MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
Sponsored by CMR Educational Society
(Affiliated to JNTU, Hyderabad, Approved by AICTE - Accredited by NBA & NAAC – 'A' Grade - ISO 9001:2008 Certified)
Maisammaguda, Dhulapally (Post Via Hakimpet), Secunderabad – 500100, Telangana State, India.
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MASTER OF TECHNOLOGY
COMPUTER SCIENCE AND ENGINEERING

DEPARTMENT OF
COMPUTER SCIENCE AND ENGINEERING

ACADEMIC REGULATIONS
COURSE STRUCTURE AND SYLLABUS
(Batches admitted from the academic year 2015 - 2016)

Note: The regulations hereunder are subject to amendments as may be made by the Academic Council of the College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already pursuing the program) as may be decided by the Academic Council.

PRELIMINARY DEFINITIONS AND NOMENCLATURES

*"Autonomous Institution /College" means an institution/college designated as autonomous institute / college by University Grants Commission (UGC), as per the UGC Autonomous College Statutes.

*"Academic Autonomy" means freedom to a College in all aspects of conducting its academic programs, granted by the University for promoting excellence.

*"Commission" means University Grants Commission.

*"AICTE" means All India Council for Technical Education.

*"University" the Jawaharlal Nehru Technological University, Hyderabad.

*"College" means Malla Reddy College of Engineering & Technology, Secunderabad unless indicated otherwise by the context.

*"Program" means:

>Master of Technology (M.Tech) degree program

>PG Degree Program: M.Tech

*"Branch" means specialization in a program like M.Tech degree program in Electronics and Communication Engineering, M.Tech degree program in Computer Science and Engineering etc.

*"Course" or "Subject" means a theory or practical subject, identified by its course – number and course-title, which is normally studied in a semester.

*T–Tutorial, P–Practical, D–Drawing, L-Theory, C-Credits

FOREWORD

The autonomy is conferred on Malla Reddy College of Engineering & Technology (MRCET) by UGC based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like UGC and AICTE. It reflects the confidence of the UGC in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own curriculum, examination system and monitoring mechanism, independent of the affiliating University but under its observance.

Malla Reddy College of Engineering & Technology (MRCET) is proud to win the credence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, and also improving upon the values and beliefs for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the College and recommendations of the JNTU Hyderabad to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several experts drawn from academics, industry and research, in accordance with the vision and mission of the college which reflects the mindset of the institution in order to produce quality engineering graduates to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications, if needed, are to be sought at appropriate time and with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The Cooperation of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the institution and brighter prospects of engineering graduates.

"A thought beyond the horizons of success committed for educational excellence"

PRINCIPAL

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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(Affiliated to JNTU, Hyderabad, Approved by AICTE - Accredited by NBA & NAAC – 'A' Grade - ISO 9001:2008 Certified)

Maisammaguda, Dhulapally (Post Via Hakimpet), Secunderabad – 500100, Telangana State, India.

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VISION

❖ To establish a pedestal for the integral innovation, team spirit, originality and competence in the students, expose them to face the global challenges and become technology leaders of Indian vision of modern society.

MISSION

❖ To become a model institution in the fields of Engineering, Technology and Management.

❖ To impart holistic education to the students to render them as industry ready engineers.

❖ To ensure synchronization of MRCET ideologies with challenging demands of International Pioneering Organizations.

QUALITY POLICY

❖ To implement best practices in Teaching and Learning process for both UG and PG courses meticulously.

❖ To provide state of art infrastructure and expertise to impart the quality education.

❖ To groom the students to become intellectually creative and professionally competitive.

❖ To channelize the activities and tune them in heights of commitment and sincerity, the requisites to claim the never ending ladder of SUCCESS year after year.

For more information: www.mrcet.ac.in

ACADEMIC REGULATIONS R-15 FOR M. TECH. (REGULAR) DEGREE COURSE

Academic Regulations of R-15 are applicable for the students of M. Tech. (Regular) Course from the Academic Year 2015-16 and onwards. The M.Tech Degree of Malla Reddy College of Engineering & Technology (MRCET), Secunderabad shall be conferred on candidates who are admitted to the program and who fulfill all the requirements for the award of the Degree.

1.0 ELIGIBILITY FOR ADMISSIONS

Admission to the above program shall be made subject to eligibility, qualification and specialization as prescribed by the University from time to time.

Admissions shall be made on the basis of merit/rank obtained by the candidates at the qualifying Entrance Test conducted by the University (or) State Government (or) on the basis of any other order of merit as approved by the University, subject to norms as laid down by the State Govt. from time to time.

2.0 AWARD OF M. TECH. DEGREE

2.1. A student shall be declared eligible for the award of the M. Tech. Degree, if he pursues a course of study in not less than two and not more than four academic years.

2.2. A student, who fails to fulfill all the academic requirements for the award of the degree within four academic years from the year of his admission, shall forfeit his seat in M. Tech. course.

2.3. The student shall register for all 88 credits and secure all the 88 credits.

2.4. The minimum instruction days in each semester are 90.

3.0 A. COURSE OF STUDY

The following specializations are offered at present for the M. Tech. course of study.
1. Aerospace Engineering
2. Computer Science and Engineering
3. Machine Design
4. System and Signal Processing
5. VLSI and Embedded Systems
6. Thermal Engineering

and any other course as approved by the MRCET from time to time.

3.0 B. Departments offering M. Tech. Programmes with specializations are noted below:

Aeronautical Engineering	Aerospace Engineering
Computer Science Engineering	Computer Science Engineering
Electronics & Communication Engineering	System & Signal Processing
Electronics & Communication Engineering	VLSI and Embedded Systems
Mechanical Engineering	Machine Design
Mechanical Engineering	Thermal Engineering

4.0 ATTENDANCE

The programs are offered on a unit basis with each subject being considered a unit.

4.1 A student shall be eligible to write University examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects.

4.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester shall be granted by the College Academic Committee.

4.3 Shortage of Attendance below 65% in aggregate shall not be condoned.

4.4 Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of that class and their registration shall stand cancelled.

4.5 A prescribed fee as determined by the examination branch shall be payable towards condonation of shortage of attendance.

4.6 A student shall not be promoted to the next semester unless he satisfies the attendance requirement of the present semester, as applicable. They may seek readmission into that semester when offered next. If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

4.7 In order to qualify for the award of the M. Tech. Degree, the candidate shall complete all the academic requirements of the subjects, as per the course structure.

4.8 A student shall not be promoted to the next semester unless he satisfies the minimum academic requirements of the previous semester.

5.0 EVALUATION

The performance of the candidate in each semester shall be evaluated subject-wise, with a maximum of 100 marks for theory and 100 marks for practicals, on the basis of Internal Evaluation and End Semester Examination.

For the theory subjects 75 marks shall be awarded based on the performance in the End Semester Examination and 25 marks shall be awarded based on the Internal Examination Evaluation. The internal evaluation consists of two mid-term examination of 25 marks each covering descriptive paper which consists 5 questions consisting of two parts each (a) and (b), out of which the student has to answer either (a) or (b), not both. Each question carries 5 marks for a total duration of 2 hours. The total marks secured by the student in each mid-term examination are evaluated for 25 marks, and the average of the two mid-term examinations shall be taken as the final marks secured by each candidate.

However, any student scoring internal marks less than 40% will be given a chance to write the internal exam once again after he/she re-registering for the concerned subject and paying stipulated fees as per the norms.

5.1 The end semesters examination will be conducted for 75 marks with 5 questions consisting of two questions each (a) and (b), out of which the student has to answer

either (a) or (b), not both and each question carries 15 marks.

5.2 For practical subjects, 75 marks shall be awarded based on the performance in the End Semester Examinations and 25 marks shall be awarded based on the day-to-day performance as Internal Marks.

5.3 There shall be two seminar presentations during I year I semester and II semester respectively. For seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the department in a report form and shall make an oral presentation before the Departmental Academic Committee consisting of Head of the Department, Supervisor and two other senior faculty members of the department. For each Seminar there will be only internal evaluation of 50 marks. A candidate has to secure a minimum of 50% of marks to be declared successful.

5.4 A candidate shall be deemed to have secured the minimum academic requirement in a subject if he secures a minimum of 40% of marks in the End semester Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal Examination taken together.

5.5 In case the candidate does not secure the minimum academic requirement in any subject (as specified in 5.4) he has to reappear for the End semester Examination in that subject.

5.6 A candidate shall be given one chance to re-register for each subject provided the internal marks secured by a candidate are less than 50% and so has failed in the end examination. In such a case, the candidate must re-register for the subject(s) and secure the required minimum attendance. The candidate's attendance in the re-registered subject(s) shall be calculated separately to decide upon his eligibility for writing the end examination in those subject(s). In the event of the student taking another chance, his internal marks and end examination marks obtained in the previous attempt stand cancelled.

5.7 In case the candidate secures less than the required attendance in any subject, he shall not be permitted to write the End Examination in that subject. He shall re-register the subject when next offered.

5.8 Laboratory examination for M. Tech. courses must be conducted with two Examiners, one of them being the Laboratory Class Teacher and the second examiner shall be another Laboratory Teacher.

