ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABUS

Effective from the Academic Year 2017-18 onwards

M. Tech. Two Year Degree Programme

(MR17 Regulations)

in

Computer Science and Engineering (CSE) Department of Computer Science and Engineering





MALLA REDDY ENGINEERING COLLEGE (Autonomous)

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

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

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MR17 ACADEMIC REGULATIONS (CBCS) For M. Tech. (REGULAR) DEGREE PROGRAMME

Applicable for the students of M. Tech. (Regular) programme admitted from the Academic Year **2017-18** onwards.

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

INSTITUTION VISION

A Culture of excellence , the hallmark of MREC as world class education center to impart Technical Knowledge in an ambience of humanity, wisdom, intellect, creativity with ground breaking discovery, in order to nurture the students to become Globally competent committed professionals with high discipline, compassion and ethical values.

INSTITUTION MISSION

Commitment to progress in mining new knowledge by adopting cutting edge technology to promote academic growth by offering state of art Under graduate and Post graduate programmes based on well-versed perceptions of Global areas of specialization to serve the Nation with Advanced Technical knowledge.

DEPARTMENT VISION

The Computer Science and Engineering Department attempts for excellence in developing, implementing, and imparting wisdom in computer science and engineering discipline through extensive educational programs, Research and Development in collaboration with industries and government agencies, scholarly publications and professional activities to the community, the state, and the nation.

DEPARTMENT MISSION

- Provide a learning environment to enhance problem-solving skills, innovations, leadership characteristics, team-spirit and ethical responsibilities.
- Provide quality education to meet the needs of Profession and Society.
- To enhance the entrepreneurship skills by establishing Industry Institute Interaction program
- Provide exposure to latest tools and technologies in the area of engineering and technology.
- To promote research-based activities in the emerging technological domains.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: To make the Post Graduates expertise in Computing Profession, solving engineering problems by understanding the core knowledge and research activities.

PEO2: To have sufficient breadth and depth of understanding regarding the professional development throughout their career.

PEO3: To demonstrate their creativity in all the engineering domains using analysis, strategic design thinking, planning and implementation.

PEO4: To make the graduates communicate, recognize and incorporate societal needs in their professional endeavors, and practice about legal and ethical responsibilities.

PROGRAMME OUTCOMES (POs)

PO1: Apply the Computing knowledge to provide the solution(s) to the complex problems.

PO2: Analyze the problems with the various complexity levels for all the engineering applications.

PO3: Design, develop and implement the Hardware/Software components for the applications.

PO4: By applying the through study, investigation, interpretation and analysis, the Complex and contemporary problems can be solved by using engineering methodologies.

PO5: Model the complex problems and exploring the solution(s) using apt tools and techniques.

PO6: Provide the computer-based solutions without compromising the public safety, health, legal and social aspects of the possible engineering problems.

PO7: Analyze the local and global impact of engineering applications for sustainable developments.

PO8: Practice the ethics code in personal, social and in all the professional activities.

PO9: Perform very effectively as an individual or a team member or a leader in the multidisciplinary domain to accomplish the goal.

PO10. Communicate and connect with a broad range of audience through an effective oral and written communication.

PO11. Ensure the professional growth through the thoughtful, appropriate and lifelong learning approaches.

PO12: Effectively manage the multidisciplinary projects in achieving the financial goals as an individual or a team member or a leader.

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO 1: Ability to design and develop the products in the emerging software technologies like RTOS, Machine Learning, Cloud Computing, Grid and Distributed Computing.

PSO 2: Ability to apply computational and mathematical skills to solve the real world problems according to technological advancements.

PSO 3: Ability to identify the research gaps in various domains and provide efficient solutions through new ideas and innovations.

1.0 Eligibility for Admissions:

Admission to the above programme 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 Government of Telangana or on the basis of any other order of merit as approved by the University, subject to reservations as laid down by the 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 the student pursues a course of study in not less than two and not more than four academic years. However, the student is permitted to write the examinations for two more years after four academic years of course work, failing which the student shall forfeit the seat in M. Tech. programme.
- **2.2** The student shall register for all 88 credits and secure all the 88 credits.

2.3 M. Tech is of 2 academic years (4 Semesters), with the academic year being divided into two semesters of 22 weeks (\geq 90 teaching days, out of which number of contact days for teaching / practical \geq 75 and conducting examinations and preparation days = 15) each.

