
5. **Analyze** different protocols of Application Layer and various security risks.

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: A0515	Database Management Systems (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT) and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites
1. A course on "Data Structures"

The purpose of learning this course is to:
1. To understand the basic concepts and the applications of database systems and Conceive the database design process through ER Model and Relational Model
2. Design Logical Database Schema and mapping it to implementation level schema through Database Language Features
3. Familiarize queries using Structure Query Language (SQL) and PL/SQL and Improvement of the database design using normalization criteria and optimize queries
4. Understand the practical problems of concurrency control and gain knowledge about failures and recovery.
5. Understand with database storage structures and access techniques

MODULE I: Introduction: [10 Periods]

What is Database Management System, Advantage of DBMS over File Processing System, Introduction and applications of DBMS, Purpose of database system, Views of data, Database system Architecture, Data Independence, The evolution of Data Models, Levels of Data Abstraction in DBMS, Database Users and DBA, Database Languages,

Introduction to Database design: Database Design, Design process, Entity Relation Model, ER diagram, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Keys and Constraints, Mapping Cardinality, Extended ER - Generalization, Specialization and Aggregation, ER Diagram Issues, Weak Entity, Conceptual Design with the ER Model.

MODULE II: [09 Periods]

Introduction to the Relational Model: *Relational Model, Conversion of ER to Relational Table.* Structure Creation, alternation. Integrity constraint over relations, enforcing integrity constraints - Defining Constraints-Primary Key, Foreign Key, Unique, not null, check. introduction to views, destroying/altering tables and views. Transaction Control Commands, Commit, Rollback, Savepoint.

Relational Algebra – Fundamental Operators and syntax, relational algebra queries, Tuple relational calculus.

MODULE III: [10 Periods]

SQL Queries: form of basic SQL query, set operations: UNION, INTERSECT, and EXCEPT, Sub Queries, correlated sub queries, Nested Queries, aggregation, IN, ANY, ALL operators, NULL values, complex integrity constraints in SQL.
PL/**SQL Concepts-** Cursors, Stored Procedure, Functions Triggers and Exceptional Handling.

Schema Refinement and Normal Forms: **schema refinement**: Pitfalls in Relational database, decomposing bad schema, Functional Dependency – definition, trivial and non-trivial FD, closure of FD set, closure of attributes, irreducible set of FD, Normalization – 1Nf, 2NF, 3NF, Decomposition using FD- dependency preservation, BCNF, Multi- valued dependency, 4NF, Join dependency and 5NF.

MODULE IV: Transaction Management and Concurrency Control: [10 Periods]

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions, Deadlock

MODULE V: Storage and Indexing: [09 Periods]

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

TEXT BOOKS:

1. Data base Management Systems, Raghu Rama krishnan, Johannes Gehrke, McGraw Hill Education (India) Private Limited, 6th edition, 2010.
2. Database Systems, 6th edition, R Elmasri, Shamkant,B.Navathe, Pearson Education, 7th edition, 2013

REFERENCES:

1. Data base System Concepts, A. Silberschatz, Henry. F. Korth, S. Sudarshan, McGraw Hill Education(India) Private Limited l, 6th edition, 2011.
2. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel, 7th Edition.
3. SQL The Complete Reference, James R. Groff, Paul N. Weinberg, 3rd Edition,
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah,PHI.

E-RESOURCES:

1. https://kakeboksen.td.org.uit.no/Database%20System%20Concepts%206th%20edition.pdf
2. http://agce.sets.edu.in/cse/ebook/DBMS%20BY%20RAGHU%20RAMAKRISHNAN.pdf
3. http://airccse.org/journal/ijdms/ijdms.html
4. http://www.springer.com/computer/database+management+%26+information+retrieval?SGWID=0-153-12-114576-0
5. http://textofvideo.nptel.iitm.ac.in/video.php?courseId=106106093
6. http://www.nptelvideos.in/2012/11/database-management-system.html

Course Outcomes:

1. Gain knowledge of fundamentals of DBMS, database design and normal forms and apply the fundamentals of data models to model an application's data requirements using conceptual modeling tools like ER diagrams
2. Apply the method to convert the ER model to a database schema based on the conceptual relational model
3. Apply the knowledge to create, store and retrieve data using Structure Query Language (SQL) and PL/SQL and apply the knowledge to improve database design using various normalization criteria and optimize queries
4. Appreciate the fundamental concepts of transaction processing- concurrency control techniques and recovery procedures.
5. Familiarity with database storage structures and access techniques

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2			3				2		3	3	3	
CO2	3	3	3			3				3		3	3	3	
CO3	3	3	3			2				3		2	3	3	
CO4	3	2	1			1				1		1			
CO5	3	1	1			1						1			

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: B1202	Web Technologies (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT) and IT)	L	T	P
Credits: 3		3	-	-

Objectives

1. To introduce PHP language for server side scripting
2. To introduce XML and processing of XML Data with Java
3. To introduce Server side programming with Java Servlets and JSP
4. To introduce Client side scripting with Javascript and AJAX.

MODULE I: **[10 Periods]**

Introduction to PHP: Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc., Handling File Uploads. Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies.

File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.

MODULE II: **[09 Periods]**

HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets;

XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemes, Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java.

MODULE III: **[10 Periods]**

Introduction to Servlets: Common Gateway Interface (CGt), Life cycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request &Responses, Using Cookies and Sessions, connecting to a database using JDBC.

MODULE IV: **[10 Periods]**

Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking, connecting to database in JSP.

MODULE V: **[09 Periods]**

Client side Scripting: Introduction to Javascript, Javascript language – declaring variables, scope of variables, functions. event handlers (onclick, on submit etc.), Document Object Model, Form validation.

TEXT BOOKS:

1. Web Technologies, Uttam K Roy, Oxford University Press
2. The Complete Reference PHP — Steven Holzner, Tata McGraw-Hill

REFERENCES:

1. Web Programming, building internet applications, Chris Bates, 2nd Edition, Wiley Dreamtech
2. Java Server Pages, Hans Bergsten, SPD O'Reilly,
3. Java Script, D. Flanagan, 6th Edition, O'Reilly Media.
4. Beginning Web Programming-Jon Duckett WROX.
5. Programming world wide web, R.W.Sebesta, 4th Edition, Pearson.

6. Internet and World Wide Web — How to program, Dietel and Nieto, Pearson.

E-RESOURCES:

1. https://kakeboksen.td.org.uit.no/Database%20System%20Concepts%206th%20edition.pdf
2. http://agce.sets.edu.in/cse/ebook/DBMS%20BY%20RAGHU%20RAMAKRISHNAN.pdf
3. http://airccse.org/journal/ijdms/ijdms.html
4. http://www.springer.com/computer/database+management+%26+information+retrieval?SGWID=0-153-12-114576-0
5. http://textofvideo.nptel.iitm.ac.in/video.php?courseId=106106093
6. http://www.nptelvideos.in/2012/11/database-management-system.html

Outcomes

1. Gain knowledge of client side scripting, validation of forms and AJAX programming
2. Have understanding of server side scripting with PHP language
3. Have understanding of what is XML and how to parse and use **XML** Data with Java
4. To introduce Server side programming with Java Servlets and JSP

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2			3				2		3	3	3	
CO2	3	3	3			3				3		3	3	3	
CO3	3	3	3			2				3		2	3	3	
CO4	3	2	1			1				1		1			
CO5	3	1	1			1						1			

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: A6601	Fundamentals of Artificial Intelligence [Professional Elective - I] (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT) and IT)	L	T	P
Credits: 3		3	-	-

PRE-REQUISITES

- Basic Programming in Python
- Data Structures

OBJECTIVES

Artificial Intelligence is a major step forward in how computer system adapts, evolves and learns. It has widespread application in almost every industry and is considered to be a big technological shift, similar in scale to past events such as the industrial revolution, the computer age, and the smart phone revolution.

This course will give an opportunity to gain expertise in one of the most fascinating and fastest growing areas of Computer Science through classroom program that covers fascinating and compelling topics related to human intelligence and its applications in industry, defence, healthcare, agriculture and many other areas. This course will give the students a rigorous, advanced and professional graduate-level foundation in Artificial Intelligence.

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

- Build intelligent agents for search and games.
- Solve AI problems through programming with Python.
- Learning optimization and inference algorithms for model learning.
- Design and develop programs for an agent to learn and act in a structured environment.

DETAIL CONTENTS

1. Introduction [9 Hours]

Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree.

2. Search Algorithms [10 Hours]

Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A* algorithm, Game Search.

3. Probabilistic Reasoning [10 Hours]

Probability, conditional probability, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model.

4. Markov Decision process [10 Hours]

MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs.

5. Reinforcement Learning **[9 Hours]**

Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning.

LIST OF SUGGESTED BOOKS

1. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 3rd Edition, Prentice Hall
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill
3. Trivedi, M.C., "A Classical Approach to Artifical Intelligence", Khanna Publishing House, Delhi.
4. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2011
5. David Poole and Alan Mackworth, "Artificial Intelligence: Foundations for Computational Agents", Cambridge University Press 2010.

WEBSITES FOR REFERENCE

https://nptel.ac.in/courses/106105077
https://nptel.ac.in/courses/106106126
https://aima.cs.berkeley.edu
https://ai.berkeley,edu/project_overview.html (for Practicals)

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-												
CO2	-	2	2										1	2	
CO3	2	2	2	3											
CO4	2	2	2	2										2	2
CO5	1	2													

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: A0518	Free and Open Source Software [Professional Elective - I] (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT) and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:

1. Familiarity with Open Source Technologies
2. Study some FOSS Projects to under the principles, methodologies of FOSS.
3. Understand the policies, licensing procedures and ethics of FOSS.

Module I: **[09 Periods]**

Introduction to Open Source: Open Source, need and principles of OSS, Open Source Standards, Requirements for Software, OSS success, Free Software, Examples, Licensing, Free Vs. Proprietary Software, Public Domain software, History of free software, Proprietary Vs Open Source Licensing Model, use of Open Source Software.

Module II: **[09 Periods]**

Fault Tolerant Design: **Principles and Open Source Methodology**- History, Open Source Initiatives, Open Standards Principles, Methodologies, Philosophy, Software freedom, Open Source Software Development, Licenses, Copyright vs. Copy left, Patents, zero marginal cost, income-generation Opportunities, Internationalization.

Module III: **[12 Periods]**

Case Studies: Apache, BSD, Linux, Mozilla Firefox, Wikipedia, Git, GNU CC, Libre Office.

Module IV: **[09 Periods]**

Open Source Project: Starting and Maintaining an Open Source Project, Open Source Hardware, Open Source Design, Open Source Teaching (OST), Open Source Media.

What Is A License, Creation of our own Licenses, Important FOSS Licenses (Apache, BSD, PL, LGPL), copyrights and copy lefts, Patent.

Module V: **[09 Periods]**

Open Source Ethics: Open Source Vs. Closed Source, Open Source Government, Ethics of Open Source, Social and Financial Impact of Open Source Technology, Shared Software, Shared Source, Open Source as a Business Strategy.

TEXT BOOKS:

1. Kailash Vadera, Bhavyesh Gandhi, "Open Source Technology", University Science Press, 1st Edition, 2009.
2. Fadi P. Deek and James A. M. McHugh, "Open Source Technology and Policy", Cambridge University Press, 2008.

REFERENCES:

1. Wale Soyinka, "Linux Administration- A beginner's Guide", Tata McGraw Hills, 2009
2. Andrew M. St. Laurent, "Understanding Open Source and Free Software Licensing", O'Reilly Media, 2004.
3. Dan Woods, GautamGuliani, "Open Source for the Enterprise", O'Reilly Media, 2005.
4. Bernard Golden, "Succeeding with Open Source", Addison-Wesley Professional,2004.

5. Clay Shirky and Michael Cusumano, “Perspectives on Free and Open Source Software”, MIT press, 2005.

Course Outcomes:

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

1. Differentiate between Open Source and Proprietary software and Licensing.
2. Recognize the applications, benefits and features of Open Source Technologies.
3. Understand and demonstrate Version Control System along with its commands.
4. Gain knowledge to start, manage open source projects.
5. Understand and practice the Open Source Ethics.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3	3		2	2	2						2	2	2
CO2		3		3	2	2	1				2		3	2	2
CO3	2	3	3	2	2	2	2				1		3	3	2
CO4		3		2	2	2	2							3	
CO5		3		2	2	2	2							3	

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: A0520	Database Management Systems Lab (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT) and IT)	L	T	P
Credits: 2		-	1	2

Co-requisites

1. Co-requisite of course "Database Management Systems"

Course Objectives:

This course enables the students to practice the concepts learnt in the subject DBMS by developing a database for an example project.

1. The student is expected to practice the designing a database system using ER diagram, developing and querying a relational database using normalization techniques in the context of example database.
2. Students are expected to Learn SQL basics for data definition and data manipulation using "MySQL" database.
3. Students are expected to apply the learn developing database applications using procedures, cursors and triggers.

List of experiments:

1	Railway Reservation System -(Redesigning IRCTC database) **Train** (train Number, name, source, destination, start_time, reach_time, traveltime, distance, class, days, type) **Ticket** (PNRNo, Transactionid, from_station, To_station, date_of_journey, class date_of_booking, total_ticket_fare, train number) **Passenger** (PNR No, Serial no, Name, Age, Reservation_status) **Train_Route**(Train_No, route_no, station_code, name, arrival_time, depart_time, distance, day) **Train_Ticket_fare**(Train_No, class, base_fare, reservation_charge, superfast_charge, other_charge, tatkal_charge, service_tax)
	Create all the tables specified above. Make underlined columns as primary key.(use number, number(m,n), varchar(n), date, time, timestamp data types appropriately) Insert atleast 5 rows to each table. (Check www.irctc.co.in website for actual data) 1. Use Interactive insertion for inserting rows to the table. 2. Use ADT (varray) for class and days column in Train table.
2	Write simple DDL/DML Queries to 1. Remove all the rows from Passenger table permanently. 2. Change the name of the Passenger table to Passenger_Details. 3. List all train details. 4. List all passenger details. 5. Give a list of trains in ascending order of number. 6. List the senior citizen passengers details. 7. List the station names where code starts with 'M'. 8. List the trains details within a range of numbers. 9. Change the super fast charge value in train fare as zero, if it is null. 10. List the passenger names whose tickets are not confirmed. 11. List the base_fare of all AC coaches available in each train. Find the ticket details where transaction id is not known. 1) Use Interactive updation for updating the seat no for particular PNR NO. 2) Find the train names that are from Secunderabad to Mumbai, but do not have the source or destination in its name. 3) Find the train details that are on Thursday (Use the ADT column created).
3	Create (Alter table to add constraint) the necessary foreign keys by identifying the relationships in the table. 1) Add a suitable constraint to train table to always have train no in the range 10001 to 99999.

	2) Add a suitable constraint for the column of station name, so that does not take duplicates. 3) Change the data type of arrival time, depart time (date -> timestamp or timestamp to date), and do the necessary process for updating the table with new values. 4) Add a suitable constraint for the class column that it should take values only as 1A, 2A, 3A, SL, C. 5) Add a not null constraint for the column distance in train_route.
4	Use SQL PLUS functions to. 1. Find the passengers whose date of journey is one month from today. 2. Print the train names in upper case. 3. Print the passenger names with left padding character. 4. Print the station codes replacing K with M. 5. Translate all the LC in class column (Train_fare) to POT and display. 6. Display the fare details of all trains, if any value is ZERO, print as NULL value. 7. Display the pnrno and transaction id, if transaction id is null, print 'not generated'. 8. Print the date_of_jounrney in the format '27th November 2010'. 9. Find the maximum fare (total fare). 10. Find the average age of passengers in one ticket. 11. Find the maximum length of station name available in the database. 12. Print the fare amount of the passengers as rounded value. 13. Add the column halt time to train route. 14. Update values to it from arrival time and depart time. High Level: 15. Update values to arrival time and depart time using conversion functions. 16. Display the arrival time, depart time in the format HH:MI (24 hours and minutes).
5	Write Queries to. Use SET Operators 1. Find the train numbers for which reservation have not yet been made. 2. Find the train names that donot have a first AC class coach. 3. Print all the PNR nos available in the database. 4. Find passenger names who have booked to 'Pune'. Use Nested Query(in Operators) 1. Find the train names that stop in 'Warangal'. 2. Find the train names that are superfast and the service tax is zero. 3. Find the Passenger name who have booked for the train that starts from 'Secunderabad'. 4. Find the trains names that have all the AC coaches and the base fare is less than 3000 for each case.
6	Use Join Query 1. Find the train names that stop in 'Warangal'. 2. Find the train names that are superfast and the service tax is zero. 3. Find the Passenger name (and train name) who have booked for the train that starts from 'Secunderabad'. 4. Display the trains names, each type of class and the total fare for each type of class. 5. Display all the train details and the ticket details (if booked any). 6. Create a sequence to provide values for the PNR no. 7. Write a query for full outer join using any of the tables above. Write Queries to. Use Coorelated (and nested) Query 1. Find the train names for which ten tickets have been reserved. 2. Find the trains that have more than ten substations. 3. Find the passengers who do not pass through 'Kachiguda'. 4. Find passengers who have booked for super fast trains.