6.0   EVALUATION OF PROJECT/DISSERTATION WORK

Every candidate shall be required to submit a thesis or dissertation on a topic approved by the Project Review Committee.

6.1   A Project Review Committee (PRC) shall be constituted with Principal as Chairperson, Heads of all the Departments offering the M. Tech. programs and two other senior faculty members.

6.2   Registration of Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the subjects, both theory and practical.

6.3   After satisfying 6.2, a candidate has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work to the Departmental Academic Committee for approval. Only after obtaining the approval of the Departmental Academic Committee can the student initiate

the Project work.

6.4   If a candidate wishes to change his supervisor or topic of the project, he can do so with the approval of the Departmental Academic Committee. However, the Departmental Academic Committee shall examine whether or not the change of topic/supervisor leads to a major change of his initial plans of project proposal. If yes, his date of registration for the project work starts from the date of change of Supervisor or topic as the case may be.

6.5   A candidate shall submit his status report in a bound-form in two stages at least with a gap of 3 months between them.

6.6   The work on the project shall be initiated at the beginning of the II year and the duration of the project is two semesters. A candidate is permitted to submit Project Thesis only after successful completion of theory and practical course with the approval of PRC not earlier than 40 weeks from the date of registration of the project work. For the approval of PRC the candidate shall submit the draft copy of thesis to the Principal through Head of the Department and make an oral presentation before the PRC.

6.7   Three copies of the Project Thesis certified by the supervisor shall be submitted to the College/School/Institute.

6.8   The thesis shall be adjudicated by one examiner selected by the University. For this, the Principal of the College shall submit a panel of 5 examiners, eminent in that field, with the help of the guide concerned and head of the department.

6.9   If the report of the examiner is not favorable, the candidate shall revise and resubmit the Thesis, in the time frame as decided by the PRC. If the report of the examiner is unfavorable again, the thesis shall be summarily rejected.

6.10   If the report of the examiner is favorable, Viva-Voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the examiner who adjudicated the Thesis. The Board shall jointly report the candidate's work as one of the following:

   A.   Excellent
   B.   Good
   C.   Satisfactory
   D.   Unsatisfactory

The Head of the Department shall coordinate and make arrangements for the conduct of Viva- Voce examination.

If the report of the Viva-Voce is unsatisfactory, the candidate shall retake the Viva-Voce examination only after three months. If he fails to get a satisfactory report at the second Viva- Voce examination, he will not be eligible for the award of the degree.

7.0 AWARD OF DEGREE AND CLASS

In assessing the performance of the students in examinations, the usual approach is to award marks based on the examinations conducted at various stages (sessional, mid-term, end-semester etc.,) in a semester. As per UGC Autonomous guidelines, the following system is implemented in awarding the grades and CGPA under the Credit Based Semester System (CBCS).

Letter Grades and Grade Points:

The UGC recommends a 10-point grading system with the following letter grades as given below:

Grades	Points	Marks secured (%)
O (Outstanding)	10	≥ 85
A+(Excellent)	9	80 – 84
A(Very Good)	8	75 – 79
B+(Good)	7	70 – 74
B(Above Average)	6	65 – 69
C(Average)	5	60 – 64
P(Pass)	4	50 – 59
F(Fail)	0	<50
Ab(Absent)	0	-

A student obtaining Grade F shall be considered failed and will be required to reappear in the examination

Computation of SGPA and CGPA

The UGC recommends the following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

i. The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e

SGPA $(S_i) = \Sigma(C_i \times G_i) / \Sigma C_i$

where C_i is the number of credits of the ith course and G_i is the grade point scored by the student in the ith course.

ii. The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

CGPA $= \Sigma(C_i \times S_i) / \Sigma C_i$

where S_i is the SGPA of the ith semester and C_i is the total number of credits in that semester.

iii. The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

8.0 WITHHOLDING OF RESULTS

If the student has not paid the dues, if any, to the Institute or if any case of indiscipline is pending against him, the result of the student will be withheld and he will not be allowed into the next semester. His degree will be withheld in such cases.

9.0 TRANSITORY REGULATIONS

9.1 Discontinued, detained, or failed candidates are eligible for admission to two earlier or equivalent subjects at a time as and when offered.

10. GENERAL

10.1 Wherever the words he, him, his, occur in the regulations, they include she, her, hers .

10.2 The academic regulation should be read as a whole for the purpose of any interpretation.

10.3 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council of the College is final.

10.4 The College may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the Academic Council of the College/Affiliating University.

MALPRACTICES RULES
DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

S.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 he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be

		allowed to appear for examinations of the remaining subjects of that semester. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course 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 subject and all the othe subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Using 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 subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant Superintendent / 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	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The

	by visible representation, assaults the officer-incharge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including

		practical examinations and project work and shall not be permitted for the remaining examinations of the subjects 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 subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects 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 subject and all other subjects the candidate has appeared including practical examinations and project work of that semester examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Academic Council of the College (or) affiliating University for further action towards suitable punishment.	

Malpractices identified by squad or special invigilators will entail punishment to the candidates as per the above guidelines..

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1 – ANALYTICAL SKILLS

To facilitate the graduates with the ability to visualize, gather information, articulate, analyze, solve complex problems, and make decisions. These are essential to address the challenges of complex and computation intensive problems increasing their productivity.

PEO2 – TECHNICAL SKILLS

To facilitate the graduates with the technical skills that prepare them for immediate employment and pursue certification providing a deeper understanding of the technology in advanced areas of computer science and related fields, thus encouraging to pursue higher education and research based on their interest.

PEO3 – SOFT SKILLS

To facilitate the graduates with the soft skills that include fulfilling the mission, setting goals, showing self-confidence by communicating effectively, having a positive attitude, get involved in team-work, being a leader, managing their career and their life.

PEO4 – PROFESSIONAL ETHICS

To facilitate the graduates with the knowledge of professional and ethical responsibilities by paying attention to grooming, being conservative with style, following dress codes, safety codes, and adapting themselves to technological advancements.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

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.

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.

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.

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.

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.

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.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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.

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 multi disciplinary environments.

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.

M.Tech - I year I semester

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						INT	EXT
1	R15D5801	Advanced Data Structures and Algorithms	4	-	3	25	75
2	R15D5802	Advanced Operating Systems	4	-	3	25	75
3	R15D5803	Computer System Design	4	-	3	25	75
4	R15D5804 R15D5805 R15D5806	**Core Elective-I** 1) Software Process and Project Management. 2) Natural Language Processing 3) Internet of Things	4	-	3	25	75
5	R15D5807 R15D5808 R15D5809	**Core Elective-II** 1) Machine Learning 2) Software Architecture and Design Patterns 3) Parallel and Distributed Algorithms	4	-	3	25	75
6	**R15D9310** **R15D9302** **R15D9303**	**Open Elective-I** 1) Adhoc-Wireless Networks 2) Multimedia Processing 3) Embedded Systems Design	4	-	3	25	75
7	R15D5881	Advanced Data Structures and Algorithms Lab	0	3	2	25	75
8	R15D5883	Technical Seminar-I	-	-	2	50	-
Total			**24**	**3**	**22**	**225**	**525**

M.Tech - I year II semester

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						INT	EXT
1	R15D5810	Advanced Network Programming	4	-	3	25	75
2	R15D5811	Advanced Databases	4	-	3	25	75
3	R15D5812	Web Services and Service Oriented Architecture	4	-	3	25	75
4	R15D5813 R15D5814 R15D5815	**Core Elective-III** 1) Advanced Data Mining 2) Storage Area Networks 3) Database Security	4	-	3	25	75
5	R15D5816 R15D5817 R15D5818	**Core Elective-IV** 1) Grid and Cloud Computing 2) Wireless Networks and Mobile Computing 3) Information Retrieval Systems	4	-	3	25	75
6	R15D9314 R15D9313 R15D9316	**Open Elective-II** 1) Embedded RTOS 2) Hardware Software Co-design 3) Mobile Computing Technologies	4	-	3	25	75
7	R15D5882	Web Services Lab	-	3	2	25	75
8	R15D5884	Technical Seminar-II	-	-	2	50	-
		Total	**24**	**3**	**22**	**225**	**525**

M.Tech - II year I semester

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						INT	EXT
1	R15D5885	**Project Review Seminars**	-	-	**4**	-	-
2	R15D5886	**Project Work**	-	-	**18**	-	-
		Total	**-**	**-**	**22**	**-**	**-**

M.Tech - II year II semester

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						INT	EXT
1	R15D5887	**Project Work & Viva Voce**	-	-	**22**	-	-
		Total	**-**	**-**	**22**	**-**	**-**

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech – I Year – I Sem(Computer Science & Engg.)

(R15D5801) ADVANCED DATA STRUCTURES AND ALGORITHMS

Objectives:

- The fundamental design, analysis, and implementation of basic data structures. Basic concepts in the specification and analysis of programs.
- Principles for good program design, especially the uses of data abstraction. Significance of algorithms in the computer field
- Various aspects of algorithm development Qualities of a good solution

UNIT I

Algorithms, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big Oh, Omega and Theta notations, Complexity Analysis Examples. Data structures-Linear and non linear data structures, ADT concept, Linear List ADT, Array representation, Linked representation, Vector representation, singly linked lists -insertion, deletion, search operations, doubly linked lists-insertion, deletion operations, circular lists. Representation of single, two dimensional arrays, Sparse matrices and their representation.