Dept.	Specialization Code	Specialization	Intake
CE	11	Structural Engineering (SE)	24
EEE	24	Electrical Power Systems (EPS)	24
ME	31	Thermal Engineering (TE)	18
IVIE	33	Machine Design (MD)	24
CSE	51	Computer Science and Engineering (CSE) – Shift-I	18
USE	51	Computer Science and Engineering (CSE) – Shift-II	24

3.0 Courses of Study:

The following specializations are offered at present for the M. Tech. programme of study.

and any other programme as approved by the University from time to time.

4 Course Registration:

- **4.1** A 'Faculty Advisor or Counselor' shall be assigned to each student, who will advise him on the Post Graduate Programme (PGP), its Course Structure and Curriculum, Choice/Option for Subjects/ Courses, based on his competence, progress, pre-requisites and interest.
- **4.2** Academic Section of the College invites 'Registration Forms' from students within 15 days from the commencement of class work for the first semester through 'ON-LINE SUBMISSIONS', ensuring 'DATE and TIME Stamping'. The ON-LINE Registration Requests for any 'SUBSEQUENT SEMESTER' shall be completed BEFORE the commencement of SEEs (Semester End Examinations) of the 'CURRENT SEMESTER'.
- **4.3** A Student can apply for ON-LINE Registration, ONLY AFTER obtaining the 'WRITTEN APPROVAL' from the Faculty Advisor, which should be submitted to the College Academic Section through the Head of Department (a copy of it being retained with Head of Department, Faculty Advisor and the Student).
- **4.4** If the Student submits ambiguous choices or multiple options or erroneous entries during ON-LINE Registration for the Subject(s) / Course(s) under a given/ specified Course Group/ Category as listed in the Course Structure, only the first mentioned Subject/ Course in that Category will be taken into consideration.
- **4.5** Subject/ Course Options exercised through ON-LINE Registration are final and CANNOT be changed, nor can they be inter-changed; further, alternate choices will also not be considered. However, if the Subject/ Course that has already been listed for Registration (by the Head of Department) in a Semester could not be offered due to any unforeseen or unexpected reasons,

then the Student shall be allowed to have alternate choice - either for a new Subject (subject to offering of such a Subject), or for another existing Subject (subject to availability of seats), which may be considered. Such alternate arrangements will be made by the Head of Department, with due notification and time-framed schedule, within the FIRST WEEK from the commencement of Class-work for that Semester.

5 Attendance Requirements:

The programmes are offered on a unit basis with each subject/course being considered as a unit.

- **5.1** Attendance in all classes (Lectures/Laboratories etc.) is compulsory. The minimum required attendance in each theory / Laboratory etc. is 75% including the days of attendance in sports, games, NCC and NSS activities for appearing for the Semester End examination (SEE). A student shall not be permitted to appear for the Semester End Examinations (SEE) if his attendance is less than 75%.
- **5.2** Condonation of shortage of attendance in each subject up to 10% (65% and above and below 75%) in each semester shall be granted by the College Academic Committee (CAC).
- 5.3 Shortage of Attendance below 65% in each subject shall not be condoned.
- **5.4** Students whose shortage of attendance is not condoned in any subject are not eligible to write their Semester End Examination of that subject and their registration shall stand cancelled.
- **5.5** A stipulated fee prescribed by the CAC, shall be payable towards Condonation of shortage of attendance.
- **5.6** A Candidate shall put in a minimum required attendance in at least three (3) theory subjects in I semester for promoting to II Semester. 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.
- **5.7** A student shall not be promoted to the next semester unless the student satisfies the attendance requirement of the present Semester, as applicable. The student may seek readmission into that semester when offered next. If any candidate fulfills the attendance requirement in the present semester, the student shall not be eligible for readmission into the same class.

6 Evaluation - Distribution and Weightage of Marks: :

The performance of the candidate in each semester shall be evaluated subject-wise, with a maximum of 100 marks for both theory and practicals, on the basis of Continuous Internal Evaluation and Semester End Examinations. For all Subjects/ Courses, the distribution shall be 40 marks for CIE, and 60 marks for the SEE

6.1 Theory Courses :

6.1.1 Continuous Internal Evaluation (CIE):

The CIE consists of two Assignments each of 05 marks and two mid-term examinations each of 35 marks. The CIE shall be finalized based on the 70% of the best performed and 30% of the other performance. The first mid-term examination shall be conducted for the first 50% of the syllabus, and the second mid-term examination shall be conducted for the remaining 50% of the syllabus.