7	Complex queries (use groupby/groupby having/join/nested) 1. Take the start station code and end station code and display the train details. 2. List the train names and the number of sub stations it has. 3. List the stations where all types of trains stop. 4. List the trains names that has atleast four bookings. 5. Create a table cancellation history (Insert values from ticket and passenger table). 6. Create a table for all the train numbers and class available in train_ticket_fare with total seats. 1. Find the station name that has highest number of trains stopping at.
8	Write a simple PL/SQL block to. 1. Print the fibonacci series. 2. Print the factorial of a given number. 3. Print 'NOT confirmed' based on the reservation status, of a particular passenger. 4. Print the total seats available for a particular train and for a particular class.
9	Write a cursor for the following. 1. Retrieve the passenger details for ―X train number and given journey date. 2. Display the train name (once) and the substation names. 3. Display the fare details of a particular train(use basic exceptions) 4. Write a cursor to update the reservation status of the passengers (generate seat number, if seats have reached maximum, put waiting list number (30% of total seats), if waiting list number reaches maximum, put PQWL (10%of total seats), RAC-20%)
10	1. Write a PL/SQL procedure to. a. List the details of passengers who has reserved next to ―Mr. X. b. PNR No. of a passengers for a given source and a destination. 2. Write a PL/SQL function to. a. Get the PNRNo and return the total ticket fare. b. Get the Passenger name, train no and return the total journey time in hours andminutes.
11	Write a Trigger for the following: 1) When a passenger cancels a ticket, do the necessary process and update the cancellation history table. 2) When train number is changed, update it in referencing tables. 3) When a passenger record is inserted reservation status should be automatically updated.
12	1) Use TCL commands for your transactions. (commit,rollback,savepoint) 2) Create a role named 'clerk', and give permission for him to select only the trains starting from 'Warangal' along with fare details. 3) Create a nested table containing trainno,name,source,destination and passengers who have booked for it (PNR no,sno, name,age). Find the passengers whose name start with 'S' and train starts from 'Warangal'

Textbooks:

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill 3rd Edition
2. Database System Concepts, Silberschatz, Korth, Mc Graw hill, V edition.

References:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel, 7th Edition.
2. SQL The Complete Reference, James R. Groff, Paul N. Weinberg, 3rd Edition,
3. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.
4. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah,PHI.

Outcomes:

1. Design database schema for a given application and apply normalization
2. Acquire skills in using SQL commands for data definition and data manipulation.
3. Develop solutions for database applications using procedures, cursors and triggers.

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes (POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	-	-												
CO2	-	2	2										1	2	
CO3	2	2	2	3										2	2

2021-22 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: B1203	Web Technologies Lab (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT) and IT)	L	T	P
Credits: 1.5		-	-	3

Pre-requisites
A Course on "Objected Oriented Programming"
Software Requirements: JDK, ZAMP

Course Objectives:
1. To provide hands-on experience on web technologies
2. To develop client-server application using web technologies
3. To introduce server side programming with Java servlets and JSP

Experiments:
1. Write a PHP script to print prime numbers between 1-50.
2. Write a PHP script to
   a. Find the length of a string.
   b. Count no of words in a string.
3. Write a PHP script to
   a. Reverse a string.
   b. Search for a specific string.
4. Write a PHP script to merge two arrays and sort them as numbers, in descending order.
5. Write a PHP script that reads data from one file and write into another file.
6. Develop static pages (using Only HTML) of an online book store. The pages should resemble: www.amazon.com. The website should consist the following pages.
   a) Home page
   b) Registration and user Login
   c) User Profile Page
   d) Books catalog
   e) Shopping Cart
   f) Payment By credit card
   g) Order Conformation
7. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.
8. Create and save an XML document on the server, which contains 10 users information.
9. Write a program, which takes User Id as an input and returns the user details by taking the user information from the XML document.
10. Install TOMCAT web server. Convert the static web pages of assignments 2 into dynamic web pages using servlets and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.
11. Redo the previous task using JSP by converting the static web pages of assignments 2 into dynamic web pages.
12. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database. Follow the MVC architecture while doing the website.

Textbooks:
1. WEB TECHNOLOGIES: A Computer Science Perspective, Jeffrey C. Jackson, Pearson Education

References:
1. Deitel H.M. and Deitel P.J., "Internet and World Wide Web How to program", Pearson International, 2012, 4th Edition.

2. J2EE: The complete Reference By James Keogh, McGraw-Hill
3. Bai and Ekedhi, The Web Warrior Guide to Web Programming, Thomson
4. Compiler Construction, Louden, Thomson.
5. Web technologies, Black Book, Dreamtech press.
6. Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India.

Outcomes:

1. Design and develop interactive and dynamic web applications using HTML, CSS, JavaScript andXML
2. Apply client-server principles to develop scalable and enterprise web applications.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-												
CO2	-	2	2										1	2	
CO3	2	2	2	3										2	2

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: B6202	COMPUTER NETWORKS LAB	L	T	P
Credits: 1.5		-	-	3

Prerequisites: NIL

Course Objectives:

This course provides students to understand the fundamental concepts of computer networking and communications make use of IEEE standards in the construction of LAN, build the skills of subnetting and supernetting, explain the concepts of protocols of Tranport Layer, QoS and Congestion control mechanisms and demonstrate different protocols of Application Layer.

Software Requirements: Turbo C / C++

List of Programs:

1. Implement the data link layer farming methods:
   a) Character Count
   b) Character stuffing and destuffing.
   c) Bit stuffing and destuffing
2. Implement on a data set of characters the three CRC polynomials: CRC-12, CRC-16 and CRC-32.
3. Implement Parity Check using the following techniques
   a) Single Dimensional Data
   b) Multi Dimensional Data
4. Implement the Even and Odd parity.
5. Implementation of Data Link Protocols
   a) Unrestricted Simplex Protocol
   b) Stop and wait Protocol
   c) Noisy Channel
6. Implementation of Sliding Window Protocols
   a) One bit sliding window protocol
   b) Go Back N sliding window protocol
   c) Selective Repeat sliding window protocol
7. Write a code simulating ARP /RARP protocols
8. Implementation of Routing Protocols
   a) Dijkstra's algorithm
   b) Distance Vector routing protocol
   c) Link State routing protocol
9. Implement the congestion algorithms
   a) Token bucket algorithm
   b) Leaky bucket algorithm
10. Implement DES algorithm.
11. Implement RSA algorithm.
12. Write a program to implement client-server application using TCP

TEXTBOOKS:

1. Behrouz A. Forouzan, **"Data Communications and Networking"**, 4th Edition, TMH, 2006.
2. Andrew S Tanenbaum, **"Computer Networks"**, 4th Edition, Pearson Education/PHI.

REFERENCES:

1. P.C .Gupta, **"Data communications and computer Networks"**, PHI.
2. S.Keshav, **"An Engineering Approach to Computer Networks"**, 2nd Edition, Pearson Education.
3. W.A. Shay, **"Understanding communications and Networks"**, 3rd Edition, Cengage Learning.

Course Outcomes:

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

1. **Implement** the various protocols.
2. **Analyze** various Congestion control mechanisms.
3. **Implement** encryption mechanisms using Symmetric Key and Asymmetric Key algorithms.

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2		3		2	2	2						2	2	2
CO2	3	3			2	2	1							2	2
CO3	2			1	2	2	2						2	2	2

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: A00M2	**Environmental Science** (Common for CE, EEE, ME, ECE, MiE, CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT) and IT)	L	T	P
Credits: NIL		2	-	-

Pre-Requisites: NIL

Objectives

1. Creating the awareness about environmental problems among students.
2. Imparting basic knowledge about the environment and its allied problems.
3. Developing an attitude of concern for the environment.
4. Motivating students to participate in environment protection and environment improvement.

Outcomes

At the end of the course, it is expected that students will be able to:

1. Identify and analyze environmental problems as well as the risks associated with these problems
2. Understand what it is to be a steward in the environment
3. Studying how to live their lives in a more sustainable manner

UNIT – I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:
Definition, Scope and Importance – Need for Public Awareness.

NATURAL RESOURCES: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources –Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams– benefits and problems - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

UNIT – II : ECOSYSTEMS:
Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. – Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following ecosystem:
a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT – III: BIODIVERSITY AND ITS CONSERVATION:
Introduction - Definition: genetic, species and ecosystem diversity. - Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - . Biodiversity at global, National and local levels. - . India as a mega-diversity nation - Hot-sports of biodiversity -Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – IV
Environmental Pollution and control:
Environmental Pollution: Classification of pollution, **Air Pollution**: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards.
Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil**.**

Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol.

UNIT – V: SOCIAL ISSUES AND THE ENVIRONMENT:
From Unsustainable to Sustainable development- Urban problems related to energy -Water conservation, rain water harvesting, watershed management - Resettlement and rehabilitation of people; its problems and concerns. Case Studies -

Environmental ethics:
Issues and possible solutions. -Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies -Wasteland reclamation. –Consumerism and waste products. - Environment Protection Act. -Air (Prevention and Control of Pollution) Act. -Water(Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. -Public awareness.

HUMAN POPULATION AND THE ENVIRONMENT: Population growth, variation among nations. Population explosion - Family Welfare Programme. -Environment and human health. -Human Rights. -Value Education. -HIV/AIDS. -Women and Child Welfare. -Role of information Technology in Environment and human health. –Case Studies.

Textbooks:
1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission., Universities Press
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

References:
1. Textbook of Environmental Sciences and Technology by M. Anji Reddy, BS Publication.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-												
CO2	-	2	2										1	2	
CO3	2	2	2	3											
CO4	2	2	2	2										2	2
CO5	1	2													

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: A0H09	MANAGEMENT FUNDAMENTALS	L	T	P
Credits: 3		3	-	-

PREREQUISITES: NIL

Course Objectives:

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 [09 Periods] Introduction to Management: Concepts of Management and organization-nature, importance and Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management.

Management Theories: 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, Corporate Social responsibility.

MODULE – II: Planning, Organization and types of Structures [10 Periods] Planning: Need for planning- -Steps in the process of planning-Advantages and limitation of planning. Types of planning - Vision, Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Management by Objectives (MBO).

Organization and types of Structures: Basic concepts related to Organization - Departmentation and Decentralization, Types of Organizations- Line organization, Line and staff organization, functional organization, committee organization, matrix organization, Virtual Organization, Cellular Organization, boundary less organization, inverted pyramid structure, lean and flat Organization structure.

MODULE – III: STAFFING AND CONTROLLING [10 PERIODS]

Staffing: Basic concepts of HRM, functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development. Performance Appraisal, Job Evaluation and Merit Rating.

Controlling: process of controlling, types of controlling, managing productivity, Quality Control: chart, R chart, C chart, P chart, (simple Problems), Deming's contribution to quality.

MODULE – IV: Operations and Materials Management [09 Periods] Operations Management : 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.

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

MODULE – V: Project Management and Contemporary Practices [10 Periods]

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

Contemporary Management Practices: Basic concepts of ERP, Just-In-Time (JIT) System, Total Quality Management (TQM), six sigma and Capability Maturity Model (CMM) Levels, Bench marking, Balanced Score card.

TEXT BOOKS:

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

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.

E RESOURCES:

1. http://freevideolectures.com/Course/2689/Management-Science
2. http://www.onlinevideolecture.com/?course=mba-programs&subject=human-resource-management
3. http://www.onlinevideolecture.com/?course=mba-programs&subject=marketing-fundamental
4. http://freevideolectures.com/Course/2371/Project-and-Production-Management
5. http://nptel.ac.in/courses/110105034/

COURSE OUTCOMES:

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

1. Understand the various concepts, principles and theories of management.
2. Understand the basic concepts of planning and various structures of organizations.
3. Understand the process of staffing and controlling
4. Understand the process of operations management. Also learn the concepts of materials management and marketing management at an organization.
5. Understand the various contemporary management practices. Also the project management techniques

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COS	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1									2	3	1	
CO2		3							2		1	
CO3		3								2	1	

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: A6201	CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P
Credits: 3		3	-	-

Course Objectives:

- Explain the objectives of information security
- Explain the importance and application of each of confidentiality, integrity, authentication and availability
- Understand various cryptographic algorithms.
- Understand the basic categories of threats to computers and networks
- Describe public-key cryptosystem.
- Describe the enhancements made to IPv4 by IPSec.
- Understand Intrusions and intrusion detection
- Discuss the fundamental ideas of public-key cryptography
- Generate and distribute a PGP key pair and use the PGP package to send an encrypted email message.
- Discuss Web security and Firewalls

MODULE - I

Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security

Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

MODULE - II

Symmetric key Ciphers: Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4.

Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.

MODULE - III

Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512),

Message authentication codes: Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme.

Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure.

MODULE - IV

Transport-level Security: Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH)

Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security

MODULE - V

E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, combining security associations, Internet Key Exchange

Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability

TEXT BOOKS:

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition

REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 3rd Edition
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

Course Outcomes:

- Student will be able to understand basic cryptographic algorithms, message and web authentication and
  Security issues
- Ability to identify information system requirements for both of them such as client and server
- Ability to understand the current legal issues towards information security

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COS	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1									2	3	1	
CO2		3							2		1	
CO3		3								2	1	
CO4		3		2	1							
CO5				2			3				1	

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: A6202	AUTOMATA AND COMPILER DESIGN	L	T	P
Credits: 3		3	-	-

Course Objectives:

- Automata and compiler Design mainly deals with the languages which are formal and regular and also deals with grammar present in the machine.
- An compiler is a program that accepts a program in source language and converts into a machine understandable format.
- The push down automata is the major one it's a five tuple set containing states, alphabets, transition function and accept states.

MODULE-I

Formal Language and Regular Expressions: Languages, Definition Languages regular expressions, Finite Automata – DFA, NFA. Conversion of regular expression to NFA, NFA to DFA. Applications of Finite Automata to lexical analysis, lex tools

Context Free grammars and parsing: Context free grammars, derivation, parse trees, ambiguity LL(K) grammars and LL(1) parsing

MODULE - II:

Bottom up parsing handle pruning LR Grammar Parsing, LALR parsing, parsing ambiguous grammars, YACC programming specification

Semantics: Syntax directed translation, S-attributed and L-attributed grammars, Intermediate code – abstract syntax tree, translation of simple statements and control flow statements.

MODULE-III

Bottom up parsing handle pruning LR Grammar Parsing, LALR parsing, parsing ambiguous grammars, YACC programming specification.

MODULE - III

Context Sensitive features – Chomsky hierarchy of languages and recognizers. Type checking, type conversions, equivalence of type expressions, overloading of functions and operations

MODULE - IV

Run time storage: Storage organization, storage allocation strategies scope access to now local names, parameters, language facilities for dynamics storage allocation.

Code optimization: Principal sources of optimization, optimization of basic blocks, peephole optimization, flow graphs, Data flow analysis of flow graphs.

MODULE - V:

Code generation: Machine dependent code generation, object code forms, generic code generation algorithm, Register allocation and assignment. Using DAG representation of Block

TEXT BOOKS:

1. Introduction to Theory of computation.Sipser, 2nd Edition, Thomson.
2. Compilers Principles, Techniques and Tools Aho, Ullman, Ravisethi, Pearson Education.

REFERENCES:

1. Modern Compiler Construction in C , Andrew W.Appel Cambridge University Press.
2. Compiler Construction, LOUDEN, Thomson.
3. Elements of Compiler Design, A. Meduna, Auerbach Publications, Taylor and Francis Group.
4. Principles of Compiler Design, V. Raghavan, TMH.

Outcomes:

- Graduate should be able to understand the concept of abstract machines and their power to recognize the languages.
- Attainsthe knowledge of language classes & grammars relationship among them with the help of chomsky hierarchy.
- Ability to understand the design of a compiler given features of the languages.
- Ability to implement practical aspects of automata theory.
- Gain knowledge of powerful compiler generation tools.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO3
CO1	3	3										2	2		
CO2	3	2										2	2		
CO3	2	3										2		2	
CO4	3	2						2				2		2	
CO5	3	2										2	2		

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: A0526	SOFTWARE ENGINEERING AND MODELING (Common for CSE and IT)	L	T	P
Credits: 3		3	-	-

PREREQUISITES: NIL

Course Objectives:

This course enables students to learn fundamental aspects of Software Engineering, analyze various process models, identify various types of requirements and the process for Requirements Engineering, make use of various System Models to conceptualize and construct a system, demonstrate different testing tactics and define metrics for software measurement, classify and mitigate the Software Risks, learn to achieve quality standards, understand the Unified Modeling Language Principles and learns fundamental process pattern for object-oriented analysis and design.

MODULE I: Introduction to Software Engineering [09 Periods] Basic terms of Software Engineering- The evolving role of software, Changing Nature of Software, Software Myths, Software engineering-A layered technology, A Process Framework, The Capability Maturity Model Integration (CMMI).

Process Models- The water fall model, Incremental process models, evolutionary process models, unified process.