UNIT II

Stack and Queue ADTs, array and linked list representations, infix to postfix conversion using stack, implementation of recursion, Circular queue-insertion and deletion, Dequeue ADT, array and linked list representations, Priority queue ADT, implementation using Heaps, Insertion into a Max Heap, Deletion from a Max Heap, java.util package-ArrayList, Linked List, Vector classes, Stacks and Queues in java.util, Iterators in java.util.

UNIT III

Searching–Linear and binary search methods, Hashing-Hash functions, Collision Resolution methods-Open Addressing, Chaining, Hashing in java.util-HashMap, HashSet, Hashtable. Sorting –Bubble sort, Insertion sort, Quick sort, Merge sort, Heap sort, Radix sort, comparison of sorting methods.

UNIT IV

Trees- Ordinary and Binary trees terminology, Properties of Binary trees, Binary tree ADT, representations, recursive and non recursive traversals, Java code for traversals, Threaded binary trees. Graphs- Graphs terminology, Graph ADT, representations, graph traversals/search methods-dfs and bfs, Java code for graph traversals, Applications of Graphs-Minimum cost spanning tree using Kruskal's algorithm, Dijkstra's algorithm for Single Source Shortest Path Problem.

UNIT V

Search trees- Binary search tree-Binary search tree ADT, insertion, deletion and searching operations, Balanced search trees, AVL trees-Definition and examples only, Red Black trees – Definition and examples only, B-Trees-definition, insertion and searching operations, Trees in java.util- TreeSet, Tree Map Classes, Tries(examples only),Comparison of Search trees. Text compression-Huffman coding and decoding, Pattern matching-KMP algorithm.

TEXT BOOKS:
1. Data structures, Algorithms and Applications in Java, S.Sahni, Universities Press.
2. Data structures and Algorithms in Java, Adam Drozdek, 3rd edition, Cengage Learning.
3. Data structures and Algorithm Analysis in Java, M.A.Weiss, 2nd edition,
4. Addison-Wesley (Pearson Education).

REFERENCE BOOKS:
1. Java for Programmers, Deitel and Deitel, Pearson education.
2. Data structures and Algorithms in Java, R.Lafore, Pearson education.
3. Java: The Complete Reference, 8th editon, Herbert Schildt, TMH.
4. Data structures and Algorithms in Java, M.T.Goodrich, R.Tomassia, 3rd edition, Wiley India Edition.
5. Data structures and the Java Collection Frame work,W.J.Collins, Mc Graw Hill.
6. Classic Data structures in Java, T.Budd, Addison-Wesley (Pearson Education).
7. Data structures with Java, Ford and Topp, Pearson Education.
8. Data structures using Java, D.S.Malik and P.S.Nair, Cengage learning.
9. Data structures with Java, J.R.Hubbard and A.Huray, PHI Pvt. Ltd.
10. Data structures and Software Development in an Object-Oriented Domain, J.P.Tremblay and G.A.Cheston, Java edition, Pearson Education.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
M.Tech – I Year – I Sem(Computer Science & Engg.)

(R15D5802) ADVANCED OPERATING SYSTEMS

Objectives:
- To understand main components of Real time Operating system and their working
- To study the operations performed by OS as a resource manager
- To understand the scheduling policies of DOS To implement the working principles of OS
- To study different OS and compare their features

UNIT I
Real-time operating systems: Design issues, principles and case study.

UNIT II
Distributed operating system: Design issues, features and principles of working, case study.

UNIT III
Network operating system: Design issues, working principles and characteristic features, case study.

UNIT IV
Kernel development: Issues and development principles, case study.

UNIT V
Protection, privacy, access control and security issues, solutions.

TEXT BOOKS:
1. A.Silberschatz - Applied Operating System Concepts, Wiley, 2000.
2. Lubemir F Bic and Alan C. Shaw - Operating System Principles, Pearson Education, 2003.

REFERENCE BOOKS:
1. Operating Systems : Internal and Design Principles - Stallings, 6th ed., PE.
2. Modern Operating Systems, Andrew S Tanenbaum 3rd ed., PE.
3. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 7th ed.,, John Wiley
4. UNIX User Guide – Ritchie & Yates.
5. UNIX Network Programming - W.Richard Stevens ,1998, PHI.
6. The UNIX Programming Environment – Kernighan & Pike, PE.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
M.Tech – I Year – I Sem(Computer Science & Engg.)

(R15D5803) COMPUTER SYSTEM DESIGN

Objectives:
- To apply the fundamentals of Computer Systems Design and IT in devising IT solutions. To Design, simulate, and analyze digital hardware.
- To Interface between basic hardware and software computing systems. To Simulate and evaluate different computing architectures.

UNIT I
Computer structure – hardware, software, system software, Von-Neumann architecture – case study. IA -32 Pentium: registers and addressing, instructions, assembly language, program flow control, logic and shift/rotate instructions, multiply, divide MMX, SIMD instructions, I/O operations, subroutines.
Input/output organization, interrupts, DMA, Buses, Interface circuits, I/O interfaces, device drivers in windows, interrupt handlers

UNIT II
Processing Unit: Execution of a complete instruction, multiple bus organization, hardwired control, micro programmed control.
Pipelining: data hazards, instruction hazards, influence on instruction sets, data path & control consideration, and RISC architecture introduction.

UNIT – III
Memory: types and hierarchy, model level organization, cache memory, performance considerations, mapping, virtual memory, swapping, paging, segmentation, replacement policies.

UNIT – IV
Processes and Threads: processes, threads, inter process communication, classical IPC problems, Deadlocks.

UNIT – V
File system: Files, directories, Implementation, Unix file system
Security: Threats, intruders, accident data loss, basics of cryptography, user authentication.

TEXT BOOKS:
1. Computer Organization – Car Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.

2. Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI

REFERENCE BOOKS:

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson /PHI
2. Morris Mano- Computer System Architecture –3rd Edition-Pearson Education.
3. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
4. Operating Systems – Internals and Design Principles Stallings, Fifth Edition–2005, Pearson Education/PHI

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech – I Year – I Sem(Computer Science & Engg.)

(R15D5804) SOFTWARE PROCESS AND PROJECT MANAGEMENT
(CORE ELECTIVE – I)

Objectives:

- Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
- Compare and differentiate organization structures and project structures.
- Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools.

UNIT I

Software Process Maturity

Software maturity Framework**,** Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process.

Process Reference Models

Capability Maturity Model (CMM)**,** CMMI, PCMM, PSP, TSP.

UNIT II

Software Project Management Renaissance

Conventional Software Management, Evolution of Software Economics, Improving Software Economics, The old way and the new way.

Life-Cycle Phases and Process artifacts

Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model based software architectures.

UNIT III

Workflows and Checkpoints of process

Software process workflows, Iteration workflows, Major milestones, Minor milestones, Periodic status assessments.

Process Planning

Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning.

UNIT IV

Project Organizations

Line-of- business organizations, project organizations, evolution of organizations, process

automation.

Project Control and process instrumentation

The seven core metrics, management indicators, quality indicators, life-cycle expectations, Pragmatic software metrics, and metrics automation.

UNIT V

CCPDS-R Case Study and Future Software Project Management Practices

Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions.

TEXT BOOKS:

1. Managing the Software Process, *Watts S. Humphrey*, Pearson Education.
2. Software Project Management, *Walker Royce,* Pearson Education.

REFERENCE BOOKS:

1. Effective Project Management: Traditional, Agile, Extreme, Robert Wysocki, Sixth edition, Wiley India, rp2011.
2. An Introduction to the Team Software Process, Watts S. Humphrey, Pearson Education, 2000
3. Process Improvement essentials, James R. Persse, O'Reilly, 2006
4. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, TMH, 2006
5. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly, 2006.
6. Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly, 2007
7. Software Engineering Project Managent, Richard H. Thayer & Edward Yourdon, 2nd edition, Wiley India, 2004.
8. The Art of Project Management, Scott Berkun, SPD, O'Reilly, 2011.
9. Applied Software Project Management, Andrew Stellman & Jennifer Greene, SPD, O'Reilly, rp2011.
10. Agile Project Management, Jim Highsmith, Pearson education, 2004.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
M.Tech – I Year – I Sem(Computer Science & Engg.)

(R15D5805) NATURAL LANGUAGE PROCESSING
(CORE ELECTIVE-I)

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.

UNIT 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 raged tools. P**rogramming 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.

UNIT 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, cross entropy, information gain. Its application to some language phenomena.

UNIT 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.

UNIT 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

UNIT V
Maximum Entropy Markov Models & Conditional Random Fields
Part-of-speech tagging, noun-phrase segmentation and information extraction models that combine maximum entropy and finite-state machines. State-of-the-art models for NLP.

Lexical Semantics Mathematics of Multinomial and Dirichlet distributions, Dirichlet as a smoothing 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

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
M.Tech – I Year – I Sem(Computer Science & Engg.)