First Assignment should be submitted before the conduct of the first mid-term examinations, and the Second Assignment should be submitted before the conduct of the second midterm examinations. The Assignments shall be as specified by the concerned subject teacher. Each mid-term examination shall be conducted for a total duration of 120 minutes, for 35 marks.

The division of marks for CIE is as given below:

Mid – Term Examination						
Part	Type of QuestionsNo. of questionsMarks per question					
	Multiple-choice questions	10	0.5	05		
Part A	Fill-in the blanks	10	0.5	05		
	Sub-Total			10		
Part B	Compulsory questions	5	2	10		
Part C	Choice questions (3 out of 5)	3	5	15		
	· · · · · · · · · · · · · · · · · · ·	Mid-Term	Exam Total	35		
Assignment						
			Grand Total	40		

6.1.2 Semester End Examination (SEE):

The division of marks for SEE is as given below:

Semester End Examination							
Part	Type of Questions	No. of questions to be answered	Marks per question	Total			
Part A	Compulsory Questions (One from each module)	5	4	20			
Part B	Choice Questions: For each question there will be an 'either or choice', which means that there will be two questions from each module and the student should answer either of the two questions	5	8	40			
Grand Total (

6.2 Practical Courses:

6.2.1 Continuous Internal Evaluation (CIE):

There will be CIE for 40 marks, shall be awarded with a distribution of 20 marks for day - to - day performance and timely submission of lab records, 5 marks for viva - voce, 15 marks for internal lab exam (best out of two exams).

6.2.2 Semester End Examination (SEE):

There will be SEE for 60 marks, shall be awarded with a distribution of 15 marks for design/procedure/schematic diagram of the given experiment, 20 marks for conduction of experiment, 15 marks for results and 10 marks for viva - voce. For conducting SEE, one internal examiner and one external examiner will be appointed by the Chief Controller of Examinations of the college. The external examiner should be selected from outside the college among the autonomous / reputed institutions from a panel of three examiners submitted by the concerned Head of the Department/BoS Chairman.

6.3 Seminar:

There shall be two seminar presentations during I semester and II semester. 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 Department PG Coordinator, Supervisor and two other senior faculty members of the department. For each Seminar there will be only internal evaluation of 100 marks with a distribution of 30 marks for the report, 50 marks for presentation and 20 marks for the queries. A candidate has to secure a minimum of 50% of marks to be declared successful. If the student fails to fulfill minimum marks, the student has to reappear during the supplementary examinations.

6.4 Comprehensive Viva-Voce:

There shall be a Comprehensive Viva-Voce in III Semester. The Comprehensive Viva-Voce is intended to assess the students' understanding of various subjects studied during the M. Tech. course of study. The Head of the Department shall be associated with the conduct of the Comprehensive Viva-Voce through a Committee. The Committee consists of the Head of the Department, one senior faculty member and an external examiner. The external examiner shall be appointed by the Chief Controller of Examinations from a panel of three examiners submitted by the concerned Head of the Department. There are no internal marks for the Comprehensive Viva-Voce and evaluates for maximum of 100 marks. A candidate has to secure a minimum of 50% of marks to be declared successful. If the student fails to fulfill minimum marks, the student has to reappear during the supplementary examinations.

6.5. General: 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 Semester End Examination and a minimum of 50% of the total marks in the Semester End Examination (SEE) and Continuous Internal Evaluation (CIE) taken together. In case the candidate does not secure the minimum academic requirement in any subject he has to reappear for the Semester End Examination in that subject. A candidate shall be given one chance to re-register for the subject if the internal marks secured by the candidate are less than 50% and failed in that subject. This is allowed for a maximum of three subjects and should register within two weeks of commencement of that semester class work. In such a case, the candidate must re-register for the subjects and secure the required minimum attendance. The candidate's attendance in the re-registered subject(s) shall be calculated separately to decide upon the eligibility for writing the Semester End Examination in those subjects. In the event of the student taking another chance, the student's Continuous Internal Evaluation (CIE) marks and Semester End Examination (SEE) marks obtained in the previous attempt stands cancelled.