MODULE II: Requirements of Software Engineering [09 Periods] Software Requirements- Functional and non-functional requirements, User requirements, System requirements, Interface specification, software requirements document.

Requirements Engineering Process - Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

MODULE III: Phases of Software Engineering [10 Periods] A: System Models -Context models, Behavioral models, Data models, Object models, structured methods.

B: Design Engineering and creating an Architectural Design- Design process and Design quality, Design concepts, the design model, Software architecture, Data design, Architectural styles and patterns, Architectural Design.

MODULE IV: Testing Methodology [09 Periods] Testing Strategies- A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box Testing, Validation Testing, System Testing.

Risk Management - Reactive vs proactive risk strategies, RMMM and plan. Quality concepts, Software quality assurance, Software reviews, Statistical Software Quality Assurance, Software Reliability, ISO 9000 Quality standards

MODULE V: Introduction to UML and Modeling [11 Periods] Introduction and Architecture- Introduction to UML, Importance of modeling, principles of modeling, object oriented modeling.Conceptual model of the UML, Architecture, Usecases

Basic Behavioral and Structural- Use case Diagrams, Activity Diagrams, Classes, Relationships, common Mechanisms and diagrams. Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages. Terms, concepts, modeling techniques for Class and Object Diagrams, Interactions, Interaction diagrams.

TEXTBOOKS:

1. Roger S. Pressman,**"Software engineering- A practitioner"s Approach"**, McGraw-Hill International Edition, 6th edition.
2. Grady Booch, James Rumbaugh, Ivar Jacobson, **–The Unified Modeling Language User Guide‖**, Pearson Education.

REFERENCES:

1. Pankaj Jalote, **"AnIntegrated Approach to Software Engineering"**, Springer Verlag, 1997.
2. Meilir Page-Jones, **–Fundamentals of Object Oriented Design in UML**‖, Pearson Education.

E –RESOURCES:

1. http://freequestionpaper.in/questionpaper/2014/08/Software-Engineering-Roger-S-Pressman- 5th-edition-IDM.pdf
2. https://books.google.co.in/books?id=PqsWaBkFh1wCandprintsec=frontcoveranddq=software+engineering+by+ian+sommerville+FREE+downloadandhl=enandsa=Xandved=0ahUKEwjjv5fhpb_TAhUHOo8KHY5OAC4Q6AEIKjAB#v=onepageandq=software%20engineering%20by%20ian%20sommerville%20FREE%20downloadandf=false
3. http://ieeexplore.ieee.org/document/4807670/
4. https://link.springer.com/search?facet-journal-id=40411andpackage=openaccessarticlesandquery=andfacet-sub-discipline=%22Software+Engineering%22
5. http://freevideolectures.com/Course/2318/Software-Engineering

COURSE OUTCOMES:

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

1. **Analyze** the customer business requirements and choose the appropriate Process model for the given project
2. **Elicit** functional and non-functional requirements using rigorous engineering methodology
3. **Conceptualize** and achieve requirements defined for the system using Architectural styles and Design patterns
4. **Design** Test cases and define metrics for standardization, mitigate and monitor the risks and assure quality standards.
5. **Understand** the basic concepts of UML and Implement the real time application using UML concepts

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO3**
CO1	3	3										2	2		
CO2	3	2										2	2		
CO3	2	3										2		2	
CO4	3	2						2				2		2	
CO5	3	2										2	2		

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: A6203	NETWORK CODING THEORY	L	T	P
Credits: 3		3	-	-

Course Objectives:

1. Learn the fundamentals of network coding theory.
2. Understand the performance parameters required for network coding.
3. Gain the knowledge of the network coding design methods.
4. Learn different approaches for the network coding.
5. Understand error correction and detection methods of adversarial errors.

COURSE OUTCOMES:

1. Demonstrate knowledge and understanding of the fundamentals of Network Coding Theory.
2. Summarize all the performance parameters and resources for network coding.
3. Construct the network code for different networks.
4. Deal with different approaches of Network Coding in lossy and lossless networks.
5. Deal with multiple sources network coding and detect adversarial errors.

MODULE- I

Introduction: A historical Perspective, Network Coding; Network Coding Benefits: Throughput, Robustness, Complexity, Security; Network Model.

Main Theorem of Network Multicast: The Min-Cut Max-flow Theorem, The Main network coding Theorem,

Theoretical Framework for Network Coding: A Network Multicast Model, algebraic Framework, Combinatorial Framework, Information-Theoretic Framework, Types of Routing and coding**.**

MODULE – II

Throughput Benefits of Network Coding: Throughput Measures, Linear Programming Approach, Configurations with Large Network Coding Benefits, Configurations with Small Network Coding Benefits, Undirected Graphs.

Networks with Delay and Cycles: Dealing with Delay, Optimizing for Delay, Dealing with Cycles. **Resources for Network Coding:** Bounds on Code Alphabet Size, Bounds on the Number of Coding Points, Coding with Limited Resources.

MODULE - III

Network Code Design Methods For Multicasting: Common initial procedure, centralized algorithms, decentralized algorithms, scalability to network changes.Single-Source Linear Network Coding:

Acyclic Networks: Acyclic Networks, Linear network code, Desirable properties of a linear network code, Existence and construction, Algorithm refinement for multicast.

Cyclic Networks: Delay-Free Cyclic Code, Non-equivalence between local and global descriptions, Convolutional network code, decoding of convolutional network code.

MODULE - IV

Inter-Session Network Coding: Scalar and vector linear network coding, Fractional coding problem formulation, Insufficiency of linear network coding, Information theoretic approaches: Multiple unicast

networks; Constructive approaches: Pairwise XOR coding in wireline networks, XOR coding in wireless networks.

Network Coding in Lossy Networks: Random linear network coding, Coding theorems: Unicast connections, Multicast connections, Error exponents for Poisson traffic with i.i.d. losses.

Subgraph Selection: Flow-based approaches: Intra-session coding, Computation-constrained coding, Inter-session coding; Queue-Length-Based approaches: Intra-session network coding for multicast sessions, Inter-session coding.

MODULE - V

Multiple Sources Network Coding:

Superposition coding and max-flow bound; Network Codes for Acyclic Networks: Achievable information rate region, Inner bound Rin, Outer bound Rout, RLP – An explicit outer bound.

Security against adversarial Errors: Error correction: Error Correcting bounds for centralized network coding, Distributed random network coding and polynomial-complexity error correction; Detection of adversarial errors: Model and problem formulation, Detection probability.

TEXT BOOKS:

1. Raymond W. Yeung, Shuo-Yen Robert Li, Ning Cai, Zhen Zhang, "Network Coding Theory", now publishers Inc, 2006, ISBN: 1-933019-24-7.
2. Christina Fragouli, Emina Soljanin, "Network Coding Fundamentals", now publishers Inc, 2007, ISBN: 978-1-60198-032-8.

Reference Books:

1. Tracey Ho, Desmond Lun, "Network Coding: An Introduction", Cambridge University Press, 2008, ISBN: 978-0-521-87310-9.
2. Muriel Medard, Alex Sprintson, "Network Coding: Fundamentals and Applications", 1st Edition, 2012, Academic Press, Elsevier, ISBN: 978-0-12-380918-6.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO3
CO1	3	3										2	2		
CO2	3	2										2	2		
CO3	2	3										2		2	
CO4	3	2						2				2		2	
CO5	3	2										2	2		

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: A0525	ADVANCED DATABASES	L	T	P
Credits: 3		3	-	-

Prerequisites: Database Concepts

Course Objectives: To understand the distributed database management and real-time application management.

Module I: Introduction of DBMS: [10 Periods]

Distributed Data Processing, Distributed Database System, Promises of DDBSs, Problem areas

Overview of Relational DBMS

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]

A: Query Processing objectives, Characterization of query processors.

B: 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 [11 Periods]

Transaction Management: Definition, properties of transaction, types of transactions. Distributed **Concurrency Control:** 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.

Course Outcomes:

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.

CO- PO, PSO Mapping **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	2			3				2		3	3	3	
CO 2	3	3	3			3				3		3	3	3	
CO 3	3	3	3			2				3		2	3	3	
CO 4	3	2	1			1				1		1			
CO 5	3	1	1			1						1			

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: A0526	ADVANCED ARTIFICIAL INTELLIGENCE	L	T	P
Credits: 3		3	-	-

Prerequisites: Discrete Mathematics

Course Objectives: This course enable the students to understand the basic fundamentals of Artificial Intelligence, determine various problem solving strategies, understand the logic concepts, different approaches to represent the knowledge, develop the expert systems in various phases and its applications, apply the fuzzy logic in various problem solving techniques

MODULE I: Introduction [10 Periods]

Introduction to Artificial Intelligence: Introduction ,history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of AI languages, current trends in AI.

MODULE II: Problem Solving [09 Periods]

Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening a*, constraint satisfaction. Problem reduction and game playing: Introduction, problem reduction, game playing, alphabeta pruning, two-player perfect information games.

MODULE III: Logic Concepts and Knowledge Representation [10 Periods]

A: Logic Concepts - Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic.

B: Knowledge Representation - Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web

MODULE IV: Expert System and Applications [10 Periods]

Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems, blackboard systems truth maintenance systems, application of expert systems, list of shells and tools.

MODULE V: Uncertainty Measure [09 Periods]

Probability theory: Introduction, Bayesian belief networks, certainty factor theory, dempster-shafer theory. Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

TEXT BOOKS:

1. Saroj Kaushik, “Artificial Intelligence”, CENGAGE Learning,
2. Stuart Russel, Peter Norvig, “Artificial intelligence, A modern Approach”, 2nd ed, PEA
3. Rich, Kevin Knight, Shiv Shankar B Nair, “Artificial Intelligence”, 3rd Ed, TMH
4. Patterson,”Introduction to Artificial Intelligence”, PHI

REFERENCES:

1. George F Lugar, “Atificial intelligence, structures and Strategies for Complex problem solving”, 5th edition, PEA
2. Ertel, Wolf Gang, “Introduction to Artificial Intelligence”, Springer 3. Blay WhitBY “Artificial Intelligence” Rosen Publishing.

E-RESOURCES:

1. https://i4iam.files.wordpress.com/2013/08/artificial-intelligence-by-rich-andknight.pdf
2. https://books.google.co.in/books?id=pVR9W5LEZUwC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
3. https://www.journals.elsevier.com/artificial-intelligence/
4. http://www.ceser.in/ceserp/index.php/ijai
5. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7_M07uyea_7zp_zRG3BvdUVy2TIab45fvPeNJfynQsAbmBEgDSUqzidwcse6xwotJA
6. http://ndl.iitkgp.ac.in/document/xttk-4kfhvUwVlXBW-YWRBg_vrHK12-lgOzTVbb5oZ6eQOBjCWDfRvquHJLEOFENjI5AmOqRc9Ar3eJF4CGFrw

Course Outcomes:

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

1. Describe the key components of the Artificial Intelligence field.
2. Identify various problem solving strategies.
3. Construct the solution for the problem using various logic and knowledge representation techniques.
4. Interpret the knowledge in various domains using expert systems.
5. Discover the solutions by using the probability theory and fuzzy logic.

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-									
CO2	-	2	2									
CO3	2	2	2	3								
CO4	2	2	2	2								
CO5	1	2										

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: A0527	SEMANTIC WEB	L	T	P
Credits: 3		3	-	-

Prerequisites: Web Technologies

COURSE OBJECTIVES:

This course enables the students to learn and understand the fundamental technologies for enabling the envisioned semantic web, study various knowledge representation techniques, make use of development tools and methods for ontology engineering, construct application and services using semantic web technologies and analyze various collaboration networks.

MODULE I: World Wide Web [09 Periods] Web Intelligence - Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence

Web Description - Ontology, Inference Engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

MODULE II: Knowledge Representation for the Semantic Web [10 Periods] Ontology - Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web - Resource Description Framework (RDF) / RDF Schema,

Web Languages - Ontology Web Language (OWL), UML, XML, XML Schema.

MODULE III: Ontology Engineering [10 Periods] A: Ontology Development - Ontology Engineering, constructing Ontology, Ontology, Development Tools, Ontology Methods

B: Ontology Sharing and Merging - Ontology Sharing and Merging, Ontology, Libraries and Ontology mapping, Logic, Rule and Inference Engines.

MODULE IV: Semantic Web Applications, Services and Technology [10 Periods]

Semantic Web Services - Semantic Web applications and services, Semantic Search,e-learning

Semantic Web Applications - Semantic Bioinformatics, Knowledge Base, XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods

MODULE V: Social Network Analysis and Semantic Web [09 Periods]

Social Network Analysis - What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis - Electronic Discussion networks.

Semantic Web - Blogs and Online Communities, Web Based Networks, Building Semantic Web Applications with social network features.

TEXT BOOKS:

1. Berners Lee, Gödel and Turing, "**Thinking on the web**", Wiley interscience, 2008.
2. Peter Mika, ". **Social Networks and the Semantic Web**", Springer, 2007.

REFERENCES:

1. J.Davies, R.Studer,P.Warren, Johri.Wiley&Sons,"Semantic Web Technologies,

Trends and Research in Ontology Based Systems"

2. Liyang Lu Chapman and Hall, **" Semantic Web and Semantic Web Services**", CRC Publishers,(Taylor & Francis Group)

E-RESOURCES:

1. http://as.wiley.com/WileyCDA/WileyTitle/productCd-0471768669.html
2. http://www.springer.com/in/book/9780387710006
3. https://research.vu.nl/ws/portalfiles/portal/2312133
4. http://nptel.ac.in/courses/106105077/18

COURSE OUTCOMES:

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

1. **Develop** web applications using semantic techniques.
2. **Relate** knowledge representation methods for semantic web.
3. **Explain** the key aspects of ontology engineering**.**
4. **Design** web services and its applications.
5. **Analyze** and build a social network.

CO- PO, PSO Mapping **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**															
COS	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO3**
CO1			2		2				3					2	
CO2	2	3		1									2		
CO3			2	3	3								2	1	
CO4			2	2	2				3					2	
CO5	2	3			1								2		

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: A0516	Design and Analysis of Algorithms (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT) and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: Data Structures

Course Objectives:

- To learn fundamental concepts an algorithm, Pseudo code, performance analysis, time complexity, disjoint sets, spanning trees and connected components.
- To Learn and Understanding of divide and conquer, applications, binary search, sorting and Strassen‘s matrix, greedy method, job sequencing, spanning trees and shortest path problem.
- To Learn and understanding dynamic programming, matrix chain, optimal binary search, knapsack problem and optimization methods, all pairs shortest path, travelling sales problem and reliability design.
- To Learn and understanding backtracking, n-queen problems, subset problem, graph coloring, Hamiltonian cycles and branch bound methods, travelling sales, knapsack problem, branch and bound, FIFO branch.
- To Learn and understanding of NP Hard and NP complete problems

MODULE I: Basics of Algorithm Design [09 Periods] Introduction -Algorithm, Pseudo code for expressing algorithms, Performance AnalysisSpace complexity, Time complexity, Asymptotic Notations, Amortized analysis. Disjoint Sets -Disjoint set operations, union and find algorithms, spanning trees, connected components and bi connected components.

MODULE II: Algorithm Methods [10 Periods] Divide and Conquer - General method, applications-Binary search, Quick sort, Merge sort, Strassen‘s matrix multiplication Greedy method General method, applications-Job sequencing with deadlines, general knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

MODULE III: Dynamic Programming and Optimization Techniques [10 Periods] A: Dynamic Programming - General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem . B: Optimization Techniques - All pairs shortest path problem, travelling sales person problem, Reliability design.