(R15D5806) INTERNET OF THINGS
(CORE ELECTIVE – I)

Objectives:

- To Introduce the terminology, technology and its applications
- To introduce the concept of M2M (machine to machine) with necessary protocols
- To introduce Python scripting language which is used in many IoT devices
- To introduce Raspberry PI platform, that is widely used in IoT applications.

UNIT I

Introduction to Internet of Things- Definition and Characteristics of IoT, Physical design of IoT- IoT protocols, IoT communication protocols, IoT communication API's. IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded systems, IoT levels and Templates. Domain specifis IoT's – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle.

UNIT II

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT system management with NETCONF, YANG-NETCONF, YANG, SNMP NETOPEER

UNIT III

Introduction to Python – Language features of phython, Data types, data structures, Control of flow, functions, modules, packaging, file handling, date/time operations, classes, exception handling. Python packages – JSON, XML, HTTPLib, URLLib, SMTPLib.

UNIT IV

IoT Physical devices and Endpoints: Introduction to Raspberry PI- Interfaces (Serial, SPI, I2C) programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT V

IoT Physical devices and Cloud offerings – Introduction to Cloud storage models and communication API's Webserver – Web server for IoT, cloud for IoT, Python web application framework. Designing a RESTful web API

TEXT BOOKS:

1. Internet of Things – A hands-on approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting started with Raspberry PI , Matt Richardson and Shawn Wallace, O'Relly(SPD), 2014, ISBN:9789350239759

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
M.Tech – I Year – I Sem(Computer Science & Engg.)

(R15D5807) MACHINE LEARNING
(CORE ELECTIVE –II)

Objectives:
- To be able to formulate machine learning problems corresponding to different applications.
- To understand a range of machine learning algorithms along with their strengths and weaknesses.
- To understand the basic theory underlying machine learning.
- To be able to apply machine learning algorithms to solve problems of moderate complexity.
- To be able to read current research papers and understands the issues raised by current research.

UNIT I
INTRODUCTION - Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning
Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias

UNIT II
Decision Tree learning – Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning
Artificial Neural Networks – Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition Advanced topics in artificial neural networks
Evaluation Hypotheses – Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms

UNIT III
Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses

for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm

Computational learning theory – Introduction, Probability learning an approximately correct hypothesis, Sample complexity for Finite Hypothesis Space, Sample Complexity for infinite Hypothesis Spaces, The mistake bound model of learning - **Instance-Based Learning**-Introduction, k -Nearest Neighbour Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning

Genetic Algorithms – Motivation, Genetic Algorithms, An illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

UNIT IV

Learning Sets of Rules – Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First Order Rules, Learning Sets of First Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution

Analytical Learning - Introduction, Learning with Perfect Domain Theories: Prolog-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge

UNIT V

Combining Inductive and Analytical Learning – Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operators,

Reinforcement Learning – Introduction, The Learning Task, Q Learning, Non-Deterministic, Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming

TEXT BOOKS:
1. Machine Learning – Tom M. Mitchell, - MGH
2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis (CRC)

REFERENCE BOOKS:
1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
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

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech – I Year – I Sem(Computer Science & Engg.)

(R15D5808) SOFTWARE ARCHITECTURE AND DESIGN PATTERNS
(CORE ELECTIVE –II)

Objectives:

After completing this course, the student should be able to:

- To understand the concept of patterns and the Catalog.
- To discuss the Presentation tier design patterns and their affect on: sessions, client access, validation and consistency.
- To understand the variety of implemented bad practices related to the Business and Integration tiers.
- To highlight the evolution of patterns.
- To how to add functionality to designs while minimizing complexity
- To understand what design patterns really are, and are not
- To learn about specific design patterns.
- To learn how to use design patterns to keep code quality high without overdesign.

UNIT I
Envisioning Architecture

The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views.

Creating an Architecture

Quality Attributes, Achieving qualities, Architectural styles and patterns, designing the Architecture, Documenting software architectures, Reconstructing Software Architecture.

UNIT II
Analyzing Architectures

Architecture Evaluation, Architecture design decision making, ATAM, CBAM.

Moving from one system to many

Software Product Lines, Building systems from off the shelf components, Software architecture infuture.

UNIT III
Patterns

Pattern Description, Organizing catalogs, role in solving design problems, Selection and usage.

Creational and Structural patterns

Abstract factory, builder, factory method, prototype, singleton, adapter, bridge, composite, façade, flyweight.

UNIT IV

Behavioral patterns

Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor.

UNIT V

Case Studies

A-7E – A case study in utilizing architectural structures, The World Wide Web - a case study in interoperability, Air Traffic Control – a case study in designing for high availability, Celsius Tech – acase study in product line development,

TEXT BOOKS:
1. Software Architecture in Practice, second edition, Len Bass, Paul Clements & Rick Kazman, Pearson Education, 2003.
2. Design Patterns, Erich Gamma, Pearson Education, 1995.

REFERENCE BOOKS:
1. Beyond Software architecture, Luke Hohmann, Addison wesley, 2003.
2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall
1. PTR, 2001
2. Software Design, David Budgen, second edition, Pearson education, 2003
3. Head First Design patterns, Eric Freeman & Elisabeth Freeman, O'REILLY, 2007.
4. Design Patterns in Java, Steven John Metsker & William C. Wake, Pearson education, 2006
5. J2EE Patterns, Deepak Alur, John Crupi & Dan Malks, Pearson education, 2003.
6. Design Patterns in C#, Steven John metsker, Pearson education, 2004.
7. Pattern Oriented Software Architecture, F.Buschmann & others, John Wiley & Sons.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
M.Tech – I Year – I Sem(Computer Science & Engg.)

(R15D5809) PARALLEL AND DISTRIBUTED ALGORITHMS
(CORE ELECTIVE –II)

Objectives:
- To learn parallel and distributed algorithms development techniques for shared memory and message passing models.
- To study the main classes of parallel algorithms.
- To study the complexity and correctness models for parallel algorithms.

UNIT-I
Basic Techniques, Parallel Computers for increase Computation speed, Parallel & Cluster Computing

UNIT-II
Message Passing Technique- Evaluating Parallel programs and debugging, Portioning and Divide
and Conquer strategies examples

UNIT-III
Pipelining- Techniques computing platform, pipeline programs examples

UNIT-IV
Synchronous Computations, load balancing, distributed termination examples, programming with shared memory, shared memory multiprocessor constructs for specifying parallelist sharing data parallel programming languages and constructs, open MP

UNIT-V
Distributed shared memory systems and programming achieving constant memory distributed shared memory programming primitives, algorithms – sorting and numerical algorithms.

TEXT BOOK:
1. Parallel Programming, Barry Wilkinson, Michael Allen, Pearson Education, 2nd Edition.

REFERENCE BOOK:
1. Introduction to Parallel algorithms by Jaja from Pearson, 1992.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech – I Year – I Sem(Computer Science & Engg.)

(R15D9310) ADHOC - WIRELESS NETWORKS
(OPEN ELECTIVE-I)

UNIT -I:
Wireless LANS and PANS: Introduction, Fundamentals of WLANS, IEEE 802.11 Standards, HIPERLAN Standard, Bluetooth, Home RF.
AD HOC Wireless Networks: Introduction, Issues in Ad Hoc Wireless Networks.

UNIT -II:
MAC Protocols: Introduction, Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention - Based Protocols, Contention - Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.

UNIT -III:
Routing Protocols: Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On – Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols.

UNIT –IV:
Transport Layer Protocols: Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc Wireless Networks.

UNIT –V:
Wireless Sensor Networks: Introduction, Sensor Network Architecture, Data Dissemination, Data Gathering, MAC Protocols for Sensor Networks, Location Discovery, Quality of a Sensor Network, Evolving Standards, Other Issues.

TEXT BOOKS:
1. Ad Hoc Wireless Networks: Architectures and Protocols - C. Siva Ram Murthy and B.S.Manoj, 2004, PHI.
2. Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control - Jagannathan Sarangapani, CRC Press.
REFERENCE BOOKS:
1. Ad- Hoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh , 1st Ed. Pearson Education.
2. Wireless Sensor Networks - C. S. Raghavendra, Krishna M. Sivalingam, 2004, Springer.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
M.Tech – I Year – I Sem(Computer Science & Engg.)

(R15D9302) MULTIMEDIA PROCESSING
(OPEN ELECTIVE-I)

UNIT I - Audio Processing Systems

Digital Signal Processors: Fixed Point DSPs, Floating Point DSPs, Development Tools, Digital Audio Interfaces: Two-Channel AES/EBU Interface, MADI Interface, Single Processor Systems: Peripherals, Control, Multi Processor Systems: Connection via Serial Links, Connection via Parallel Links, Connection via Standard Bus Systems, Scalable Audio System

UNIT II – Equalizers

Recursive Audio Filters: Design, Parametric Filter structures, Quantization Effects, Non-recursive Audio Filters: Fast Convolution, Fast Convolution of Long Sequences, Filter Design by Filter Sampling, Multi-Complementary Filter Bank: Principles, Example: 8-band Multi Complementary Filter Bank

UNIT III - Audio Coding

Audio Coding: Lossless Audio Coding, Lossy Audio Coding, Psycho acoustics, Advanced Audio Coding (MPEG Coding Standards), Spectral Band Replication, Java Applet- Psycho acoustics.