7 Examinations and Assessment - The Grading System :

- 7.1 Marks will be awarded to indicate the performance of each student in each Theory Subject, or Lab / Practicals, or Seminar, or Comprehensive Viva Voce or Project, etc., based on the % marks obtained in CIE + SEE (Continuous Internal Evaluation + Semester End Examination, both taken together) as specified in Item 6 above, and a corresponding Letter Grade shall be given.
- **7.2** As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades (UGC Guidelines) and corresponding percentage of marks shall be followed:

% of Marks Secured (Class Intervals)	Grade Points	Letter Grade (UGC Guidelines)
> 0.0%	10	(Cutatanding)
\geq 90%,	10	O (Outstanding)
(≥80%, <90%)	9	A+ (Excellent)
(≥70%,<80%)	8	A (Very Good)
(≥60%,<70%)	7	B+ (Good)
(≥55%,<60%)	6	B (Average)
(≥50%,<55%)	5	C (Pass)
(< 50%)	0	F (Fail)
Absent	0	Ab

- **7.3** A student obtaining F Grade in any Subject shall be considered 'failed' and is be required to reappear as 'Supplementary Candidate' in the Semester End Examination (SEE), as and when conducted. In such cases, his Internal Marks (CIE Marks) in those Subjects will remain the same as those he obtained earlier.
- 7.4 A student not appeared for examination then 'Ab' Grade will be allocated in any Subject shall be considered 'failed' and will be required to reappear as 'Supplementary Candidate' in the Semester End Examination (SEE), as and when conducted.
- **7.5** A Letter Grade does not imply any specific Marks percentage and it will be the range of marks percentage.
- **7.6** In general, a student shall not be permitted to repeat any Subject/ Course (s) only for the sake of 'Grade Improvement' or 'SGPA/ CGPA Improvement'.
- 7.7 A student earns Grade Point (GP) in each Subject/ Course, on the basis of the Letter Grade obtained by him in that Subject/ Course. The corresponding 'Credit Points' (CP) is computed by multiplying the Grade Point with Credits for that particular Subject/ Course. Credit Points (CP) = Grade Point (GP) x Credits For a Course
- 7.8 The Student passes the Subject/Course only when he gets $GP \ge 5(C \text{ Grade or above})$.
- 7.9 The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points (∑CP) secured from ALL Subjects/ Courses registered in a Semester, by the Total Number of Credits registered during that Semester. SGPA is rounded off to TWO Decimal Places. SGPA is thus computed as:

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

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

7.10 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student over all Semesters considered for registration. The CGPA is the ratio of the Total Credit Points secured by a student in ALL registered Courses in ALL Semesters, and the Total Number of Credits registered in ALL the Semesters. CGPA is rounded off to TWO Decimal Places. CGPA is thus computed from the II Semester onwards, at the end of each Semester, as per the formula

 $CGPA = \left\{ \sum_{j=1}^{M} C_{j}G_{j} \right\} / \left\{ \sum_{j=1}^{M} C_{j} \right\} \dots \text{ for all S semesters registered}$

(i.e., up to and inclusive of S semesters, $S \ge 2$)

where 'M' is the TOTAL no. of Subjects (as specifically required and listed under the Course Structure of the parent Department) the Student has 'REGISTERED' from the 1stSemester onwards up to and inclusive of the Semester S (obviously M > N), 'j' is the Subject indicator index (takes into account all Subjects from 1 to S Semesters), C_j is the no. of Credits allotted to the jth Subject, and G_j represents the Grade Points (GP)corresponding to the Letter Grade awarded for that jth Subject. After registration and completion of I Semester however, the SGPA of that Semester itself may be taken as the CGPA, as there are no cumulative effects.

7.11 For Calculations listed in Item 7.6 – 7.10, performance in failed Subjects/ Courses (securing F Grade) will also be taken into account, and the Credits of such Subjects/Courses will also be included in the multiplications and summations.

8. 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.

- **8.1** A Project Review Committee (PRC) shall be constituted with Head of the Department as Chairperson/Department PG Coordinator, Project Supervisor and one senior faculty member of the Departments offering the M. Tech. programme.
- 8.2 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.