MODULE IV: Backtracking and Branch and Bound [10 Periods] Backtracking-General method, n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles Branch and Bound - General method, applications: Travelling sales person problem, 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution. 92

MODULE V: NP-Hard and NP-Complete problems [09 Periods] NP-Hard and NP-Completeness: Basic concepts, NP - Hard and NP Complete classes, Cook‘s theorem, Deterministic and Non-Deterministic algorithms, NP-hard graph problems and scheduling problem

TEXTBOOKS:

1. Ellis Horowitz, SatrajSahni and Rajasekharan, "Fundamentals of Computer Algorithms" Galgotia publications pvt. Ltd 2. T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein, "Introduction to Algorithms", second edition, PHI Pvt. Ltd./ Pearson Education

REFERENCES:

1. M.T.Goodrich and R.Tomassia "Algorithm Design, Foundations, Analysis and Internet examples", John wiley and sons.

2. R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, "Introduction to Design and Analysis of Algorithms A strategic approach", Mc Graw Hill. 3. Parag Himanshu Dave, Himanshu BalchandraDave,"Design and Analysis of algorithms" Pearson

E-RESOURCES:

1.https://comsciers.files.wordpress.com/2015/12/horowitz-and-sahani-fundamentals -ofcomputer-algorithms-2nd-edition.pdf

2.https://books.google.co.in/books?id=7qKXCzF1XC8C&printsec=frontcover&dq=T.H.Cormen,C.E.Leiserson,+R.L.Rivest,and+C.Stein,+%22Introduction+to+Algorithms%22,+second+edition,+PHI+Pvt.+Ltd./+Pearson+Education,ebook,pdf&hl=en&sa=X&ved=0ahUKEwjFupORxdXTAhXLQo8KHU7FC5cQ6AEIKjAB#v=onepage&q&f=false

3. http://en.cnki.com.cn/Article_en/CJFDTOTAL-JFYZ200208019.htm

4. http://nptel.ac.in/courses/106101060/

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

1. Analyze performance of algorithms using asymptotic notations, performance analysis, disjoint sets, spanning trees and connected components
2. Describe and analyze paradigms for designing good algorithms using Divide-andConquer and Greedy Techniques, applications, binary search, sorting and Strassen‘s matrix, greedy method, job sequencing, spanning trees and shortest path problem.
4. Synthesize dynamic-programming algorithms and analyze matrix chain, optimal binary search, knapsack problem and optimization methods, all pairs shortest path, travelling sales problem and reliability design.
5. Apply backtracking and branch and bound techniques to solve some complex problems, n-queen problems, subset problem, graph coloring, Hamiltonian cycles and branch bound methods, travelling sales, knapsack problem, branch and bound, FIFO branch
6. Apply algorithm design techniques to solve certain NP-complete problems.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2									3	2	
CO2	3	2	3	2									3	2	
CO3	3	2	3	2									3	2	
CO4	3	2	3	2									3	2	
CO5	3	2	3	2									3	2	

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: A0532	INTERNET OF THINGS	L	T	P
Credits: 3		3	-	-

Prerequisites: Basic knowledge of computer architecture, programming and communication protocols

COURSE OBJECTIVES:

Understand the basics of Embedded System, IoT and the development model. Understand the architecture, Instruction set and work on ARM microcontroller using practical hands-on. Ability to select appropriate hardware and microcontrollers based on need of application. Understand the Internet of Things Standards, Frameworks and Techniques. Apply the tools, techniques and skills acquired towards development of Projects.

MODULE I - INTRODUCTION TO EMBEDDED SYSTEMS AND INTERNET OF THINGS (IOT)

[09 Periods]

Architecture of Embedded Systems , Embedded Systems Development process, Architecture of Internet of Things , Applications of Embedded Systems and IoT, Design Methodology for IOT Products

MODULE II - OVERVIEW OF OPEN SOURCE HARDWARE AND ITS RELEVANCE TO IOT

[09 Periods]

Introduction and Programming Arduino Development Board , Working with Sensor Integration, Interfacing Input / Output devices (Pot, LDR, LCD, etc), Introduction to Network Connectivity, Concepts of IP based communication, Client – Server model of communication, Introduction to Wi-Fi communication using ESP8266, ESP8266 in Station & Access Point Mode

MODULE III – FUNDAMENTALS OF PYTHON PROGRAMMING & RASPBERRY PI

[10 Periods]

A: Introduction to python programming, working with functions, classes, REST full Web Services, Client Libraries.

B: Introduction & programming Raspberry Pi3, Integrating Input Output devices with Raspberry Pi3

MODULE IV – IOT PLATFORM: CLOUD COMPUTING PLATFORMS FOR IOT DEVELOPMENT (IBM CLOUD)[10 PERIODS]

IOT Platform Architecture (IBM Internet of Things & Watson Platforms), API Endpoints for Platform Services , Devices Creation and Data Transmission, Introduction to NODE-RED and Application deployment

MODULE V – IOT USECASES: SMART CITY PROJECT & INDUSTRIAL USECASES

[10 Periods]

Introduction to Smart City Project & IOT Use cases , Development of Smart city Applications , Project Work -1 (Smart city Use case) , Project Work-2 (Industrial Use case)

TEXT BOOKS:

1. Internet of Things: A Hands-On Approach by by Arsheep Bahga, Vijay Madisetti
2. The Internet of Things: Key applications and Protocols ǁ Wiley Publications 2nd Edition

REFERENCES:

1. Embedded Systems: Real-Time Interfacing to Arm(r) Cortex -M Microcontrollers: Volume-1 & 2 by Jonathan W Valvano
2. Designing the Internet of Things by Adrian McEwen, Hakim Cassimally, Wiley Publications, 2012
3. Embedded Real Time Systems: Concepts, Design and Programming by Dr.K.V.K.K.Prasad, DreamTech Publication, 2003.

E-RESOURCES:

1. http://www.itu.int/en/ITU-T/gsi/iot/Pages/default.aspx
2. http://electronicdesign.com/embedded/understanding-protocolsbehind-internet- things
3. http://eclipse.org/community/eclipse_newsletter/2014/february/articl e2.php
4. http://iot.eclipse.org/protocols.html
5. http://www.slideshare.net/paolopat/internet-ofthingsprotocolswar
6. http://www.slideshare.net/RealTimeInnovations/io-34485340
7. http://www.networkworld.com/article/2456421/internet-of-things/aguide-to-the-confusing-internet-of-things-standards-world.html

COURSE OUTCOMES:

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

1. **Describe** the fundamental concepts of IoT and its applications
2. **Illustrate** M2M concepts with protocols.
3. **Develop** applications using Python Scripting Language.
4. **Build** real world applications by applying Raspberry PI.
5. **Examine** web based services.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	3	3	3	3						3	3	3
CO2	3	2	3	2	3							2	3	3	3
CO3	3	3	3	3	3							3	3	3	3
CO4	3	3	3	3	3	3						3	3	3	3
CO5	3	3	3	3	3							3	3	3	3

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: A0503	DISTRIBUTED SYSTEMS	L	T	P
Credits: 3		3	-	-

Prerequisites: Computer Networks, DBMS and Operating Systems

COURSE OBJECTIVES:

Student will be able to learn fundamental aspects of Distributed systems and analyze basics of Architectural and Fundamental Models. To identify various types of requirements and the process for Distributed objects. To make use of various OS layers to conceptualize and construct a system, to demonstrate different file systems tactics and define Events and time ordering in distributed transactions.

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 [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 [10 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 [10 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 [10 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.

E- **REFERENCES:**

1. http://www.gecg.in/papers/ds5thedn.pdf
2. https://cs.uwaterloo.ca/~bernard/courses/cs454/0.Begin.pdf
3. https://www.cs.helsinki.fi/u/jakangas/Teaching/DistSys/DistSys-08f-1.pdf
4. https://courses.cs.ut.ee/MTAT.08.009/2014_fall/uploads/Main/slides10-2.pdf

COURSE OUTCOMES:

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

1. Structuring distributed applications: using client-server and remote procedure calls.
2. Learns inter process communication and distributed objects.
3. Design Cryptographic Algorithms and security issues for distributed systems.
4. Assess distributed file systems.
5. Ordering of events: using logical and physical clocks.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2	3		3								3	1	
CO2	1	3		2									2	1	
CO3			3	2	3				3				2	3	
CO4	2	3											2		
CO5	2	2			2								3		

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: A0527	MULTIMEDIA AND ANIMATION TECHNIQUES	L	T	P
Credits: 3		3	-	-

Prerequisites: Computer Graphics

COURSE OBJECTIVES:

This course will enable the students to learn the fundamental concepts of animation, creating flash animation concepts, learn the 3d animation techniques, apply the motion capture software for animation and analyze various color models.

MODULE I: INTRODUCTION [09 PERIODS]

What is mean by Animation – Why we need Animation – History of Animation– Uses of Animation – Types of Animation – Principles of Animation – Some Techniques of Animation – Animation on the WEB – 3D Animation – Special Effects -Creating Animation.

MODULE II: Creating Animation in Flash [10 Periods] Introduction to Flash Animation – Introduction to Flash – Working with the Timeline and Frame-based Animation - Working with the Time line and Twin based animation - Understanding Layers – Action script.

MODULE III: 3D Animation Effects [10 Periods]

A: 3D Animation & its Concepts – Types of 3D Animation – Skeleton & Kinetic3D Animation.

B: Texturing & Lighting of 3D Animation – 3D Camera Tracking –Applications & Software of 3D Animation.

MODULE IV: Motion Capture [09 Periods]

Motion Caption – Formats – Methods – Usages – Expression – Motion Capture Softwares' – Script Animation Usage – Different Languages of Script Animation among the Software.

MODULE V: COLOR MODEL [10 PERIODS]

Concept Development –Story Developing –Audio & Video – Color Model –Device Independent Color Model – Gamma and Gamma Correction - Production Budgets- 3D Animated Movies.

TEXT BOOKS:

1. Juke Parent, **"Computer Animation: Algorithms and Techniques**", 3rd Edition, (Hardcover,RickParent).

2. Williams Richars, "**The Animator's Survival Kit--Revised Edition: A Manual of Methods, Principles and Formulas for Classical, Computer, Games, Stop Motion and Internet",** Faber & Faber, 2012.

REFERENCES:

1. Alex Michael, **"Animating with Flash MX Professional Creative Animation Techniques"**, 1st edition Focal Press, 2003.

E-RESOURCES:

1. http://www.bkstr.com/floridastore/home Autodesk Maya2016
2. https://itunes.apple.com/us/app/the-animators-survival-kit/id627438690?mt=8
3. http://ieeexplore.ieee.org/document/7239940/
4. nptel.ac.in/courses/106102063/25

COURSE OUTCOMES:

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

1. **Understand** fundamental concepts of animation.
2. **Implement** animation using flash concepts.
3. **Outline** the scripting concepts in 3D animation methods.
4. **Analyze** the different languages of scripting animation techniques.
5. **Apply** the story developing and color model in 3D animated movies.

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	1	2			2							-	1		
CO2			3		3							3		2	
CO3					3							-		2	
CO4				2								-			
CO5			3		3							3		3	3

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: A6206	CRPTOGRAPHY AND NETWORK SECURITY LAB	L	T	P
Credits: 1.5		-	-	3

LIST OF EXPERIMENTS:

1. Write a C program that contains a string (char pointer) with a value ï¿½Hello worldï¿½. The program should XOR each character in this string with 0 and displays the result.
2. Write a C program that contains a string (char pointer) with a value ï¿½Hello worldï¿½. The program should AND or and XOR each character in this string with 127 and display the result.
3. Write a Java program to perform encryption and decryption using the following algorithms
   1. Ceaser cipher
   2. Substitution cipher
   3. Hill Cipher
4. Write a C/JAVA program to implement the DES algorithm logic.
5. Write a C/JAVA program to implement the Blowfish algorithm logic.
6. Write a C/JAVA program to implement the Rijndael algorithm logic.
7. Write the RC4 logic in Java Using Java cryptography; encrypt the text ï¿½Hello worldï¿½ using Blowfish. Create your own key using Java key tool.
8. Write a Java program to implement RSA algorithm.
9. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript.
10. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
11. Calculate the message digest of a text using the MD5 algorithm in JAVA.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2										2		2	
CO2	3	2										2		2	
CO3	2	2										2		2	
CO4	3	2						2				2		2	
CO5	3	2										2		2	

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: A6207	AUTOMATA AND COMPILER DESIGN LAB	L	T	P
Credits: 1.5		-	-	3

PREREQUISITES: NIL COURSE OBJECTIVES:

This course outlines the major concept areas of language translation and various phases of compiler, extend the knowledge of parser by parsing LL parser and LR parser, analyze the intermediate forms and the role of symbol table, classify code optimization techniques and analyze the data flow and develop machine code generation algorithms.

Software Requirements: C++ Compiler / JDK kit, (LEX, YACC) / UBUNTU

LIST OF PROGRAMS:

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 should 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 generating tools.
3. Write a C program to recognize strings under 'a*', 'a*b+', 'abb'
4. Write a C program to test whether a given identifier is valid or not
5. Write a Program for Implementation of recursive descent Parser.
6. Design Predictive parser for the given language.
7. Write a program to calculate first function for the given grammar.
8. Write a Program for Implementation of Shift Reduce parsing
9. Write a program to Design predictive parser or LL(1) parser for the given grammar.
10. Design LALR bottom up parser for the above language.
11. Convert the BNF rules into Yacc form and write code to generate abstract syntax tree.
12. 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 preceded 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 garbage 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 specified 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
jumps 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 STOP instruction.

TEXT BOOKS:

1. A.V. Aho .J.D.Ullman ,"**Principles of compiler design**" ,Pearson Education.
2. Andrew N. Appel, "**Modern Compiler Implementation in C**", Cambridge University Press.
3. D.M Dhamdhere, "**Systems programming and operating systems**" ,2nd edition,tata McGraw hill publishing comp pvtLtd.

REFERENCES:

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

COURSE OUTCOMES:

At the end of the course, students will be able to
1. **Apply** the knowledge of lex tool & yacc tool to develop a scanner & parser.
2. **Develop** program for solving parser problems.
3. **Create** program for intermediate code generation.
4. **Write** code to generate abstract syntax tree and to convert BNF to YACC.
5. **Implement** target code from the abstract syntax tree.

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO 8**	**PO9**	**PO10**	**PO11**	**PO1 2**	**PSO1**	**PSO 2**	**PSO3**
CO1	3	2										2		2	
CO2	3	2										2		2	
CO3	2	2										2		2	
CO4	3	2						2				2		2	
CO5	3	2										2		2	

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code:A0M03	Quantitative Aptitude & Verbal Reasoning - I (Common for CE, EEE, ME, ECE, CSE, IT and Mi.E)	L	T	P
Credits: NIL		2	-	-

PRE REQUISITES: NIL

Quants: Number System (NS)

Number Systems-Factors and Multiples: The H.C.F. of two or more than two numbers; Factorization Method Division Method; Finding the H.C.F. of more than two numbers; product of two numbers = Product of their H.C.F. and L.C.M.; Co-primes; H.C.F. and L.C.M. of Fractions:Comparison of Fractions.

VERBAL: ARTICLES, PARA JUMBLES

Articles- Types of articles, Countable nouns, Uncountable nouns, Usage of articles, Omission of articles.

Para Jumbles- Para Jumbles, Types of Para Jumbles, Strategies to answer questions on Jumbled Paragraphs.

LOGICAL: DATA ARRANGEMENTS, BLOOD RELATION

Data Arrangements- Linear Arrangement, Circular Arrangement, Multi- Dimensional Arrangement.

Blood Relations- Classification of blood relations, Pointing a person, Equation related problems.

MODULE – II[6 PERIODS]

Quants: Time and Distance, Pipes

Time & Distance-;Km/hr to m/sec conversion; m/sec to km/hr conversion; man covers a certain distance at x km/hr and an equal distance at y km/hr

VERBAL: SENTENCE COMPLETION, PREPOSITIONS

Sentence Completion- Formats of Question; Strategies to solve sentence completion questions- Proactive and reactive solving, Identifying clues- Signposts, Types of signposts, Root words, Sentence structure clues.

Prepositions- Definition, Types of prepositions, Preposition of Place, Preposition of Time, Preposition of Direction, Compound Prepositions, Prepositional Phrases.

LOGICAL: CODING AND DECODING

Coding and Decoding-Number Series, Alphabet Series, Analogy, Odd Man Out, Visual Reasoning.

MODULE–III [6 PERIODS]

Quants: Ages, Progression, Logarithms

Ages, Progression-; Arithmetic progression; Arithmetic mean; Geometric progression and mean

Logarithms-Why logarithms: Properties of Logarithms: Laws of logarithm: Characteristic of logarithm:

VERBAL: VOCABULARY: VOCABULARY-ETYMOLOGY, ROOT WORDS, PREFIXES AND SUFFIXES; SYNONYMS AND ANTONYMS, TIPS TO SOLVE QUESTIONS ON SYNONYMS AND ANTONYMS; WORD ANALOGY, PATTERNS OF QUESTIONS ON WORD ANALOGY; MISCELLANEOUS VOCABULARY.

LOGICAL: DATA INTERPRETATION AND DATA SUFFICIENCY

Data Interpretation- Tables, Pie charts, Bar Graphs, Line graphs
Data Sufficiency-Strategies to solve.

MODULE – IV [6 PERIODS]

Quants: Permutations and Combinations, Probability
Permutations-Factorial Notation: The different arrangements; Number of Permutations: number of all permutations of n things, taken all at a time; n subjects of which p_1 are alike of one kind; p_2 are alike of another kind; p_3 are alike of third kind; Number of Combinations: The number of all combinations of n things, taken r at a time.

VERBAL: SENTENCE CORRECTION

Sentence Correction- Subject-Verb Agreement; Modifiers; Parallelism; Pronoun- Antecedent Agreement; Verb Time Sequence; Comparisons; Determiners; Exercise Questions.

LOGICAL: CLOCKS AND CALENDARS

Clocks: Introduction, Derivation of angles, Angles between hands of the clock, Hands together, Hands at angular distance, Gain & Loss problems.
Calendars: - Leap year-Non leap year, Odd days, Finding the day from date, Repeated years.

MODULE - V: [6 PERIODS]

Quants: Areas and Volumes (Mensuration)
Areas & Volumes-Pythagoras Theorem Results on Quadrilaterals Perimeter; Area of a circle Circumference Length of an arc Area of a sector; Area of a triangle.

VERBAL: READING COMPREHENSION, CRITICAL REASONING

Reading Comprehension- Speed reading strategies; Reading Comprehension
- types of questions, tackling strategies; Critical Reasoning.