UNIT -IV:

Video Processing: Analog Video, Digital Video. Time-Varying Image Formation models: Three-Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling of Video signals, Filtering operations.

UNIT –V:

Motion Estimation: Optical flow, General Methodologies, Pixel Based Motion Estimation Block- Matching Algorithm, Mesh based Motion Estimation, Global Motion Estimation, Region based Motion Estimation, Multi resolution motion estimation, Waveform based coding, Block based transform coding, Predictive coding, Application of motion estimation in Video coding.

TEXT BOOKS:

1. Udo Zolzer, "Digital Audio Signal Processing" 2nd Edition, John Wiley Sons & Pvt Ltd.
2. Digital Image Processing – Gonzaleze and Woods, 3rd Ed., Pearson.
3. Video Processing and Communication – Yao Wang, Joem Ostermann and Ya–quin Zhang. 1st Ed., PH Int.

REFRENCE BOOKS:

1. Digital Image Processing and Analysis-Human and Computer Vision Application with CVIP Tools – Scotte Umbaugh, 2nd Ed, CRC Press, 2011.
2. Digital Video Processing – M. Tekalp, Prentice Hall International.
3. Digital Image Processing – S.Jayaraman, S.Esakkirajan, T.Veera Kumar – TMH, 2009.
4. Multidimentional Signal, Image and Video Processing and Coding – John Woods, 2nd Ed, Elsevier.
5. Digital Image Processing with MATLAB and Labview – Vipula Singh, Elsevier.
6. Video Demystified – A Hand Book for the Digital Engineer – Keith Jack, 5th Ed., Elsevier.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
M.Tech – I Year – I Sem(Computer Science & Engg.)

(R15D9303) EMBEDDED SYSTEMS DESIGN
(OPEN ELECTIVE-I)

UNIT –I:

ARM Architecture:

ARM Design Philosophy, Registers, Program Status Register, Instruction Pipeline, Interrupts and Vector Table, Architecture Revision, ARM Processor Families.

UNIT –II:

ARM Programming Model – I:

Instruction Set: Data Processing Instructions, Addressing Modes, Branch, Load, Store Instructions,PSR Instructions, Conditional Instructions.

UNIT –III:

ARM Programming Model – II:

Thumb Instruction Set: Register Usage, Other Branch Instructions, Data Processing Instructions, Single-Register and Multi Register Load-Store Instructions, Stack, Software Interrupt Instructions

UNIT –IV:

ARM Programming:

Simple C Programs using Function Calls, Pointers, Structures, Integer and Floating Point Arithmetic, Assembly Code using Instruction Scheduling, Register Allocation, Conditional Execution and Loops.

UNIT –V:

Memory Management:

Cache Architecture, Polices, Flushing and Caches, MMU, Page Tables, Translation, Access Permissions, Context Switch.

TEXT BOOKS:
1. ARM Systems Developer's Guides- Designing & Optimizing System Software – Andrew N.Sloss, Dominic Symes, Chris Wright, 2008, Elsevier.
2. Professional Embedded ARM development-James A Langbridge, Wiley/Wrox

REFERENCE BOOKS:
1. Embedded Microcomputer Systems, Real Time Interfacing – Jonathan W. Valvano – Brookes/ Cole, 1999, Thomas Learning.
2. ARM System on Chip Architecture, Steve Furber, 2nd Edition, Pearson

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech – I Year – I Sem(Computer Science & Engg.)

(R15D5881) ADVANCED DATA STRUCTURES AND ALGORITHMS LAB

Objectives:

- The fundamental design, analysis, and implementation of basic data structures.
- Basic concepts in the specification and analysis of programs.
- Principles for good program design, especially the uses of data abstraction.

Sample Problems on Data structures:

1) Write Java programs that use both recursive and non-recursive functions for implementing the following searching methods:
   a) Linear search b) Binary search
2) Write Java programs to implement the following using arrays and linked lists
   a) List ADT
3) Write Java programs to implement the following using an array.
   a) Stack ADT b) Queue ADT
4) Write a Java program that reads an infix expression and converts the expression to postfix form. (Use stack ADT).
5) Write a Java program to implement circular queue ADT using an array.
6) Write a Java program that uses both a stack and a queue to test whether the given string is a palindrome or not.
7) Write Java programs to implement the following using a singly linked list.
   a) Stack ADT b) Queue ADT
8) Write Java programs to implement the deque (double ended queue) ADT using
   a) Array b) Singly linked list c) Doubly linked list.
9) Write a Java program to implement priority queue ADT.
10) Write a Java program to perform the following operations:
    a) Construct a binary search tree of elements.
    b) Search for a key element in the above binary search tree.
    c) Delete an element from the above binary search tree.
11) Write a Java program to implement all the functions of a dictionary (ADT) using Hashing.
12) Write a Java program to implement Dijkstra's algorithm for Single source shortest
13) path problem.
14) Write Java programs that use recursive and non-recursive functions to traverse the
15) given binary tree in
    a) Preorder b) Inorder c) Postorder.
16) Write Java programs for the implementation of bfs and dfs for a given graph.
17) Write Java programs for implementing the following sorting methods:
    a) Bubble sort d) Merge sort g) Binary tree sort

b)   Insertion sort e) Heap sort

c)   Quick sort f) Radix sort

18) Write a Java program to perform the following operations:

a)   Insertion into a B-tree b) Searching in a B-tree

19) Write a Java program that implements Kruskal's algorithm to generate minimum cost

20) spanning tree.

21) Write a Java program that implements KMP algorithm for pattern matching

REFERENCE BOOKS:

1. Data Structures and Algorithms in java, 3rd edition, A.Drozdek, Cengage Learning.
2. Data Structures with Java, J.R.Hubbard, 2nd edition, Schaum's Outlines, TMH.
3. Data Structures and algorithms in Java, 2nd Edition, R.Lafore, Pearson Education.
4. Data Structures using Java, D.S.Malik and P.S. Nair, Cengage Learning.
5. Data structures, Algorithms and Applications in java, 2nd Edition, S.Sahani, Universities
   Press.
6. Design and Analysis of Algorithms, P.H.Dave and H.B.Dave, Pearson education.
7. Data Structures and java collections frame work, W.J.Collins, Mc Graw Hill.
8. Java: the complete reference, 7th editon, Herbert Schildt, TMH.
9. Java for Programmers, P.J.Deitel and H.M.Deitel, Pearson education / Java: How to Program P.J.Deitel and H.M.Deitel , 8th edition, PHI.
10. Java Programming, D.S.Malik,Cengage Learning.
    A Practical Guide to Data Structures and Algorithms using Java, S.Goldman & K.Goldman, Chapman & Hall/CRC, Taylor & Francis Group.
    (Note: Use packages like java.io, java.util, etc)

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
M.Tech – I Year – II Sem(Computer Science & Engg.)

(R15D5810) ADVANCED NETWORK PROGRAMMING

Objectives:

- Computer network programming involves writing computer programs that enable processes to communicate with each other across a computer network
- **Network programming is client–server programming**
- Interprocess communication, even if it is bidirectional, cannot be implemented in a perfectly symmetric way: to establish a communication channel between two processes, one process must take the initiative, while the other is waiting for it. Therefore, network programming unavoidably assumes a client–server model: The process initiating the communication is a client, and the process waiting for the communication to be initiated is a server. The client and server processes together form a distributed system. In a peer-to-peer communication, the program can act both as a client and a server.

UNIT – I

Linux Utilities- File handling utilities, Security by file permissions, Process utilities, Disk utilities,
Networking utilities, Filters, Text processing utilities and Backup utilities. Bourne again shell(bash) - Introduction, pipes and redirection, here documents, running a shell script,
the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples. Review of C programming concepts-arrays, strings (library functions), pointers, function pointers, structures, unions, libraries in C.

UNIT - II

Files- File Concept, File types File System Structure, Inodes, File Attributes, file I/O in C using system calls, kernel support for files, file status information-stat family, file and record locking-lockf and fcntl functions, file permissions- chmod, fchmod, file ownership-chown, lchown , fchown, linkssoft links and hard links – symlink, link, unlink. File and Directory management – Directory contents, Scanning Directories- Directory file APIs. Process- Process concept, Kernel support for process, process attributes. Process control – process creation, replacing a process image, waiting for a process, process termination, zombie process, orphan process.

UNIT - III

Signals- Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise , alarm, pause, abort, sleep functions. Interprocess Communication - Introduction to IPC mechanisms, Pipes- creation, IPC between related processes using unnamed pipes, FIFOs-creation, IPC between unrelated processes using FIFOs(Named pipes), differences between unnamed and named pipes, popen and pclose library functions, Introduction to message queues, semaphores and shared memory.

Message Queues- Kernel support for messages, UNIX system V APIs for messages, client/server

example. Semaphores-Kernel support for semaphores, UNIX system V APIs for semaphores.

UNIT – IV

Shared Memory- Kernel support for shared memory, UNIX system V APIs for shared memory,

client/server example. Network IPC - Introduction to Unix Sockets, IPC over a network, Client-Server model ,Address formats(Unix domain and Internet domain), Socket system calls for Connection Oriented - Communication, Socket system calls for Connectionless-Communication, Example-Client/Server Programs- Single Server-Client connection, Multiple simultaneous clients, Socket options – setsockopt, getsockopt, fcntl.