- **8.3** After satisfying 8.2, a candidate has to submit, in consultation with his Project Supervisor, the title, objective and plan of action of his project work to the PRC for approval. Only after obtaining the approval of the PRC the student can initiate the Project work.
- **8.4** If a candidate wishes to change his supervisor or topic of the project, he can do so with the approval of the PRC. However, the PRC 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.
- **8.5** A candidate shall submit his project status report in two stages at least with a gap of 2 months between them.
- **8.6** The work on the project shall be initiated at the beginning of the III Semester and the duration of the project is two semesters. A candidate is permitted to submit Project Thesis only after successful completion of all theory and practical courses 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 Head of the Department and make an oral presentation before the PRC.

Note: The project supervisor/guide has to ensure that the student has to publish a minimum of one paper related to the thesis in a National/International Conference/Journal.

- **8.7** For the final approval by the PRC, the soft copy of the thesis should be submitted for <u>ANTI-PLAGIARISM</u> for the quality check and the plagiarism report should be included in the final thesis. If the similarity information is less than 24%, then only thesis will be accepted for submission.
- **8.8** Three copies of the Project Thesis certified by the supervisor, HOD shall be submitted to the Chief Controller of Examinations / Principal for project evaluation (Viva Voce).
- **8.9** For Project work part-I in III Semester there is an internal marks of 100, the evaluation should be done by the PRC for 60 marks and Supervisor will evaluate for 40 marks. The Supervisor and PRC will examine the Problem Definition, Objectives, Scope of Work and Literature Survey in the same domain. A candidate has to secure a minimum of 50% of marks to be declared successful for Project work part-I. If the student fails to fulfill minimum marks, the student has to reappear after one month with modifications suggested by PRC.
- **8.10** For Project work part-II in IV Semester there is an internal marks of 100, the evaluation should be done by the PRC for 60 marks and Supervisor will evaluate for 40 marks. The PRC will examine the overall progress of the Project Work and decide the Project is eligible for final submission or not. A candidate has to secure a minimum of 50% of marks to be declared successful for Project work part-II. If the student fails to fulfill minimum marks, the student has to reappear after one month with modifications suggested by PRC.
- **8.11** For Project Evaluation (Viva Voce) in IV Semester there is an external marks of 100 and the same evaluated by the External examiner appointed by the Chief Controller of Examinations. For this, the Head of the Department shall submit a panel of 3 examiners, eminent in that field, with the help of the supervisor/guide concerned. The distribution of 100 marks followed by Quality of the work (Plagiarism), Paper publication, nature of the work (Tools & software used and Innovative ideas), presentation and viva-Voce each for 20 marks. The candidate has to secure minimum of 50% marks in Project Evaluation (Viva-Voce) examination.
- **8.12** If the student fails to fulfill as specified in 8.11, based on the recommendation of the external examiner, the student will reappear for the Viva-Voce examination with the revised thesis only after three months. In the reappeared examination also, fails to fulfill, the student will not be eligible for the award of the degree.
- **8.13** The Head of the Department shall coordinate and make arrangements for the conduct of Project Viva-Voce examination.
- 9. Award of Degree and Class :

9.1 A Student who registers for all the specified Subjects/ Courses as listed in the Course Structure, satisfies all the Course Requirements, and passes the examinations prescribed in the entire PG Programme (PGP), and secures the required number of 88 Credits (with CGPA ≥ 5.0), shall be declared to have 'QUALIFIED' for the award of the M.Tech. Degree in the chosen Branch of Engineering and Technology with specialization as he admitted.

9.2 Award of Class

After a student has satisfied the requirements prescribed for the completion of the programme and is eligible for the award of M. Tech. Degree, he shall be placed in one of the following three classes based on the CGPA:

Class Awarded	CGPA
First Class with Distinction	≥ 8.00
First Class	\geq 6.50 and < 8.00
Second Class	$\geq\!5.00$ and $<\!6.50$

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

10. Withholding of Results:

If the student has not paid the dues, if any, to the University 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.

11. Transitory Regulations:

- **11.1** If any candidate is detained due to shortage of attendance in one or more subjects, they are eligible for re-registration to maximum of three earlier or equivalent subjects at a time as and when offered.
- **11.2** The candidate who fails in any subject will be given two chances to pass the same subject; otherwise, he has to identify an equivalent subject as per MR17 Academic Regulations.