LOGICAL: DIRECTIONS, CUBES, SYLLOGISMS

Directions -Introduction, Direction based questions, Shadow based problems.
Cubes- Cube & cuboid concepts, 3-2-1-0 faced problems.
Syllogisms- Statements and Conclusion, Syllogisms using Venn Diagrams

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COs	**Programme Outcomes (POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1						2		2				2
CO2						2		2				2
CO3						2		2				2
CO4						2		2				2
CO5						2		2				2

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: A0H08	ENGINEERING ECONOMICS AND ACCOUNTANCY	L	T	P
Credits: 3		3	-	-

PREREQUISITES: NIL

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

MODULE-1 Business Environment and Managerial Economics [10 Periods]

Business Environment: Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Latest trends in Business Environment (Entrepreneurship).

Managerial Economics: Definition, Nature and Scope of Managerial Economics– Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand, Types, Significance of Elasticity of Demand, Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

MODULE – II Theory of Production and Cost Analysis [10 Periods] Theory of Production: Production Function – ISOquants and ISOcosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.

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

MODULE – III MARKET STRUCTURES AND PRICING POLICIES [09 PERIODS]

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

MODULE – IV Capital and Capital Budgeting [09 Periods]

Capital: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance.

Capital Budgeting: Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

MODULE – V FINANCIAL ACCOUNTING AND RATIOS [10 PERIODS]

Financial Accounting: Introduction, Accounting principles, Accounting Cycle,

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

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

TEXT BOOKS:

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

REFERENCES:

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

E-RESOURCES:

1. http://www.learnerstv.com/Free-Economics-video-lecture-courses.htm
2. http://nptel.ac.in/courses/110105067/
3. http://nptel.ac.in/courses/110107073/
4. http://nptel.ac.in/courses/110101005/
5. http://nptel.ac.in/courses/109104073/

COURSE OUTCOMES:

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

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

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2							1		3	
CO2	3			2	1							
CO3		1			2						3	
CO4	2	1			3							
CO5		1			2						3	

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: A6209	ETHICAL HACKING	L	T	P
Credits: 3		3	-	-

Prerequisites:

- A course on "Operating Systems"
- A course on "Computer Networks"
- A course on "Network Security and Cryptography"

Course Objectives:

- The aim of the course is to introduce the methodologies and framework of ethical hacking for enhancing the security.
- The course includes-Impacts of Hacking; Types of Hackers; Information Security Models; Information Security Program; Business Perspective; Planning a Controlled Attack; Framework of Steps (Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation, Deliverable and Integration)

MODULE – I: Introduction

Hacking Impacts, The Hacker Framework: Planning the test, Sound Operations, Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation, Final Analysis, Deliverable, Integration Information Security Models: Computer Security, Network Security, Service Security, Application Security, Security Architecture Information Security Program: The Process of Information Security, Component Parts of Information Security Program, Risk Analysis and Ethical Hacking

MODULE – II: The Business Perspective

Business Objectives, Security Policy, Previous Test Results, Business Challenges Planning for a Controlled Attack: Inherent Limitations, Imposed Limitations, Timing is Everything, Attack Type, Source Point, Required Knowledge, Multi-Phased Attacks, Teaming and Attack Structure, Engagement Planner, The Right Security Consultant, The Tester, Logistics, Intermediates, Law Enforcement

MODULE – III: Preparing for a Hack

Technical Preparation, Managing the Engagement Reconnaissance: Social Engineering, Physical Security, Internet Reconnaissance

UNIT – IV: Enumeration

Enumeration Techniques, Soft Objective, Looking Around or Attack, Elements of Enumeration, Preparing for the Next Phase Exploitation: Intutive Testing, Evasion, Threads and Groups, Operating Systems, Password Crackers, RootKits, applications, Wardialing, Network, Services and Areas of Concern

UNIT -V: Deliverable

The Deliverable, The Document, Overal Structure, Aligning Findings, Presentation Integration: Integrating the Results, Integration Summary, Mitigation, Defense Planning, Incident Management, Security Policy, Conclusion

TEXT BOOK

- James S. Tiller, "The Ethical Hack: A Framework for Business Value Penetration Testing", Auerbach Publications, CRC Press

REFERENCE BOOKS

- EC-Council, “Ethical Hacking and Countermeasures Attack Phases”, Cengage Learning
- Michael Simpson, Kent Backman, James Corley, “Hands-On Ethical Hacking and Network Defense”, Cengage Learning

Course Outcomes:

- Gain the knowledge of the use and availability of tools to support an ethical hack
- Gain the knowledge of interpreting the results of a controlled attack
- Understand the role of politics, inherent and imposed limitations and metrics for planning of a test
- Comprehend the dangers associated with penetration testing

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
CO	**Programme Outcomes(POs)**												**PSOs**		
	PO	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO	1	1	1	1									1	1	1
CO	1	2	2	2	1							1	1		2
CO	1	1	1	2	1							1	1		1
CO	1	1	1	1	1							1	1	1	1
CO	1	2	2	2	2							2	2	1	3

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: A0536	DATA MINING	L	T	P
Credits: 3		3	-	-

PREREQUISITES: NIL

Course Objectives:

This course provides the students to understand stages in building a Data Warehouse, identify the need and importanceof preprocessing techniques, implement similarity and dissimilarity techniques, analyze and evaluate performance of algorithms for Association Rules, analyze Classification and Clustering algorithms.

MODULE I: Introduction and Mining Issues & Data [09 Periods]

Introduction - Why Data Mining? What Is Data Mining? What Kinds of Data Can Be mined? What Kinds of Patterns Can Be Mined? Which Technologies Are Used? Which Kinds of Applications Are Targeted?

Mining Issues and Data - Major Issues in Data Mining, Types of Data, Data Quality

MODULE II: Data, Measuring Data Similarity and Dissimilarity [10 Periods]

Data - Data Pre-processing, Aggregation, Sampling, Dimensionality Reduction, Feature Subset Selection, Feature Creation, Data Discretization and Binarization, Variable transformation.

Measuring Data Similarity and Dissimilarity - Similarity and Dissimilarity between simple attributes, Dissimilarities and similarities between data objects, Examples of Proximity measures, Issues in Proximity Calculation, Selection of right proximity measure.

MODULE III: Classification and Techniques [09 Periods]

A: Classification - Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree. **B: Techniques** -Methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction.

MODULE IV: Classifier and Association Analysis [10 Periods]

Classifiers - Alterative Techniques**,** Bayes' Theorem, Naïve Bayesian Classification, Bayesian Belief Networks

Association Analysis - Basic Concepts and Algorithms: Problem Definition, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm

MODULE V: Cluster Analysis and DBSCAN [10 Periods]

Cluster Analysis - Basic Concepts and Algorithms: Overview: What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters; K-means: The Basic K-means Algorithm, K-means Additional Issues, Bisecting K-means, Strengths and Weaknesses; Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm.

DBSCAN - Traditional Density Center-Based Approach, DBSCAN Algorithm, Strengths

and Weaknesses.

TEXT BOOKS:

1. Pang-Ning Tan & Michael Steinbach, "**Introduction to Data Mining**", VipinKumar, Pearson.
2. Jiawei Han, Michel Kamber,"**Data Mining concepts and Techniques**", 3/e, Elsevier.

REFERENCES:

1. Hongbo Du, "**Data Mining Techniques and Applications: An Introduction**",Cengage Learning.
2. Vikram Pudi and P. Radha Krishna, "**Data Mining**", Oxford.
3. Mohammed J. Zaki, Wagner Meira, Jr ,"**Data Mining and Analysis - fundamentalConcepts and Algorithms**", Oxford
4. Alex Berson, Stephen Smith ,"**Data Warehousing Data Mining & OLAP**" , TMH.

E-RESOURCES:

1. http://www-users.cs.umn.edu/~kumar/dmbook/index.php
2. http://myweb.sabanciuniv.edu/rdehkharghani/files/2016/02/The-Morgan-Kaufmann-Series-in-Data-Management-Systems-Jiawei-Han-Micheline-Kamber- Jian-Pei-Data-Mining.-Concepts-and-Techniques-3rd-Edition-Morgan-Kaufmann-2011.pdf
3. http://www.ijctee.org/files/Issuethree/IJCTEE_1111_20.pdf
4. http://www.ccsc.org/southcentral/E-Journal/2010/Papers/Yihao%20final%20paper%20CCSC%20for%20submission.pdf
5. https://gunjesh.wordpress.com/

COURSE OUTCOMES:

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

1. **Acquire** knowledge in building a Data Warehouse
2. **Understand** the need and importance of preprocessing techniques
3. **Implement** Similarity and dissimilarity techniques
4. **Analyze** and evaluate performance of algorithms for Association Rules.
5. **Deploy** Classification and Clustering algorithms

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO	Programme Outcomes(POs)												PSOs		
	POs	PO	PO	PO	PO	PO	PO	PO	PO	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO	1	1	1	1									1	1	1
CO	1	2	2	2	1							1	1		2
CO	1	1	1	2	1							1	1		1
CO	1	1	1	1	1							1	1	1	1
CO	1	2	2	2	2							2	2	1	3

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: A6212	CRYPT ANALYSIS	L	T	P
Credits: 3		3	-	-

Prerequisites: A Course on "Computer Networks, Mathematics".

Course Objectives:

- To understand the importance of cryptanalysis in our increasingly computer-drivenworld.
- To understand the fundamentals of Cryptography
- To understand the Lattice- based cryptanalysis and elliptic curves and pairings
- To understand birthday- based algorithms for functions and attacks on stream ciphers
- To apply the techniques for secure transactions in real world applications

MODULE - I

A bird's – eye view of modern Cryptography: Preliminaries, Defining Security in Cryptography **Monoalphabetic Ciphers:** Using Direct Standard Alphabets, The Caesar Cipher, Modular arithmetic, Direct Standard alphabets, Solution of direct standard alphabets by completing the plain component, Solving direct standard alphabets by frequency considerations, Alphabets based on decimations of the normal sequence, Solution of decimated standard alphabets, Monoalphabets based on linear transformation. **Polyalphabetic Substitution:** Polyalphabetic ciphers, Recognition of polyalphabetic ciphers, Determination of number of alphabets, Solution of individual alphabets if standard, Polyalphabetic ciphers with a mixed plain sequence, Matching alphabets, Reduction of a polyalphabetic cipher to a monoalphabetic ciphers with mixed cipher sequences

MODULE - II

Transposition: Columnar transposition, Solution of transpositions with Completely filled rectangles, Incompletely filled rectangles, Solution of incompletely filled rectangles – Probable word method, Incompletely filled rectangles general case, Repetitions between messages; identical length messages. **Sieve algorithms:** Introductory example: Eratosthenes's sieve, Sieving for smooth composites

MODULE - III

Brute force Cryptanalysis: Introductory example: Dictionary attacks, Brute force and the DES Algorithm, Brute force as a security mechanism, Brute force steps in advanced cryptanalysis, Brute force and parallel computers. **The birthday paradox: Sorting or not?:** Introductory example: Birthday attacks on modes of operation, Analysis of birthday paradox bounds, Finding collisions, Application to discrete logarithms in generic groups.

MODULE - IV

Birthday- based algorithms for functions: Algorithmic aspects, Analysis of random functions, Number-theoretic applications, A direct cryptographic application in the context of blockwise security, Collisions in hash functions. **Attacks on stream ciphers:** LFSR- based key stream generators,

Correlation attacks, Noisy LFSR model, Algebraic attacks, Extension to some non- linear shift registers, The cube attack.

MODULE - V

Lattice- based cryptanalysis: Direct attacks using lattice reduction, Coppersmith's small roots attacks. **Elliptic curves and pairings:** Introduction to elliptic curves, The Weil pairing, the elliptic curve factoring method.

TEXT BOOKS:

1. Elementary Cryptanalysis A Mathematical Approach by Abraham Sinkov, The mathematical Association of America (lnc).
2. Algorithmic Cryptanalysis" by Antoine joux, CRC Press'

REFERENCES:

1. Algebraic Cryptanalysis, Bard Gregory, Springer, 2009
2. Cryptanalysis of Number Theoretic Ciphers, Sameul S. Wag staff, Champan & Hall/CRC.
3. Cryptanalysis: A Study of Cipher and Their Solution, Helen F. Gaines,1989

COURSE OUTCOMES:

- Ability to apply cryptanalysis in system design to protect it from various attacks.
- Ability to identify and investigate vulnerabilities and security threats and the mechanisms to counter them.
- Ability to analyze security of cryptographic algorithm against brute force attacks, birthday attacks.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO	Programme Outcomes(POs)												PSOs		
	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1									1	1	1
CO2	1	2	2	2	1							1	1		2
CO3	1	1	1	2	1							1	1		1
CO4	1	1	1	1	1							1	1	1	1
CO5	1	2	2	2	2							2	2	1	3

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech VI Sem		
Code: A6210	ADVANCED WIRELESS NETWORKS	L	T	P
Credits: 3		3	-	-

Pre-Requisites: Computer Networks

Course Objectives:

- The students should get familiar with the wireless/mobile market and the future needs and challenges.
- To get familiar with key concepts of wireless networks, standards, technologies and their basic Operations.
- To learn how to design and analyse various medium access.
- To learn how to evaluate MAC and network protocols using network simulation software tools.
- The students should get familiar with the wireless/mobile market and the future needs and challenges.

Course Outcomes: After completion of course, students would be able to:

- Demonstrate advanced knowledge of networking and wireless networking and understand various types of wireless networks, standards, operations and use cases.
- Be able to design WLAN, WPAN, WWAN, Cellular based upon underlying propagation and performance analysis.
- Demonstrate knowledge of protocols used in wireless networks and learn simulating wireless networks.
- Design wireless networks exploring trade-offs between wire line and wireless links.
- Develop mobile applications to solve some of the real-world problems.

MODULE - I

Introduction:

Wireless Networking Trends, Key Wireless Physical Layer Concepts, Multiple Access Technologies - CDMA, FDMA, TDMA, Spread Spectrum technologies, Frequency reuse, Radio Propagation and Modelling, Challenges in Mobile Computing: Resource poorness, Bandwidth, energy etc.

WIRELESS LOCAL AREA NETWORKS:

IEEE 802.11 Wireless LANs Physical & MAC layer, 802.11 MAC Modes (DCF& PCF) IEEE 802.11 standards, Architecture & protocols, Infrastructure vs. Adhoc Modes, Hidden Node & Exposed Terminal Problem, Problems, Fading Effects in Indoor and outdoor WLANs, WLAN Deployment issues

MODULE – II

Wireless Cellular Networks:

1G and 2G, 2.5G, 3G, and 4G, Mobile IPv4, Mobile IPv6, TCP over Wireless Networks,

Cellular architecture, Frequency reuse, Channel assignment strategies, Handoff strategies, Interference and system capacity, Improving coverage and capacity in cellular systems, Spread spectrum Technologies.

MODULE - III

WiMAX (Physical layer, Media access control, Mobility and Networking), IEEE802.22 Wireless Regional Area Networks, IEEE 802.21 Media Independent Handover Overview

WIRELESS SENSOR NETWORKS:

Introduction, Application, Physical, MAC layer and Network Layer, Power Management, Tiny OS Overview.

MODULE - IV

Wireless PANs:

Bluetooth AND Zigbee, Introduction to Wireless Sensors,.

MODULE - V

Security:

Security in wireless Networks Vulnerabilities, Security techniques, Wi-Fi Security, DoS in wireless communication.

ADVANCED TOPICS

IEEE 802.11x and IEEE 802.11i standards, Introduction to Vehicular Adhoc Networks

REFERENCES:

1. Schiller J., Mobile Communications, Addison Wesley 2000
2. Stallings W., Wireless Communications and Networks, Pearson Education 2005
3. Stojmenic Ivan, Handbook of Wireless Networks and Mobile Computing, John Wiley and Sons Inc 2002
4. Yi Bing Lin and Imrich Chlamtac, Wireless and Mobile Network Architectures, John Wiley and Sons Inc 2000
5. Pandya Raj, Mobile and Personal Communications Systems and Services, PHI 200

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Program Outcomes (POs)					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1		1			
CO2	1		1			
CO3			1		1	
CO4			1		2	1
CO5	1		1	1	2	3

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: A0532	MOBILE COMPUTING	L	T	P
Credits: 3		3	-	-

PREREQUISITES: **NIL**

MODULE I:

Mobile Computing: Novel Applications, Limitations of Mobile Computing, Mobile Computing Architecture: Programming languages, Functions of Operating Systems, Functions of Middleware for mobile Systems, Mobile Computing Architectural layers, Protocols, Layers.