UNIT-V

Network Programming in Java-Network basics, TCP sockets, UDP sockets (datagram sockets),

Server programs that can handle one connection at a time and multiple connections (using multithreaded server), Remote Method Invocation (Java RMI)-Basic RMI Process, Implementation details-Client-Server Application.

TEXT BOOKS:
1. Unix System Programming using C++, T.Chan, PHI.(Units II,III,IV)
2. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH.(Unit I)
3. An Introduction to Network Programming with Java, Jan Graba, Springer, rp 2010.(Unit V)
4. Unix Network Programming ,W.R. Stevens, PHI.(Units II,III,IV)
5. Java Network Programming,3rd edition, E.R. Harold, SPD, O'Reilly.(Unit V)

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

Education.

4. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones, Wrox, Wiley India Edition.

5. Unix Network Programming The Sockets Networking API, Vol.-I,W.R.Stevens, Bill Fenner,

   A.M.Rudoff, Pearson Education.

6. Unix Internals, U.Vahalia, Pearson Education.

7. Unix shell Programming, S.G.Kochan and P.Wood, 3rd edition, Pearson Education.

8. C Programming Language, Kernighan and Ritchie, PHI

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech – I Year – I Sem(Computer Science & Engg.)

(R15D5811) ADVANCED DATABASES

Objectives:

By the end of the course, you will know:

- How to design a database
- How to convert the design into the appropriate tables
- Handling Keys appropriately
- Enforcing Integrity Constraints to keep the database consistent
- Normalizing the tables to eliminate redundancies
- Querying relational data
- Optimizing and processing the queries
- Storage Strategies for easy retrieval of data through index
- Triggers, Procedures and Cursors ,Transaction Management
- Distributed databases management system concepts and Implementation

UNIT I

Database System Applications, Purpose of Database Systems, View of Data – Data Abstraction, Instances and Schemas, Data Models – the ER Model, Relational Model, Other Models – Database Languages – DDL,DML, Database Access from Applications Programs, Transaction Management, Data Storage and Querying, Database Architecture, Database Users and Administrators, ER diagrams,. Relational Model: Introduction to the Relational Model – Integrity Constraints Over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views –Altering Tables and Views, Relational Algebra, Basic SQL Queries, Nested Queries, Complex Integrity Constraints in SQL, Triggers

UNIT II

Introduction to Schema Refinement – Problems Caused by redundancy, Decompositions – Problem related to decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms – FIRST, SECOND, THIRD Normal forms – BCNF –Properties of Decompositions- Loss less- join Decomposition, Dependency preserving Decomposition, Schema Refinement in Data base Design – Multi valued Dependencies – FOURTH Normal Form, Join Dependencies, FIFTH Normal form.

UNIT III

Transaction Management: The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions – Lock Based Concurrency Control, Deadlocks – Performance of Locking – Transaction Support in SQL. Concurrency Control: Serializability, and recoverability – Introduction to Lock Management – Lock Conversions, Dealing with Dead Locks, Specialized Locking Techniques – Concurrency Control without Locking. Crash

recovery: Introduction to Crash recovery, Introduction to ARIES, the Log, and Other Recovery related Structures, the Write-Ahead Log Protocol, Check pointing, recovering from a System Crash, Media recovery

UNIT IV

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing –Clustered Indexes, Primary and Secondary Indexes, Index data Structures – Hash Based Indexing, Tree based Indexing Storing data: Disks and Files: -The Memory Hierarchy – Redundant Arrays of Independent Disks. Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM) B+ Trees: A Dynamic Index Structure, Search, Insert, Delete. Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendable vs. Linear Hashing.

UNIT V

Distributed databases: Introduction to distributed databases, Distributed DBMS architectures, Storing data in a distributed DBMS, Distributed catalog management, Distributed query processing Updating distributed data, Distributed transactions, Distributed concurrency control, Distributed recovery

TEXT BOOKS:
1. Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, TMH, 3rd Edition,2003.
2. Data base System Concepts, A.Silberschatz, H.F. Korth, S.Sudarshan, McGraw hill, VI edition, 2006.
3. Fundamentals of Database Systems 5th edition. Ramez Elmasri, Shamkant B.Navathe, Pearson Education, 2008.

REFERENCE BOOKS:
1. Introduction to Database Systems, C.J.Date,Pearson Education.
2. Database Management System Oracle SQL and PL/SQL, P.K.Das Gupta, PHI.
3. Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning, 2008.
4. Database Systems, A Practical approach to Design Implementation and Management Fourth edition, Thomas Connolly, Carolyn Begg, Pearson education.
5. Database-Principles, Programming, andPerformance, P.O'Neil&E.O'Neil, 2nd ed., ELSEVIER
6. Fundamentals of Relational Database Management Systems, S.Sumathi, S.Esakkirajan, Springer.
7. Introduction to Database Management, M.L.Gillenson and others, Wiley Student Edition.
8. Database Development and Management, Lee Chao, Auerbach publications, Taylor & Francis Group.
9. Distributed Databases Principles & Systems, Stefano Ceri, Giuseppe Pelagatti, TMH.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
M.Tech – I Year – II Sem(Computer Science & Engg.)

(R15D5812) WEB SERVICES AND SERVICE ORIENTED ARCHITECTURE

Objectives:
- To Understand Web Services and implementation model for SOA
- To Understand the SOA, its Principles and Benefits
- To Understand XML concepts
- To Understand paradigms needed for testing Web Services
- To explore different Test Strategies for SOA-based applications
- To implement functional testing, compliance testing and load testing of Web Services
- To Identify bug-finding ideas in testing Web Services

UNIT I

Evolution and Emergence of Web Services – Evolution of distributed computing. Core distributed computing technologies – client/server, CORBA, JAVA RMI, Micro Soft DCOM, MOM, Challenges in Distributed Computing, role of J2EE and XML in distributed computing, emergence of Web Services and Service Oriented Architecture (SOA). Introduction to Web Services – The definition of web services, basic operational model of web services, tools and technologies enabling web services, benefits and challenges of using web services.

UNIT II

Web Service Architecture – Web services Architecture and its characteristics, core building blocks of web services, standards and technologies available for implementing web services, web services communication, basic steps of implementing web services. Describing Web Services – WSDL introduction, non functional service description, WSDL1.1 Vs WSDL 2.0, WSDL document, WSDL elements, WSDL binding, WSDL tools, WSDL port type, limitations of WSDL.

UNIT III

Brief Over View of XML – XML Document structure, XML namespaces, Defining structure in XML
Documents, Reuse of XML schemes, Document navigation and transformation. SOAP : Simple Object Access Protocol, Inter-application communication and wire protocols, SOAP as a messaging protocol, Structure of a SOAP message, SOAP envelope, Encoding, Service Oriented Architectures, SOA revisited, Service roles in a SOA, Reliable messaging, The enterprise Service Bus, SOA Development Lifecycle, SOAP HTTP binding, SOAP communication model, Error handling in SOAP.

UNIT IV

Registering and Discovering Services : The role of service registries, Service discovery, Universal

Description, Discovery, and Integration, UDDI Architecture, UDDI Data Model, Interfaces, UDDI

Implementation, UDDI with WSDL, UDDI specification, Service Addressing and Notification, Referencing and addressing Web Services, Web Services Notification.

UNIT V

SOA and web services security considerations, Network-level security mechanisms, Application-level security topologies, XML security standards, Semantics and Web Services, The semantic

interoperability problem, The role of metadata, Service metadata, Overview of .NET and J2EE, SOA and Web Service Management, Managing Distributed System, Enterprise management Framework, Standard distributed management frameworks, Web service management, Richer schema languages, WS-Metadata Exchange.

TEXT BOOKS:
1. Web Services & SOA Principles and Technology, Second Edition, Michael P. Papazoglou.
2. Developing Java Web Services, R. Nagappan, R. Skoczylas, R.P. Sriganesh, Wiley India.
3. Developing Enterprise Web Services, S. Chatterjee, J. Webber, Pearson Education.

REFERENCE BOOKS:
1. XML, Web Services, and the Data Revolution, F.P.Coyle, Pearson Education.
2. Building web Services with Java, 2nd Edition, S. Graham and others, Pearson Education.
3. Java Web Services, D.A. Chappell & T. Jewell, O'Reilly, SPD.
4. McGovern, et al., "Java web Services Architecture", Morgan Kaufmann Publishers, 2005.
5. J2EE Wer Services, Richard Monson-Haefel, Pearson Education.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech – I Year –II Sem(Computer Science & Engg.)

(R15D5813) ADVANCED DATA MINING
(CORE ELECTIVE –III)

Objectives:
- To develop the abilities of critical analysis to data mining systems and applications.
- To implement practical and theoretical understanding of the technologies for data mining
- To understand the strengths and limitations of various data mining models**;**

UNIT-I
Data mining Overview and Advanced Pattern Mining
Data mining tasks – mining frequent patterns, associations and correlations, classification and regression for predictive analysis, cluster analysis , outlier analysis; advanced pattern mining in multilevel, multidimensional space – mining multilevel associations, mining multidimensional associations, mining quantitative association rules, mining rare patterns and negative patterns.