MODULE II:

Mobile Devices: Handheld Mobile Smartphones with Multimedia Functionalities, Smartcards, Smart Sensors,Mobile System Networks: Cellular Network, WLAN Network and Mobile IP, Ad-hoc Networks, Mobility Management

MODULE III:

Global System For Mobile Communications (Gsm): Mobile Services, System Architecture, Protocols, Localization & Calling, Handover, Security. GPRS: GPRS System Architecture, UMTS: UMTS System Architecture. LTE: Long Term Evolution

MODULE IV:

Mobile Network Layer: Mobile IP: Goals, Assumptions, Entities and Terminology, IP Packet Delivery, Agent Discovery, Registration, Tunneling and Encapsulation, Optimizations, Dynamic Host Configuration Protocol (DHCP) Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP, TCP over 2.5G/3G Wireless Networks.

MODULE V:

Security Issues in Mobile Computing: Introduction, Information Security, Security Techniques and Algorithms, Security Protocols, Security Models, Security Frameworks for mobile Environment.

TEXT BOOKS:

1. Raj Kamal, "Mobile Computing", OXFORD UNIVERSITY PRESS.
2. Asoke K Talukder, et al, "Mobile Computing", Tata McGraw Hill, 2008.

REFERENCES:

1. Jochen Schiller, "Mobile Communications", Pearson Education, Second Edition, 2008.
2. Dr. Sunilkumar, et al "Wireless and Mobile Networks: Concepts and Protocols", Wiley India.
3. Matthew S.Gast, "802.11 Wireless Networks", SPD O'REILLY.

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Program Outcomes (POs)					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1		1			
CO2	1		1			
CO3			1		1	
CO4			1		2	1
CO5	1		1	1	2	3

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VI Semester		
Code: A0539	Information Retrieval Systems	L	T	P
Credits: 3		3	-	-

Pre-requisite: Data Structures

Course Objectives:

- To learn the important concepts and algorithms in IRS
- To understand the data/file structures that are necessary to design, and implement informationretrieval (IR) systems.

MODULE I

Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems,Digital Libraries and Data Warehouses

Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities

MODULE II

Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction

Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models

MODULE III

Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages

Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters

MODULE IV

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

Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies

MODULE V

Text Search Algorithms: Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems

Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval

TEXT BOOK:

1. Information Storage and Retrieval Systems – Theory and Implementation, Second Edition,Gerald J. Kowalski, Mark T. Maybury, Springer

REFERENCES

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms,Prentice Hall, 1992.
2. Information Storage & Retrieval By Robert Korfhage – John Wiley & Sons.
3. Modern Information Retrieval By Yates and Neto Pearson Education.

COURSE OUTCOMES:

- Ability to apply IR principles to locate relevant information large collections of data
- Ability to design different document clustering algorithms
- Implement retrieval systems for web search tasks.
- Design an Information Retrieval System for web search tasks.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1		1		1						1	1		
CO2	1	2	1	1	1	1						1		2	1
CO3	1	1	2	2	1	1						2		2	2
CO4	1	1	1	2	1	1						3		1	2
CO5	1	1	1	1	1	1						2		1	2

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VI Semester		
Code: A0540	IT SECURITY METRICS	L	T	P
Credits: 3		3	-	-

Learning Objectives:

To learn security metrics.

To learn The Security Process Management Framework.

To learn Measurements Security Operations.

To learn Measuring Security Cost and Value.

To learn The Security Improvement Program.

MODULE-1: What Is a Security Metric? Metric and Measurement, Security Metrics Today, The Dissatisfying State of Security Metrics, Reassessing Our Ideas About Security Metrics. Designing Effective Security Metrics: Choosing Good Metrics, GQM for Better Security Metrics, More Security Uses for GQM, Summary.

MODULE-2: Understanding Data: What Are Data? Data Sources for Security Metrics; We Have Metrics and Data -Now what, Summary, Case Study 1. The Security Process Management Framework: Managing Security as a Business Process, the SPM Framework, Before You Begin SPM, Summary. The Analyzing Security Metrics Data: The Most Important Step, Analysis Tools and Techniques, Summary. Designing the Security Measurement Project: Before the Project Begins, Phase One: Build a Project Plan and Assemble the Team, Phase two: Gather the Metrics Data, phase Three: Analyze the Metrics Data and Build Conclusions, phase Four: Present Results, Phase Five: Reuse the Results, Project Management Tools, Summary.

MODULE-3: Measurements Security Operations: Sample Metrics for Security Operations, Sample Measurement Project for Security Operations, Summary. Measuring Compliance and Conformance: The Challenges of Measuring Compliance, Sample Measurement Projects for Compliance and Conformance, Summary.

MODULE-4: Measuring Security Cost and Value: Sample Measurement Projects for Compliance and Conformance, The Importance of Data to Measuring Cost and Value, Summary. Measuring People, Organizations, and Culture: Sample Measurement Projects for People, Organizations, and Culture, Summary.

MODULE-5: The Security Improvement Program: Moving from Projects to Programs, Managing Security Measurement with a Security, Requirements for a SIP, Measuring the SIP, Summary. Learning Security: Different Contexts for Security Process Management: Organizational Learning, Three Learning Styles for IT Security Metrics, Final Thoughts, Summary.

TEXTBOOKS:

1. IT SECURITY METRICS, Lance Hayden, TATA McGraw-HILL.
2. SECURITY METRICS, CAROLINE WONG, TATA McGraw-HILL

CO- PO Mapping **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**						
COs	**Program Outcomes (POs)**					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	1		1			
CO2	1		1			
CO3			1		1	
CO4			1		2	1
CO5	1		1	1	2	3

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VI Semester		
Code: A0540	INTERNET TECHNOLOGIES AND SERVICES	L	T	P
Credits: 3		3	-	-

Objective:
The student who has knowledge of programming with java should be able to develop web based solutions using multi-tier architecture. S/he should have good understanding of different technologies on client and server side components as Follows:
Client Side: HTML5, CSS3, Javascript, Ajax, JQuery and JSON
Server Side: Servlets, JSP
Database: MySQL with Hibernate and Connection Pooling
Framework: Struts with validation framework, Internationalization (I18N)
SOA: Service Oriented Architecture, Web services fundamentals, Axis framework for WS
MODULE I: Client Side Technologies: Overview of HTML - Common tags, XHTML, capabilities of HTML5 Cascading Style sheets, CSS3 enhancements, linking to HTML Pages, Classes in CSS Introduction to JavaScripts, variables, arrays, methods and string manipulation, BOM/DOM (Browser/Document Object Model), accessing elements by ID, Objects in JavaScript Dynamic HTML with JavaScript and with CSS, form validation with JavaScript, Handling Timer Events Simplifying scripting with JQuery, JASON for Information exchange.
MODULE II: Introduction to Java Servlets: Introduction to Servlets: Lifecycle of a Servlet, Reading request and initialization parameters, Writing output to response, MIME types in response, Session Tracking: Using Cookies and Sessions Steps involved in Deploying an application Database Access with JDBC and Connection Pooling Introduction to XML, XML Parsing with DOM and SAX Parsers in Java Ajax - Ajax programming with JSP/Servlets, creating XML Http Object for various browsers, Sending request, Processing response data and displaying it. Introduction to Hibernate
MODULE III: Introduction to JSP: JSP Application Development: Types of JSP Constructs (Directives, Declarations, Expressions, Code Snippets), Generating Dynamic Content, Exception Handling, Implicit JSP Objects, 30 SCHOOL OF IT,JNT UNIVERSITY HYDERABAD-500085 : : REGULATIONS,COURSE STRUCTURE & SYLLABUS FOR M.TECH(CNIS) W.E.F 2019-20 Conditional Processing, Sharing Data Between JSP pages, Sharing Session and Application Data, Using user defined classes with jsp:useBean tag, Accessing a Database from a JSP.
MODULE IV: Introduction to Struts Framework: Introduction to MVC architecture, Anatomy of a simple struts2 application, struts configuration file, Presentation layer with JSP, JSP bean, html and logic tag libraries, Struts Controller class, Using form data in Actions, Page Forwarding, validation frame work, Internationalization
MODULE V : Service Oriented Architecture and Web Services Overview of Service Oriented Architecture – SOA concepts, Key Service Characteristics, Technical Benefits of a SOA Introduction to Web Services– The definition of web services, basic operational model of web services, basic steps of implementing web services. Core fundamentals of SOAP – SOAP Message Structure, SOAP encoding, SOAP message exchange models, Describing Web Services –Web Services life cycle, anatomy of WSDL Introduction to Axis– Installing axis web service framework, deploying a java web service on axis. Web Services Interoperability – Creating java and .Net client applications for an Axis Web Service (Note: The Reference Platform for the course will be open source products Apache Tomcat Application Server, MySQL database, Hibernate and Axis) .

TEXT BOOKS:
1. Web Programming, building internet applications, Chris Bates 3rd edition, WILEY Dreamtech .
2. The complete Reference Java 7th Edition , Herbert Schildt., TMH.
3. Java Server Pages,Hans Bergsten, SPD, O'Reilly.
4. Professional Jakarta Struts - James Goodwill, Richard Hightower, Wrox Publishers.
5. Developing Java Web Services, R. Nagappan, R. Skoczylas, R.P. Sriganesh, Wiley India, rp – 2008.
6. Understanding SOA with Web Services, Eric Newcomer and Greg Lomow, Pearson Edition – 2009
7. Java Web Service Architecture, James McGovern, Sameer Tyagi et al., Elsevier – 2009

REFERENCES:

1. Programming the world wide web,4th edition,R.W.Sebesta,Pearson
2. Core SERVLETS ANDJAVASERVER PAGES VOLUME 1: CORE TECHNOLOGIES , Marty Hall and Larry Brown Pearson
3. Internet and World Wide Web – How to program , Dietel and Nieto PHI/Pearson.
4. Jakarta Struts Cookbook , Bill Siggelkow, S P D O'Reilly.
5. Professional Java Server Programming,S.Allamaraju & othersApress(dreamtech).
6. Java Server Programming ,Ivan Bayross and others,The X Team,SPD
7. Web Warrior Guide to Web Programmming-Bai/Ekedaw-Cengage Learning.
8.BeginningWebProgramming-JonDuckett,WROX.

CO- PO Mapping **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**						
COs	**Program Outcomes (POs)**					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	1		1			
CO2	1		1			
CO3			1		1	
CO4			1		2	1
CO5	1		1	1	2	3

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VI Semester		
Code: A0540	CLOUD COMPUTING	L	T	P
Credits: 3		3	-	-

Objectives:

Cloud computing has evolved as a very important computing model, which enables information, software, and shared resources to be provisioned over the network as services in an on-demand manner.

This course provides an insight into what is cloud computing and the various services cloud is capable.

MODULE I: Computing Paradigms, High-Performance Computing, Parallel Computing.,Distributed Computing..,ClusterComputing.,Grid Computing, Cloud Computing., Biocomputing, Mobile Computing.,QuantumComputing, Optical Computing. Nanocomputing.

MODULE II: Cloud Computing Fundamentals: Motivation for Cloud Computing,The Need for Cloud Computing,Defining Cloud Computing, Definition of Cloud computing,Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing,Five Essential Characteristics...Four Cloud Deployment Models .

MODULE III: Cloud Computing Architecture and Management: Cloud architecture, Layer,Anatomy of the Cloud,Network Connectivity in Cloud Computing, Applications, on the Cloud,Managing the Cloud,Managing the Cloud Infrastructure Managing the Cloud application, Migrating Application to Cloud, Phases of Cloud Migration Approaches for Cloud Migration.

MODULE IV: Cloud Service Models: Infrastructure as a Service,Characteristics of IaaS.Suitability of IaaS,Pros and Cons of IaaS,Summary of IaaS Providers,Platform as a Service,Characteristics of PaaS,Suitability of PaaS,Pros and Cons of PaaS,Summary of PaaS Providers,Software as a Service,Characteristics of SaaS,Suitability of SaaS,Pros and Cons of SaaS,Summary of SaaS Providers.Other Cloud Service Models.

MODULE V: Cloud Service Providers:EMC,EMC IT,Captiva Cloud Toolkit,Google,Cloud Platform,Cloud Storage,Google Cloud Connect,Google Cloud Print,Google App Engine,Amazon Web Services,Amazon Elastic Compute Cloud,Amazon Simple Storage Service,Amazon Simple Queue ,ervice,Microsoft,Windows Azure,Microsoft Assessment and Planning Toolkit,SharePoint,IBM,Cloud Models,IBM SmartCloud,SAP Labs,SAP HANA Cloud 92 SCHOOL OF IT,JNT UNIVERSITY HYDERABAD-500085 : : REGULATIONS,COURSE STRUCTURE & SYLLABUS FOR M.TECH(CNIS) W.E.F 2019-20 Platform,Virtualization Services Provided by SAP,Salesforce,Sales Cloud,Service Cloud: Knowledge as a Service,Rackspace,VMware,Manjrasoft,Aneka Platform.

TEXT BOOKS:

1. Essentials of cloud Computing : K.Chandrasekhran , CRC press, 2014

REFERENCES:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing , Kai Hwang, Geoffery C.Fox, Jack J.Dongarra, Elsevier, 2012.
3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy,ShahedLatif,O'Reilly,SPD,rp2011

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Program Outcomes (POs)					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1		1			
CO2	1		1			
CO3			1		1	
CO4			1		2	1
CO5	1		1	1	2	3

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VI Semester		
Code: A0540	SOFTWARE QUALITY ASSURANCE AND TESTING	L	T	P
Credits: 3		3	-	-

Objectives:

The student should be able to:

To understand software testing and quality assurance as a fundamental component of software life cycle.

To define the scope of SW T&QA projects To efficiently perform T&QA activities using modern software tools To estimate cost of a T&QA project and manage budgets .

To prepare test plans and schedules for a T&QA project.

To develop T&QA project staffing requirements .

To effectively manage a T&QA project.

MODULE I: Software Quality Assurance and Standards: The Software Quality challenge, What is Software Quality, Software Quality factors, The components of Software Quality Assurance system, Software Quality Metrics, Costs of Software Quality, Quality Management Standards, Management and its role in Software Quality Assurance, SQA unit and other actors in SQA system. - (Chapters: 1-4, 21-23, 25, 26) of T3 Quality Standards: ISO 9000 and Companion ISO Standards, CMM, CMMI, PCMM, Malcom Balridge, 3 Sigma, 6 Sigma and other latest quality standards (Refer Internet and R11, R12, R13).

MODULE II: Software Testing Strategy and Environment: Minimizing Risks, Writing a Policy for Software Testing, Economics of Testing, Testing-an organizational issue, Management Support for Software Testing, Building a Structured Approach to Software Testing, Developing a Test Strategy Building Software Testing Process: Software Testing Guidelines, workbench concept, Customizing the Software Testing Process, Process Preparation checklist - (Chapters: 2,3) of T1 Software Testing Techniques: Dynamic Testing – Black Box testing techniques, White Box testing techniques, Static testing, Validation Activities, Regression testing -(Chapters: 4, 5, 6, 7, 8) of T2 .

MODULE III : Software Testing Tools: Selecting and Installing Software Testing tools – (Chapter 4) of T1. Automation and Testing Tools - (Chapter 15) of T2 Load Runner, Win runner and Rational Testing Tools, Silk test, Java Testing Tools, JMetra, JUNIT and Cactus. (Refer Internet and R9, R10) 80 SCHOOL OF IT,JNT UNIVERSITY HYDERABAD-500085 : : REGULATIONS,COURSE STRUCTURE & SYLLABUS FOR M.TECH(CNIS) W.E.F 2019-20 .

MODULE IV: Testing Process Seven Step Testing Process – I: Overview of the Software Testing Process, Organizing of Testing, Developing the Test Plan, Verification Testing, Validation Testing. (Chapters 6, 7, 8, 9, 10) of T1 .

MODULE V: Seven Step Testing Process – II: Analyzing and Reporting Test results, Acceptance and Operational Testing, Post-Implementation Analysis Specialized Testing Responsibilities: Software Development Methodologies, Testing Client/Server Systems (Chapters 12, 13, 14, 15) of T1.

TEXT BOOKS:

1. Effective Methods for Software Testing, Third edition, William E. Perry, Wiley India, 2009 .
2. Software Testing – Principles and Practices, Naresh Chauhan, Oxford University Press, 2010.
3. Software Quality Assurance – From Theory to Implementation, Daniel Galin, Pearson Education, 2009.

REFERENCES:

1. Testing Computer Software, Cem Kaner, Jack Falk, Hung Quoc Nguyen, Wiley India, rp2012.
2. Software Testing – Principles, Techniques and Tools, M.G.Limaye, Tata McGraw-Hill, 2009.
3. Software Testing - A Craftsman's approach, Paul C. Jorgensen, Third edition, Auerbach Publications, 2010.
4. Foundations of Software Testing, Aditya P. Mathur, Pearson Education, 2008.

5. Software Testing and Quality Assurance – Theory and Practice, Kshirasagar Naik, Priyadashi Tripathy, Wiley India, 2010.
6. Software Testing, Ron Patton, Second edition, Pearson Education, 2006.
7. Software Testing and Analysis – Process, Principles and Techniques, Mauro Pezze, Michal Young, Wiley India, 2008.
8. Software Testing Techniques, Boris Beizer, Second edition, Wiley India, 2006
9. Foundations of Software Testing, Dorothy Graham, et al., Cengage learning, 2007, rp 2010.
10. Software Testing - Effective Methods, Tools and Techniques, Renu Rajani, Pradeep Oak, Tata McGraw-Hill, rp2011.
11. Software Automation Testing Tools for Beginners, Rahul Shende, Shroff Publishers and Distributors, 2012.
12. Software Testing Tools, K.V.K.K. Prasad, Dream Tech Press, 2008.
13. Software Testing Concepts and Tools, Nageswara Rao Pusuluri, Dream Tech press, 2007.

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Program Outcomes (POs)					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	1		1			
CO2	1		1			
CO3			1		1	
CO4			1		2	1
CO5	1		1	1	2	3

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VI Semester		
Code: A0540	NATURAL LANGUAGE PROCESSING	L	T	P
Credits: 3		3	-	-

Objectives:

To acquire basic understanding of linguistic concepts and natural language complexity, variability.
To acquire basic understanding of machine learning techniques as applied to language.
To implement N-grams Models.

MODULE I: Introduction and Overview What is Natural Language Processing, hands-on demonstrations. Ambiguity and uncertainty in language. The Turing test. Regular Expressions 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 regex tools. Programming in Python An introduction to programming in Python. Variables, numbers, strings, arrays, dictionaries, conditionals, iteration. The NLTK (Natural Language Toolkit) String Edit Distance and Alignment Key algorithmic tool: dynamic programming, a simple example, use in optimal alignment of sequences. String edit operations, edit distance, and examples of use in spelling correction, and machine translation.

MODULE II: Context Free Grammars 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 Non-probabilistic Parsing Efficient CFG parsing with CYK, another dynamic programming algorithms. Early parser. Designing a little grammar, and parsing with it on some test data. Probability Introduction to probability theory Joint and conditional probability, marginals, independence, Bayes rule, combining evidence. Examples of applications in natural language. Information Theory The "Shannon game"--motivated by language! Entropy, crossentropy, information gain. Its application to some language phenomena.

MODULE III: Language modeling and Naive Bayes 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. 130 SCHOOL OF IT,JNT UNIVERSITY HYDERABAD-500085 : : REGULATIONS,COURSE STRUCTURE & SYLLABUS FOR M.TECH(CNIS) W.E.F 2019-20.

MODULE IV: Probabilistic Context Free Grammars Weighted context free grammars. Weighted CYK. Pruning and beam search. Parsing with PCFGs 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. Maximum Entropy Classifiers 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: Maximum Entropy Markov Models & Conditional Random Fields Part-of-speech tagging, nounphrase segmentation and information extraction models that combine maximum entropy and finite-state machines. State-of-the-art models for NLP. Lexical Semantics Mathematics of Multinomial and Dirichlet distributions, Dirichlet as a smoothing All for multinomial's Information Extraction & Reference Resolution- Various methods, including HMMs. Models of anaphora 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 BOOKS:

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.
4. Lutz and Ascher - "Learning Python", O'Reilly

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak						
COs	**Program Outcomes (POs)**					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	1		1			
CO2	1		1			
CO3			1		1	
CO4			1		2	1
CO5	1		1	1	2	3

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VI Semester		
Code: A0540	BLOCKCHAIN TECHNOLOGY	L	T	P
Credits: 3		3	-	-

Objectives:

Familiarise the functional/operational aspects of cryptocurrency ECOSYSTEM.

Understand emerging abstract models for Blockchain Technology.

dentify major research challenges and technical gaps existing between theory and practice in cryptocurrency domain .

MODULE 1 :The consensus problem - Asynchronous Byzantine Agreement - AAP protocol and its analysis - Nakamoto Consensus on permission-less, nameless, peer-to-peer network - Abstract Models for BLOCKCHAIN - GARAY model - RLA Model - Proof of Work (PoW) as random oracle - formal treatment of consistency, liveness and fairness - Proof of Stake (PoS) based Chains - Hybrid models (PoW + PoS) .

MODULE 2: cryptographic basics for cryptocurrency - a short overview of Hashing, signature schemes, encryption schemes and elliptic curve cryptography .

MODULE 3 : Bitcoin - Wallet - Blocks - Merkley Tree - hardness of mining - transaction verifiability - anonymity - forks - double spending - mathematical analysis of properties of Bitcoin.

MODULE 4 : Ethereum - Ethereum Virtual Machine (EVM) - Wallets for Ethereum - Solidity - Smart Contracts - some attacks on smart contracts .

MODULE 5: (Trends and Topics) - Zero Knowledge proofs and protocols in Blockchain - Succinct non interactive argument for Knowledge (SNARK) - pairing on Elliptic curves - Zcash .

Text Books:

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016. (Free download available).

Reference Books :

1. Joseph Bonneau et al, SoK: Research perspectives and challenges for Bitcoin and cryptocurrency, IEEE Symposium on security and Privacy, 2015 (article available for free download) { curtain raiser kind of generic article, written by seasoned experts and pioneers}.
2. J.A.Garay et al, The bitcoin backbone protocol - analysis and applications EUROCRYPT 2015 LNCS VOl 9057, (VOLII), pp 281-310. (Also available at eprint.iacr.org/2016/1048) . (serious beginning of discussions related to formal models for bitcoin protocols).
3. R.Pass et al, Analysis of Blockchain protocol in Asynchronous networks , EUROCRYPT 2017, (eprint.iacr.org/2016/454) . A significant progress and consolidation of several principles).
4. R.Pass et al, Fruitchain, a fair blockchain, PODC 2017 (eprint.iacr.org/2016/916)

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Program Outcomes (POs)					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1		1			
CO2	1		1			
CO3			1		1	
CO4			1		2	1
CO5	1		1	1	2	3

2020-21 Onwards (MR-20)	MALLAREDDYENGINEERINGCOLLEGE (Autonomous)	B.Tech.		
Code: A0148	GREENBUILDINGS (Open Elective)	L	T	P
Credits:3		3	-	-

PREREQUISITE: NIL

Course 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

Introduction to green buildings, green materials, sources of green materials, high-performancegreenbuildingsImpactsofbuildingconstruction,operation,anddisposalMethodsandtoolsfor buildingassessment,GreenGlobes

MODULE II

The green building process, Design and construction relationships, benefits of greenbuildingquality,healthyandsafeenvironments,Siteandlandscapestrategies.

MODULE III

A: Building energy system strategies, Water cycle strategies, Materials selectionstrategies,IndoorEnvironmentalQuality[IEQ]
B:Analysisandstrategies,Construction,teamresponsibilitiesandcontrols,Buildingcommissioningstrategies

MODULE IV

Economicissuesandanalysis,UseoftheGreenStrategiescostestimatingtool,Futuredirectionsingreen,highperformancebuildingtechnologies

MODULEV

CarbonaccountingGreenBuildingSpecification,CaseStudyongreenbuildings,NetZeroEnergyBuildings,SustainableConstructionsincivilEngineering.

TESTBOOKS

1. AbeKrugerandCarl, "**Green Building, Principles and Practices in Residential Construction**",In2012,SevillePublication.
2. RossSpiegel,DruMeadows,"**Green Building Materials: A Guide to Product Selection and Specification**", 3rd Edition, October2010

REFERENCES

1. CharlesJ.Kibert,"**SustainableConstruction:GreenBuildingDesignandDeliveryHardcover–Import**",16Nov2012

E-RESOURCES

1.http://www.ncrec.gov/Pdfs/bicar/GreenBuilding.pdf

COURSE OUTCOMES:

Attheendof thecourse,studentswillbeableto

1. IdentifygreenBuildingMaterialsandtheirSources.
2. Understandtheconstructionprocessofgreenbuildingsandtheirbenefitsquality,healthyandsafeenvironments
3. Learnthestrategiestoconstructgreenbuildings.
4. Identifytheissuesaraisedduetoconstructionof greenbuildings
5. Gainknowledgeonthecasestudiesofgreenbuildings.

CO-POMapping:

CO-POMAPPING (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-Weak															
CO S	**ProgrammeOutcomes(POs)**														
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**	**PS O3**
CO 1		3	2	1	2		3	2	1	1	1	1			
CO 2		1	2			2	3			1		1			
CO 3	1	1	1				2					1			
CO 4				2			2			1	2	1			
CO 5			1			1	1		1	2	1	1			

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VI Semester		
Code: A0H03	ENGLISH COMMUNICATION AND PRESENTATION SKILLS LAB (Common for EEE, ECE, CSE and IT)	L	T	P
Credits: 1		-	-	2

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

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

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 forthe 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 projectwork.

MODULE I: ORAL PRESENTATION

Mechanics of Presentations – Methodology of Presentation, Importance of Non-verbalcommunication during presentations– Nuances of Presentation.
*This particular MODULE is for internal evaluation purpose(s).

MODULE II: E - CORRESPONDENCE AND EMAIL ETIQUETTE

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

- This MODULE is purely for internal assessment/evaluation

MODULE III: GROUP DISCUSSION

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

MODULE IV: INTERVIEW SKILLS & OFFICE ETIQUETTE

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

MODULE V: JOB HUNT PROCESS

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

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

REFERENCES:

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

E-RESOURCES:

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

COURSE OUTCOMES:

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

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

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1					1					2		2
CO2										1		2
CO3		1		1						2		2
CO4					1	1			1	2		2
CO5				1	1				1	2		2

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: A 0544	DATA MINING LAB	L	T	P
Credits: 2		-	1	2

PREREQUISITES: NIL

COURSE OBJECTIVES:

This course provides the students to understand stages in building a Data Warehouse, identify the need and importanceof preprocessing techniques, implement similarity and dissimilarity techniques, analyze and evaluate performance of algorithms for Association Rules, analyze Classification and Clustering algorithms.

Software Requirements: WEKA TOOL

LIST OF PROGRAMS:

1. Demonstration of preprocessing on dataset student.arff.
2. Implementation of preprocessing on dataset labor.arff.
3. Demonstration of Association rule process on dataset contactlenses.arff using aprioriAlgorithm.
4. Implement Association rule process on dataset test.arff using apriori algorithm.
5. Apply classification rule process on dataset student.arff using j48 algorithm.
6. Perform classification rule process on dataset employee.arff using j48 algorithm.
7. Use classification rule process on dataset employee.arff using id3 algorithm.
8. Deploy classification rule process on dataset employee.arff using naïve bayesAlgorithm.
9. Implement clustering rule process on dataset iris.arff using simple k-means.
10. Make use of clustering rule process on dataset student.arff using simple k- means.
11. Design a decision tree by pruning the nodes on your own. Convert the decision trees into "if- then-else rules". The decision tree must consists of 2-3 levels and convert it into a set of rules.
12. Generate Association rules for the following transactional database using Apriorialgorithm.

TID	List of Items
T100	I1,I2,I5
T200	I2,I4
T300	I2,I3
T400	I1,I2,I4
T500	I1,I3
T600	I2,I3
T700	I1,I3
T800	I1,I2,I3,I5

TEXT BOOKS:

1. Pang-Ning Tan & Michael Steinbach, "**Introduction to Data Mining**",VipinKumar, Pearson.
2. Jiawei Han, Michel Kamber ,"**Data Mining concepts and Techniques**", 3/e,Elsevier.

REFERENCES:

1. Hongbo Du, "**Data Mining Techniques and Applications: An Introduction**",Cengage Learning.
2. Vikram Pudi and P. Radha Krishna, "**Data Mining**", Oxford.
3. Mohammed J. Zaki, Wagner Meira, Jr ,"**Data Mining and Analysis - FundamentalConcepts and Algorithms**", Oxford
4. Alex Berson, Stephen Smith ,"**Data Warehousing Data Mining & OLAP**" , TMH.

COURSE OUTCOMES:

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

1. **Analyze** the classification rules on various databases.
2. **Deploy** association rules for any kind of databases.
3. **Develop** clustering rules for applications.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1									1	1	1
CO2	1	2	2	2	2								2		2
CO3	1	2	3	2	1								1		2

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: A6211	ETHICAL HACKING LAB	L	T	P
Credits: 1.5		-	-	2

Course Objectives:

- The aim of the course is to introduce the methodologies and framework of ethical hacking for enhancing the security.
- The course includes-Impacts of Hacking; Types of Hackers; Information Security Models; Information Security Program; Business Perspective; Planning a Controlled Attack; Framework of Steps (Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation, Deliverable and Integration)

LIST OF EXPERIMENT:

1. Setup a honey pot and monitor the honey pot on network
2. Write a script or code to demonstrate SQL injection attacks
3. Create a social networking website login page using phishing techniques
4. Write a code to demonstrate DoS attacks
5. Install rootkits and study variety of options
6. Study of Techniques uses for Web Based Password Capturing.
7. Install jcrypt tool (or any other equivalent) and demonstrate Asymmetric, Symmetric Crypto algorithm, Hash and Digital/PKI signatures studied in theory Network Security And Management
8. Implement Passive scanning, active scanning, session hizaking, cookies extraction using Burp suit tool

COURSE OUTCOMES:

1. Gain the knowledge of the use and availability of tools to support an ethical hack
2. Gain the knowledge of interpreting the results of a controlled attack

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1									1	1	1
CO2	1	2	2	2	2								2		2
CO3	1	2	3	2	1								1		2

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: A6217	**CYBER SECURITY**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

PREREQUISITES:

NIL

COURSE OBJECTIVES:

- This course makes the students to understand the concept of cyber security and issues and challenges associated with it, the cybercrimes, their nature, legal remedies and as to how report the crimes through available platforms and procedures.
- The course includes the reporting procedure of inappropriate content, underlying legal aspects and best practices for the use of social media platforms, the basic concepts related to E-commerce and digital payments, the basic security aspects related to computer and mobiles.

MODULE-I: INTRODUCTION TO CYBER SECURITY [9 PERIODS]

Hacking, Types of hacking, Myths about hacking, Types of hackers, Motives for Hacking, Ethical hacking, Concept of cyber security, Issues and challenges of cyber security, Cyberterrorism, Cyber forensics, The INDIAN cyberspace, Regulation of cyberspace, National cyber security policy, Communication technology, Internet, World wide web, Advantages and Disadvantages of the Internet, Internet infrastructure for data transfer and governance, Internet society, Recent cyber-attacks and Data breaches in India.

MODULE-II: CYBER CRIME AND CYBER LAW [10 PERIODS]

Cybercrime, Classification of cybercrimes, Common cybercrimes- cybercrime targeting computers and mobiles, cybercrime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Cybercriminals modus- operandi, Reporting of cybercrimes, Remedial and mitigation measures, Legal perspective of cybercrime, IT Act 2000 and its amendments, Cybercrime and offences, Organizations dealing with Cybercrime and Cyber security in India, Case studies.

MODULE-III: SOCIAL MEDIA OVERVIEW AND SECURITY [10 PERIODS]

Introduction to Social networks, Types of social media, Social media platforms, Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of social media, Case studies.

MODULE-IV: E-COMMERCE AND DIGITAL PAYMENTS [10 PERIODS]

Definition of E- Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled Payment Systems (AePS), Digital payments related common frauds and preventive measures, RBI guidelines on digital payments and customer protection in unauthorized banking transactions, Relevant provisions of Payment Settlement Act,2007.

MODULE-V: DIGITAL DEVICES SECURITY, TOOLS AND TECHNOLOGIES FOR CYBER SECURITY [9 PERIODS]

End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third-party software, Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus, Management of host firewall and Anti-virus, Wi-Fi security, Configuration of basic security policy and permissions, Cyber safety tips.

TEXT BOOKS

1. Cyber Crime Impact in the New Millennium, by R. C Mishra , Auther Press. Edition 2010.
2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011).

REFERENCE BOOKS

1. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson , 13th November, 2001)
2. Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd. Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.

COURSE OUTCOMES:

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

1. **Explore** various concepts of cyber security and issues.
2. **Investigate** more on various challenges associated with cyber security.
3. **Analyze** reporting procedure of inappropriate content.
4. **Review** underlying legal aspects and best practices for the use of social media platforms.
5. **Examine** various basic concepts related to E-commerce and digital payments.

CO - PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes (POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3		1	3								3		3	
CO2		2	2		2								2		
CO3	2	3		1	1								2	3	
CO4		3	3									1	3	2	
CO5	3		2	3	3							2		1	

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: A6215	Digital Forensics	L	T	P
Credits: 3		3	-	-

Course Objectives:

•To learn the concepts of the rapidly changing and fascinating field of computer forensics
•To be familiar with the technical expertise and the knowledge required to investigate, detect, and prevent digital crimes
•To identify the approaches on digital forensics legislations, digital crime, forensics processes and procedures
•To understand perceptions of E-evidence collection, preservation, network forensics, art of steganography and mobile device forensics

MODULE –I:

Digital Forensics Science: Forensics science, computer forensics and digital forensics.
Computer Crime: Criminalistics asitrelates to the investigative process, analysis of cyber criminalities area, holistic approach to cyber-forensics

MODULE –II:

Cyber Crime Scene Analysis: Discuss the various court orders etc., methods to search and seizure electronic evidence, retrieved and un-retrieved communications, Discuss the importance of understanding what court documents would be required for a criminal investigation

MODULE –III:

Evidence Management & Presentation: Create and manage shared folders using operating system, importance of the forensic mindset, define the workload of law enforcement, explain what the normal case would look like, define who should be notified of a crime, parts of gathering evidence, Define and apply probable cause.