UNIT-II
Advance Classification
Classification by back propagation, support vector machines, classification using frequent patterns, other classification methods – genetic algorithms, roughest approach, fuzz>set approach;

UNIT-III
Advance Clustering
Density - based methods –DBSCAN, OPTICS, DENCLUE; Grid-Based methods – STING, CLIQUE;
Exception – maximization algorithm; clustering High- Dimensional Data; Clustering Graph and Network Data.

UNIT-IV
Web and Text Mining
Introduction, web mining, web content mining, web structure mining, we usage mining, Text mining – unstructured text, episode rule discovery for texts, hierarchy of categories, text clustering.

UNIT-V
Temporal and Spatial Data Mining
Introduction; Temporal Data Mining – Temporal Association Rules, Sequence Mining, GSP algorithm, SPADE, SPIRIT Episode Discovery, Time Series Analysis, Spatial Mining – Spatial Mining Tasks, Spatial Clustering. Data Mining Applications.

TEXT BOOKS:
1. Data Mining Concepts and Techniques, Jiawei Hang Micheline Kamber, Jian pei, Morgan Kaufmannn.
2. Data Mining Techniques – Arun K pujari, Universities Press.

REFERENCE BOOKS:
1. Introduction to Data Mining – Pang-Ning Tan, Vipin kumar, Michael Steinbach, Pearson.
2. Data Mining Principles & Applications – T.V Sveresh Kumar, B.Esware Reddy, Jagadish S Kalimani, Elsevier.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech – I Year – II Sem(Computer Science & Engg.)

(R15D5814) STORAGE AREA NETWORKS
(CORE ELECTIVE-III)

Objectives:
- To understand Storage Area Networks characteristics and components.
- To become familiar with the SAN vendors and their products
- To learn Fibre Channel protocols and how SAN components use them to communicate with each other
- To become familiar with Cisco MDS 9000 Multilayer Directors and Fabric Switches
- Thoroughly learn Cisco SAN-OS features.
- To understand the use of all SAN-OS commands. Practice variations of SANOS features

UNIT I: Introduction to Storage Technology

Review data creation and the amount of data being created and understand the value of data to a business, challenges in data storage and data management, Solutions available for data storage, Core elements of a data center infrastructure, role of each element in supporting business activities

UNIT II: Storage Systems Architecture

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

UNIT III: Introduction to Networked Storage

Evolution of networked storage, Architecture, components, and topologies of FC-SAN, NAS, and IPSAN, Benefits of the different networked storage options, understand the need for long-term archiving solutions and describe how CAS fulfills the need, understand the appropriateness of the different networked storage options for different application environments

UNIT IV: Information Availability & Monitoring & Managing Datacenter

List reasons for planned/unplanned outages and the impact of downtime, Impact of downtime, Differentiate between business continuity (BC) and disaster recovery (DR) ,RTO

and RPO, Identify single points of failure in a storage infrastructure and list solutions to mitigate these failures, Architecture of backup/recovery and the different backup/recovery topologies , replication technologies and their role in ensuring information availability and business continuity, Remote replication technologies and their role in providing disaster recovery and business continuity capabilities Identify key areas to monitor in a data center, Industry standards for data center monitoring and management, Key metrics to monitor for different components in a storage infrastructure, Key management tasks in a data center

UNIT V: Securing Storage and Storage Virtualization
Information security, Critical security attributes for information systems, Storage security domains, List and analyzes the common threats in each domain, Virtualization technologies, block-level and filelevel virtualization technologies and processes

Case Studies
The technologies described in the course are reinforced with EMC examples of actual solutions. Realistic case studies enable the participant to design the most appropriate solution for given sets of criteria.

TEXT BOOK:
1. EMC Corporation, Information Storage and Management, Wiley.

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

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
M.Tech – I Year – II Sem(Computer Science & Engg.)

(R15D5815) DATABASE SECURITY
(CORE ELECTIVE-III)

Objectives:
- To learn the security of databases
- To learn the design techniques of database security
- To learn the secure software design

UNIT I
Introduction
Introduction to Databases Security Problems in Databases Security Controls Conclusions
Security Models -1
Introduction Access Matrix Model Take-Grant Model Acten Model PN Model Hartson and Hsiao's Model Fernandez's Model Bussolati and Martella's Model for Distributed databases

UNIT II
Security Models -2
Bell and LaPadula's Model Biba's Model Dion's Model Sea View Model Jajodia and Sandhu's Model The Lattice Model for the Flow Control conclusion.
Security Mechanisms
Introduction User Identification/Authentication Memory Protection Resource Protection Control Flow Mechanisms Isolation Security Functionalities in Some Operating Systems Trusted Computer System Evaluation Criteria

UNIT III
Security Software Design
Introduction A Methodological Approach to Security Software Design Secure Operating System
Design Secure DBMS Design Security Packages Database Security Design

UNIT IV
Statistical Database Protection & **Intrusion Detection Systems**
Introduction Statistics Concepts and Definitions Types of Attacks Inference Controls evaluation
Criteria for Control Comparison .Introduction IDES System RETISS System ASES System Discovery

UNIT V

Models For The Protection Of New Generation Database Systems -1

Introduction A Model for the Protection of Frame Based Systems A Model for the Protection of Object- Oriented Systems SORION Model for the Protection of Object-Oriented Databases

Models For The Protection Of New Generation Database Systems -2

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

TEXT BOOKS:

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

REFERENCE BOOK:

1. Database security by alfred basta, melissa zgola, CENGAGE learning.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
M.Tech – I Year – II Sem(Computer Science & Engg.)

(R15D5816) GRID AND CLOUD COMPUTING
(CORE ELECTIVE-IV)

Objectives:
- To implement Basics, techniques and tools for Grid & Cloud Computing
- To understand any kind of heterogeneous resources over a network using open standards
- To implement the Service models

UNIT-I

System models for advanced computing –clusters of cooperative computing, grid computing and cloud computing; software systems for advanced computing-service oriented software and parallel and distributed programming models with introductory details, Features of grid and cloud platform.

UNIT-II

Cloud Computing services models and features in Saas, Paas and Iaas. Service oriented architecture and web services; Features of cloud computing architectures and simple case studies.

UNIT-III

Virtualization- Characteristic features, Taxonomy Hypervisor, Virtualization and Cloud Computing, Pros and Cons of Cloud Computing, Technology Examples/Case Studies.

UNIT-IV

Cloud programming Environmental- Map Reduce Hadoop Library from Apache, Open Source Cloud Software Systems –Eucalyptus.

UNIT-V

Grid Architecture and Service modeling, Grid resource management, Grid Application trends.

TEXT BOOKS:
1. Distributed and Cloud Computing, Kaittwang Geoffrey C.Fox and Jack J Dongrra, Elsevier India 2012.
2. Mastering Cloud Computing- Raj Kumar Buyya, Christian Vecchiola and S.Tanurai Selvi, TMH, 2012.

REFERENCE BOOKS:
1. Cloud Computing, John W. Ritting House and James F Ramsome, CRC Press, 2012.
2. Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press, 2012.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
M.Tech – I Year – II Sem(Computer Science & Engg.)

(R15D5817) WIRELESS NETWORKS AND MOBILE COMPUTING
(CORE ELECTIVE –IV)

Objectives:
The main objective of this course is to provide the students with the competences required for understanding and using the communications component of an universal communications environment. Students will be provided, in particular, with the knowledge required to understand

- Emerging communications networks,
- Their computational demands,
- The classes of distributed services and applications enabled by these networks, and
- The computational means required to create the new networks and the new applications.

UNIT I
WIRELESS NETWORKS: Wireless Network, Wireless Network Architecture, Wireless Switching Technology, Wireless Communication problem, Wireless Network Reference Model, Wireless Networking Issues & Standards. **MOBILE COMPUTING:** Mobile communication, Mobile computing, Mobile Computing Architecture, Mobile Devices, Mobile System Networks, Mobility Management

UNIT II
WIRELESS LAN: Infra red Vs radio transmission, Infrastructure and Ad-hoc Network, IEEE 802.11: System Architecture, Protocol Architecture, 802.11b, 802.11a, Newer Developments, HIPERLAN 1, HIPERLAN 2, Bluetooth : User Scenarios, Architecture.

UNIT 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

UNIT 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)

UNIT V
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.

TEXT BOOKS:
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. Raj Kamal, "Mobile Computing", OXFORD UNIVERSITY PRESS.

REFERENCE BOOKS:
1. Asoke K Talukder, et al, "Mobile Computing", Tata McGraw Hill, 2008.
2. Matthew S.Gast, "802.11 Wireless Networks", SPD O'REILLY.
3. Ivan Stojmenovic, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2007.
4. Kumkum Garg, "Mobile Computing", Pearson.
5. Handbook of Security of Networks, Yang Xiao, Frank H Li, Hui Chen, World Scientific, 2011.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
M.Tech – I Year – II Sem(Computer Science & Engg.)

(R15D5818) INFORMATION RETRIEVAL SYSTEMS
(CORE ELECTIVE –IV)

Objectives:
On completion of this course you should have gained a good understanding of the foundation concepts of information retrieval techniques and be able to apply these concepts into practice. Specifically, you should be able to: To use different information retrieval techniques in various application areas

- To apply IR principles to locate relevant information large collections of data
- To analyze performance of retrieval systems when dealing with unmanaged data sources
- To implement retrieval systems for web search tasks.

UNIT I
Boolean retrieval. The term vocabulary and postings lists. Dictionaries and tolerant retrieval. Index construction. Index compression.

UNIT II
Scoring, term weighting and the vector space model. Computing scores in a complete search system. Evaluation in information retrieval. Relevance feedback and query expansion.

UNIT III
XML retrieval. Probabilistic information retrieval. Language models for information retrieval. Text classification. Vector space classification.

UNIT IV
Support vector machines and machine learning on documents, Flat clustering, Hierarchical clustering, Matrix decompositions and latent semantic indexing.

UNIT V
Web search basics. Web crawling and indexes, Link analysis.

TEXT BOOK:
1. Introduction to Information Retrieval , Christopher D. Manning and Prabhakar Raghavan and Hinrich Schütze, Cambridge University Press, 2008.

REFERENCE BOOKS:

1. Information Storage and Retrieval Systems: Theory and Implementation, Kowalski, Gerald, Mark T Maybury, Springer.
2. Modern Information Retrieval, Ricardo Baeza-Yates, Pearson Education, 2007.
3. Information Retrieval: Algorithms and Heuristics, David A Grossman and Ophir Frieder, 2nd Edition, Springer, 2004.
4. Information Retrieval Data Structures and Algorithms, William B Frakes, Ricardo BaezaYates, Pearson Education, 1992.
5. Information Storage & Retieval, Robert Korfhage, John Wiley & Sons.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
M.Tech – I Year – II Sem(Computer Science & Engg.)

(R15D9314) EMBEDDED REAL TIME OPERATING SYSTEMS
(OPEN ELECTIVE -II)

UNIT –I:
Introduction: Introduction to UNIX/LINUX, Overview of Commands, File I/O,(open, create, close, lseek, read, write), Process Control (fork, vfork, exit, wait, waitpid, exec.

UNIT -II:
Real Time Operating Systems: Brief History of OS, Defining RTOS, The Scheduler, Objects,Services, Characteristics of RTOS, Defining a Task, asks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency. Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use

UNIT -III:
Objects, Services and I/O: Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem

UNIT -IV:
Exceptions, Interrupts and Timers: Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations.

UNIT -V:
Case Studies of RTOS: RT Linux, MicroC/OS-II, Vx Works, Embedded Linux, Tiny OS and Android OS.

TEXT BOOKS:
1. Real Time Concepts for Embedded Systems – Qing Li, Elsevier, 2011.

REFERENCE BOOKS:
1. Embedded Systems- Architecture, Programming and Design - Rajkamal, 2007, TMH.
2. Advanced UNIX Programming - Richard Stevens.
3. Embedded Linux: Hardware, Software and Interfacing – Dr. Craig Hollabaugh..

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech – I Year – I Sem(Computer Science & Engg.)

(R15D9313) HARDWARE- SOFTWARE CO- DESIGN
(OPEN ELECTIVE -II)

UNIT –I

CO- DESIGN ISSUES

Co- Design Models, Architectures, Languages, A Generic Co-design Methodology.

CO- SYNTHESIS ALGORITHMS : Hardware software synthesis algorithms: hardware – software partitioning distributed system cosynthesis.

UNIT –II

PROTOTYPING AND EMULATION:

Prototyping and emulation techniques, prototyping and emulation environments, future developments in emulation and prototyping architecture specialization techniques, system communication infrastructure

TARGET ARCHITECTURES:

Architecture Specialization techniques, System Communication infrastructure, Target Architecture and Application System classes, Architecture for control dominated systems (8051-Architectures for High performance control), Architecture for Data dominated systems (ADSP21060, TMS320C60), Mixed Systems.

UNIT – III

COMPILATION TECHNIQUES AND TOOLS FOR EMBEDDED PROCESSOR ARCHITECTURES:

Modern embedded architectures, embedded software development needs, compilation technologies practical consideration in a compiler development environment.

UNIT – IV

DESIGN SPECIFICATION AND VERIFICATION:

Design, co-design, the co-design computational model, concurrency coordinating concurrent computations, interfacing components, design verification, implementation verification, verification tools, interface verification

UNIT – V

LANGUAGES FOR SYSTEM – LEVEL SPECIFICATION AND DESIGN-I

System – level specification, design representation for system level synthesis, system level specification languages,

LANGUAGES FOR SYSTEM – LEVEL SPECIFICATION AND DESIGN-II

Heterogeneous specifications and multi language co-simulation the cosyma system and lycos system.

TEXT BOOKS :
1. Hardware / software co- design Principles and Practice – Jorgen Staunstrup, Wayne Wolf – 2009, Springer.
2. Hardware / software co- design Principles and Practice, 2002, kluwer academic publishers

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
M.Tech – I Year – II Sem(Computer Science & Engg.)

(R15D9316) MOBILE COMPUTING TECHNOLOGIES
(OPEN ELECTIVE -II)

Unit – I: Introduction to Mobile Computing Architecture

Mobile Computing – Dialog Control – Networks – Middleware and Gateways – Application and Services – Developing Mobile Computing Applications – Security in Mobile Computing – Architecture for Mobile Computing – Three Tier Architecture – Design considerations for Mobile Computing – Mobile Computing through Internet – Making existing Applications Mobile Enabled.

Unit – II: Cellular Technologies: GSM, GPS, GPRS, CDMA and 3G

Bluetooth – Radio Frequency Identification – Wireless Broadband – Mobile IP – Internet Protocol Version 6 (IPv6) – Java Card – GSM Architecture – GSM Entities – Call Routing in GSM – PLMN Interfaces – GSM addresses and Identifiers – Network aspects in GSM – Authentication and Security – Mobile computing over SMS – GPRS and Packet Data Network – GPRS Network Architecture – GPRS Network Operations – Data Services in GPRS – Applications for GPRS – Limitations of GPRS – Spread Spectrum technology – Is-95 – CDMA Versus GSM – Wireless Data – Third Generation Networks – Applications on 3G

Unit – III: Wireless Application Protocol (WAP) and Wireless LAN

WAP – MMS – Wireless LAN Advantages – IEEE 802.11 Standards – Wireless LAN Architecture – Mobility in wireless LAN
Intelligent Networks and Interworking
Introduction – Fundamentals of Call processing – Intelligence in the Networks – SS#7 Signaling – IN Conceptual Model (INCM) – softswitch – Programmable Networks – Technologies and Interfaces for IN

Unit – IV: Client Programming, Palm OS,Symbian OS, Win CE Architecture

Introduction – Moving beyond the Desktop – A Peek under the Hood: Hardware Overview – Mobile phones – PDA – Design Constraints in Applications for Handheld Devices – Palm OS architecture – Application Development – Multimedia – Symbian OS Architecture – Applications for Symbian, Different flavors of Windows CE -Windows CE Architecture **J2ME** JAVA in the Handset – The Three-prong approach to JAVA Everywhere – JAVA 2 Micro Edition (J2ME) technology – Programming for CLDC – GUI in MIDP – UI Design Issues – Multimedia – Record Management System – Communication in MIDP – Security considerations in MIDP – Optional Packages

Unit – V: Voice over Internet Protocol and Convergence

Voice over IP- H.323 Framework for Voice over IP – Session Initiation Protocol – Comparision between H.323 and SIP – Real Time protocols – Convergence Technologies – Call Routing – Voice over IP Applications – IP multimedia subsystem (IMS) – Mobile VoIP

Security Issues in Mobile Computing
Introduction – Information Security – Security Techniques and Algorithms – Security Protocols – Public Key Infrastructure – Trust – Security Models – Security frameworks for Mobile
Environment

TEXT BOOKS:
1. Mobile Computing – Technology, Applications and Service Creation – Asoke K Talukder, Roopa R Yavagal, 2009, TATA McGraw Hill
2. Mobile Communications – Jochen Schiller – 2nd Edition – Pearson Education

REFERENCES:
1. The CDMA 2000 System for Mobile Communications – Vieri Vaughi, Alexander Damn Jaonvic – Pearson
2. ADALESTEIN : Fundamentals of Mobile & Parvasive Computing, 2008, TMH

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(R15D5882) WEB SERVICES LAB

Objectives:

- To implement the technologies like WSDL, UDDI.
- To learn how to implement and deploy web service client and server

List of Programs:

1. Write a program to implement WSDL Service (Hello Service . WSDL File)
2. Write a program the service provider can be implement a single get price(), static bind() and get product operation.
3. Write a program to implement the operation can receive request and will return a response in two ways.
    a. One-Way operation
    b. Request - Response
4. Write a program to implement to create a simple web service that converts the temperature from Fahrenheit to Celsius (using HTTP Post Protocol)
5. Write a program to implement business UDDI Registry entry
6. Write a program to implement
    a. Web based service consumer
    b. Windows application based web service consumer