MODULE –IV:

Computer Forensics: Prepare a case, begin an investigation, understand computer forensics, workstations and software, Conduct an investigation, Complete a case, Critique case

MODULE –V:

Network Forensics: open-source security tools for network forensic analysis, Recent trends in mobile forensic technique and methods to search and seizure electronic evidence requirements for preservation of network data.

Legal Aspects of Digital Forensics: ITAct2000, amendment of ITAct2008.

TEXT BOOK:

1. The Basics of Digital Forensics, JohnSammons, Elsevier
2. Computer Forensics Computer Crime Scene Investigation, John Vacca, Laxmi Publications

REFERENCES:

1. Learn Computer Forensics: A Beginner's Guide to Searching, Analyzing, and Securing Digital Evidence, William Oettinger, 1st Edition, Packt Publishing, 2020,ISBN:1838648178
2. Cyber crime and Digital Forensics: An Introduction, Thomas J.Holt, AdamM. Bossler, Kathryn C. Seigfried-Spellar, Routledge

2020-21 Onwards(MR20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: A0551	MACHINE LEARNING	L	T	P
Credits: 3		3	-	-

PREREQUISITES: NIL

Course Objectives:

This course provides the students a broad introduction to python programming, machine learning, discuss about various learning algorithms like decision tree learning, Bayesian learning, computational learning, instance based learning, combined inductive and analytical learning methods, analyze genetic algorithms and various learning set of rules.

MODULE I: PYTHON PROGRAMMING -MACHINE LEARNING (ML) [10 PERIODS]

INTRODUCTION TO PYTHON:

Python, expression, variables, assignment statements, functions, built in function, strings, modules, lists, making choice(Boolean, if, storing conditional statements), repetition(loops, while, counted loops, user input loops, control loops , style notes), File processing(one record per line, records with multiple fields, positional data, multiline records, looking ahead, writing files), sets and dictionaries(sets, dictionaries, inverting a dictionary), Algorithms with suitable example. Construction of functions, methods, Graphical user interfaces, databases and applications.

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in ML

Concept Learning - Introduction, Concept Learning task, Concept learning as search, Find- S: Finding a maximally specific hypothesis, Version spaces and candidate elimination algorithm, Remarks on version spaces and Candidate elimination, Inductive bias.

Module II: Decision Tree Learning and ANN [09 Periods]

Decision Tree learning - Introduction, Decision Tree representation, Appropriate Problems, Decision Tree learning algorithm, Hypothesis Space Search, Inductive bias, Issues.

Artificial Neural Networks - Introduction, Neural network representation, Problems for Neural Network Learning, Perceptions, Multilayer networks and Back Propagation algorithm, Remarks on back propagation algorithm, Evaluation Hypotheses, Motivation, Estimation hypothesis accuracy, Sampling theory, General approach for deriving confidence intervals, Difference in error of two hypotheses,

Module III: Bayesian learning and Instance based Learning [10 Periods]

A: Bayesian learning - Introduction and concept learning, Maximum Likelihood and Least Squared Error Hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle.

B: Instance-based Learning - K -Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Lazy and Eager Learning, Genetic Algorithm: Motivation, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

Module IV: Rules and Analytical Learning [09 Periods]

Learning Sets of Rules - Introduction, Sequential Covering Algorithms, Learning Rule Sets: Learning First Order Rules, Learning Sets of First Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution.

Analytical Learning - Introduction, Learning with Perfect Domain Theories: Prolog-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge

Module V: Learning Techniques [10 Periods]

Combining Inductive and Analytical Learning - Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to initialize Hypothesis, Using Prior Knowledge to alter Search Objective, Using Prior Knowledge to Augment Search Operators.

Reinforcement Learning - Introduction, Learning Task, Q Learning, Non-Deterministic, Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming

TEXT BOOKS:

1. Jennifer Campbell paul Gries Jason Montojo Greg Wilson, "Practical Programming" Anintroduction to Computer Science Using Python
2. Tom M. Mitchell, ―**Machine Learning**‖, MGH, 1st Edition, 2013.
3. Stephen Mars land, ―**Machine Learning: An Algorithmic Perspective**‖, Chapman and Hall / CRC, 2nd Edition, 2014.

REFERENCES:

1. Neural Networks, William WHsieh, ―**Machine Learning Methods in the Environmental Sciences**‖
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

E-RESOURCES:

1. http://www.zuj.edu.jo/download/machine-learning-tom-mitchell-pdf/
2. https://goo.gl/FKioSh
3. http://www.ntu.edu.sg/home/egbhuang/pdf/ieee-is-elm.pdf
4. www.fxpal.com/publications/a-genetic-algorithm-for-video-segmentation-and-summarization.pdf
5. http://nptel.ac.in/courses/106106139/
6. http://nptel.ac.in/courses/106105152/

2020-21 Onwards(MR20)	MALLAREDDYENGINEERINGCOLLEGE (Autonomous)	B.Tech. VII Semester		
Code:A0557	Human Computer Interaction [Professional Elective- VI]	L	T	P
Credits:3		3	-	-

COURSEOBJECTIVES

To gain an overview of Human-Computer Interaction (HCI), with an understanding of userinterfacedesigningeneral,andalternativestotraditional–keyboardandmouse‖computing; becomefamiliarwiththevocabularyassociatedwithsensoryandcognitivesystemsasrelevant to task performance by humans; be able to apply models from cognitive psychologytopredictinguserperformanceinvarioushuman-computerinteractiontasksandrecognizethelimitsofhumanperformanceastheyapplytocomputeroperation;appreciatetheimportance of a design and evaluation methodology that begins with and maintains a focus on the user; be familiar with a variety of both conventional and non-traditional user interfaceparadigms,thelatterincludingvirtualandaugmentedreality,mobileandwearablecomputing, and ubiquitous computing; and understand the social implications of technology and their ethical responsibilities as engineers in the design of technological systems. Finally, working in small groups on a product design from start to finish will provide you within valuableteam-work experience.

MODULE–I [10PERIODS]

Introduction: Importance of user Interface– definition, importance of good design. Benefits of good design.A brief history of Screen design. The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

MODULE–II [10PERIODS]

Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business Functions.

Screen Designing: Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content–screen navigation and flow– information retrieval on web – statistical graphics – Technological consideration in interface design.

MODULE–III [10 PERIODS]

Windows – New and Navigation schemes selection of window, selection of devices based and screen-based controls. Components–text and messages, Icons and increases–Multimedia, colors, uses problems, choosing colors.

MODULE–IV [10 PERIODS]

HCI in the software process: The software life cycle, Usability engineering, Iterative design and prototyping, Design Focus: Design rationale, Design rules, Principles to support usability Standards, Golden rules (Shneiderman's Eight Golden Rules of Interface Design) and heuristics, Universal design.

MODULE–V [10 PERIODS]

Cognitive models - Socio-Organizational issues and stake holder requirements –Goal and task hierarchies Design Focus: GOMS saves money, Linguistic models, Cognitive architectures, Ubiquitous computing and augmented realities, Information and data visualization–Communication and collaboration models-Hypertext.

COURSEOUTCOMES

- Ability to apply HCI and principles to interaction design.
- Ability to design certain tools for blind or PH people.

TEXTBOOKS

1. The essential guide to user interface design, Wilbert O Galitz, Wiley Dream Tech.Modules 1,2, 3
2. Human – Computer Interaction. Alan Dix, Janet Fincay, GreGoryd, Abowd, RussellBealg,Pearson EducationModules 4,5

REFERENCEBOOKS

1. Designing the user interface.3rd Edition Ben Shneidermann, Pearson Education Asia.
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech.
3. User Interface Design, Soren Lauesen,Pearson Education.
4. Human–Computer Interaction, D.R.Olsen,CengageLearning.
5. Human–Computer Interaction, Smith–Atakan, Cengage Learning.

CO-PO, PSO Mapping
(3/2/1indicatesstrengthof correlation)3-Strong,2-Medium,1-Weak

COs	ProgrammeOutcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1		1						1	1	2	1
CO2	1	2	1	2	1							1	1	2	
CO3	1	3	2	2	1	1						2	1	2	1
CO4	1	3	3	3	1	2						3	2	2	1
CO5	1	3	3	3	1	2						3	2	3	1

2020-21 Onwards (MR20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech VII Sem		
Code: A6219	**Open Elective-II** **Software Project Management**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Course Objectives & Outcomes

The objectives of the course are:

1. To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
2. To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
3. To understand successful software projects that support organization's strategic goals

Course Outcomes

After completing this Course, the student should be able to:

1. To match organizational needs to the most effective software development model
2. To understand the basic concepts and issues of software project management
3. To effectively Planning the software projects
4. To implement the project plans through managing people, communications and change
5. To select and employ mechanisms for tracking the software projects
6. To conduct activities necessary to successfully complete and close the software projects
7. To develop the skills for tracking and controlling software deliverables
8. To create project plans that address real-world management challenges

MODULE I: Introduction

Project, Management, Software Project Management activities, Challenges in software projects, Stakeholders, Objectives & goals

Project Planning: Step-wise planning, Project Scope, Project Products & deliverables, Project activities, Effort estimation, Infrastructure

MODULE II: Project Approach

Lifecycle models, Choosing Technology, Prototyping

Iterative & incremental Process Framework: Lifecycle phases, Process Artifacts, Process workflows (Book 2)

MODULE III: Effort estimation & activity Planning

Estimation techniques, Function Point analysis, SLOC, COCOMO, Use case-based estimation , Activity Identification Approaches, Network planning models, Critical path analysis

Risk Management

Risk categories, Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach

MODULE IV: Project Monitoring &Control , Resource Allocation creating a framework for monitoring & control, Progress monitoring, Cost monitoring, Earned value Analysis, Defects Tracking, Issues Tracking, Status reports, Types of Resources, Identifying resource requirements, Resource scheduling

MODULE V: Software Quality

Planning Quality, Defining Quality - ISO 9016, Quality Measures, Quantitative Quality Management

Planning, Product Quality & Process Quality Metrics, Statistical Process Control Capability Maturity Model, Enhancing software Quality (Book3)

Text Books:

1. Software Project Management, Bob Hughes & Mike Cotterell, TATA Mcgraw-Hill
2. Software Project Management, Walker Royce: Pearson Education, 2005.
3. Software Project Management in practice, PankajJalote, Pearson.

Reference Book:

1. Software Project Management, Joel Henry, Pearson Education.

CO- PO-PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO S	Programme Outcomes(POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	3	2	2	2	-	-	-	-	-	-	-	2	-	-
CO 2	3	3	2	2	2	-	-	-	-	-	-	-	2	-	-
CO 3	3	2	2	2	2	-	-	-	-	-	-	-	2	-	-
CO 4	2	2	2	2	2	-	-	-	-	-	1	-	2	1	1
CO 5	2	3	2	2	2	-	-	-	-	-	-	-	2	1	1

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: A0363	**RENEWABLE ENERGY SOURCES** (Open Elective)	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

PREREQUISITES: NIL COURSE OBJECTIVES:

The objective of this subject is to provide knowledge about different non-conventional energy sources.

MODULE I: PRINCIPLES OF SOLAR RADIATION

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

Solar Collectors: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.
Solar Energy Storage and Applications: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

MODULE III: WIND ENERGY & BIO-MASS

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

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India. Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants and their economics.

MODULE V: DIRECT ENERGY CONVERSION

Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, merit, materials, applications. MHD generators - principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems. Electron gas dynamic conversion - economic aspects. Fuel cells - Principles of Faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

TEXT BOOKS

1.G.D. Rai, "**Non-Conventional Energy Sources",** Khanna publishers, 2011.

2.Tiwari and Ghosal, "**Renewable Energy Resources"**, Narosa Publishing House, 2007.

REFERENCES

1.Twidell & Weir, "**Renewable Energy Sources",** Taylor and Francis Group Publishers,2015.

2.Sukhatme, **"Solar Energy",** McGraw-Hill-third edition, 2008.

3.B.S Magal Frank Kreith& J.F Kreith "**Solar Power Engineering",** McGraw-Hill Publications, 2010.

4.Frank Krieth & John F Kreider, "**Principles of Solar Energy",** McGraw-Hill, 1981.

5.Ashok V Desai, "**Non-Conventional Energy**", New International (P) Limited, 2003.

E - RESOURCES

1.nptel.ac.in/courses/112105051/

2.https://www.vssut.ac.in/lecture_notes/lecture1428910296.pdf

3.faculty.itu.edu.tr/onbasiogl1/DosyaGetir/62002

4.https://www.journals.elsevier.com/renewable-energy/

5.www.ijrer.org

COURSE OUTCOMES

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

1.Understand the principles of solar radiation
2.Recognize solar collectors, Solar energy storage and its applications
3.Classify the harvesting of wind energy & bio-mass energy.
4.Understand the harvesting of geothermal energy & ocean energy.
5.Apply the direct energy conversion methods

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO 1	PO2	PO3	PO4	PO5	PO 6	PO 7	PO8	PO9	PO10	PO11	PO1 2	PSO1	PSO2	PSO3
CO1	1					3	3					3			
CO2	1					3	3					3			
CO3	1					3	3					3			
CO4	1					3	3					3			
CO5	1					3	3					3			

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: A6216	**DIGITAL FORENSICSLAB**	**L**	**T**	**P**
Credits: 2		**3**	**-**	**-**

COURSEOBJECTIVES:

- Tolearntheconceptsoftherapidlychangingandfascinatingfieldofcomputerforensics
- Tobefamiliarwiththetechnicalexpertiseandtheknowledgerequiredtoinvestigate,detect,andprev entdigitalcrimes
- To identify the approaches on digital forensicslegislations,digitalcrime,forensicsprocessesandprocedures
- TounderstandperceptionsofE-evidencecollection,preservation,networkforensics,artofsteganographyandmobiledeviceforensi cs

List of experiments:

1 Study of Computer Forensics and different tools used for forensic investigation

2 How to Recover Deleted Files using Forensics Tools

3 Study the steps for hiding and extract any text file behind an image file/Audio file using Command Prompt.

4 How to Extract Exchangeable image file format(EXIF)Data from Image Files using Exifreader Software

5 How to make the forensic image of the hard drive using En Case Forensics.

6 How to Restoring the Evidence Image using En Case Forensics

7 How to Collect Email Evidence in Victim PC

8 How to Extracting Browser Artifacts

9 How to View Last Activity of Your PC

10 Find Last Connected USB on your system (USBForensics)

11 Comparison of two Files for forensics investigation by Compare IT software

12 Live Forensics Case Investigation using Autopsy

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	3	3										2	2		
CO2	3	2										2	2		
CO3	2	3										2		2	
CO4	3	2						2				2		2	

2020-21 Onwards(MR20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: A0560	Machine Learning Lab	L	T	P
Credits: 2		-	1	2

Prerequisites: Computer Programming, Python

Course Objective: The objective of this lab is to get an overview of the various machine learning techniques and can able to demonstrate those using python.

Course Outcomes: After the completion of the course the student can able to:

- understand complexity of Machine Learning algorithms and their limitations;
- understand modern notions in data analysis-oriented computing;
- be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;
- Be capable of performing experiments in Machine Learning using real-world data

Software Requirement: Python

List of Programs

1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is the probability that a student is absent given that today is Friday? Apply Baye‘s rule in python to get the result. (Ans: 15%)
2. Extract the data from database using python
3. Implement k-nearest neighbours classification using python
4. Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k means clustering with 3 means (i.e., 3 centroids) VAR1 VAR2 CLASS 1.713 1.586 0 0.180 1.786 1 0.353 1.240 1 0.940 1.566 0 1.486 0.759 1 1.266 1.106 0 1.540 0.419 1 0.459 1.799 1 0.773 0.186 1
5. The following training examples map descriptions of individuals onto high, medium and low credit-worthiness.
medium skiing design single twenties no -> highRisk
high golf trading married forties yes -> lowRisk
low speedway transport married thirties yes -> medRisk
medium football banking single thirties yes -> lowRisk
high flying media married fifties yes -> highRisk
low football security single twenties no -> medRisk
medium golf media single thirties yes -> medRisk
medium golf transport married forties yes -> lowRisk
high skiing banking single thirties yes -> highRisk
low golf unemployed married forties yes -> highRisk

Input attributes are (from left to right) income, recreation, job, status, age-group, home owner. Find the unconditional probability of `golf' and the conditional probability of `single' given `medRisk' in the dataset?

6. Implement linear regression using python.
7. Implement the multivariate linear regression.
8. Implement simple logistic regression and multivariate logistics regression.
9. Implement Naïve Bayes theorem to classify the English text
10. Implement an algorithm to demonstrate the significance of genetic algorithm
11. Implement the finite words classification system using Back-propagation algorithm
12. Implement anomaly detection and recommendation.

REFERENCES:

1. Willi Richert, Luis Pedro Coelho, ―Building Machine Learning with Python‖, **Packt** Publishing, 2013.