12. Student Transfers:

- 12.1 There shall be no Branch/Specialization transfers after the completion of Admission Process.
- 12.2 The students seeking transfer to MALLA REDDY ENGINEERING COLLEGE (Autonomous) MREC(A) from various other Universities/institutions have to pass the failed subjects which are equivalent to the subjects of MREC(A), and also pass the subjects of MREC(A) which the students have not studied at the earlier institution. Further, though the students have passed some of the subjects at the earlier institutions, if the same subjects are prescribed in different semesters of MREC(A), the students have to study those subjects in MREC(A) inspite of the fact that those subjects are repeated.
- **12.3** The transfer students from other Universities / Institutions to MREC (A) who are on rolls will be provided one chance to write internal examinations in the failed subjects and/or subjects not studied as per the clearance letter issued by the JNTUH.
- 13. General:
- **13.1 Credit**: A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work per week.
- **13.2 Credit Point:** It is the product of grade point and number of credits for a course.
- 13.3 Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her".
- 13.4 The academic regulation should be read as a whole for the purpose of any interpretation.
- **13.5** In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the College Academic Committee headed by the Principal is final.

MALPRACTICES RULES DISCIPLINARY ACTION FOR IMPROPER CONDUCT IN EXAMINATIONS

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

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

	result in damage to or destruction of	
	property in the examination hall or	
	any part of the College campus or	
	engages in any other act which in the	
	opinion of the officer on duty amounts	
	to use of unfair means or misconduct	
	or has the tendency to disrupt the	
	orderly conduct of the examination	
7	Leaves the exam hall taking away	Expulsion from the examination hall and
	answer script or intentionally tears of	cancellation of performance in that course
	the script or any part thereof inside or	and all the other courses the candidate has
	outside the examination hall.	already appeared including practical
		examinations and project work and shall
		not be permitted for the remaining
		examinations of the courses of that
		semester/year. The candidate is also
		debarred for two consecutive semesters
		from class work and all SEE. The
		continuation of the programme by the
		candidate is subject to the academic
		regulations in connection with forfeiture of
		seat
8	Possess any lethal weapon or firearm	Fynulsion from the examination hall and
Ū	in the examination hall	cancellation of the performance in that
	in the examination han.	course and all other courses the candidate
		has already appeared including practical
		examinations and project work and shall
		not be nermitted for the remaining
		examinations of the courses of that
		semester The candidate is also debarred
		and forfeits the seat.
9	If student of the college, who is not a	Expulsion from the examination hall and
	candidate for the particular	cancellation of the performance in that
	examination or any person not	course and all other courses the candidate
	connected with the college indulges in	has already appeared including practical
	any malpractice or improper conduct	examinations and project work and shall
	mentioned in clause 6 to 8.	not be permitted for the remaining
		examinations of the courses of that
		semester. The candidate is also debarred
		and forfeits the seat. Person(s) who do not
		belong to the College will be handed over to
		police and, a police case will be registered
		against them.
10	Comes in a drunken condition to the	Expulsion from the examination hall and
	examination hall.	cancellation of the performance in that

		course and all other courses the candidate
		has already appeared including practical
		examinations and project work and shall
		not be permitted for the remaining
		examinations of the courses of that
		semester.
11	Copying detected on the basis of	Cancellation of the performance in that
	internal evidence, such as, during	course and all other courses the candidate
	valuation or during special scrutiny.	has appeared including practical
		examinations and project work of that SEE.
12	If any malpractice is detected which is	
	not covered in the above clauses 1 to 11	
	shall be reported to the CCE for	
	further action toward suitable	
	punishment.	

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

Malpractices identified by squad or special invigilators

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

MALLA REDDY ENGINEERING COLLEGE (Autonomous) COURSE STRUCTURE – M. Tech. COMPUTER SCIENCE AND ENGINEERING (Choice Based Credit System)

(MR17 Regulations - Effective from Academic Year 2017-18 onwards)

	I SEMESTER									
s.	Catagory	Course	ourse Name of the Course		Contact Hours/Week			Scheme of Valuation		Total
No	Category	Code	Name of the Course	L	Т	Р	Credits	Internal (CIE)	External (SEE)	Marks
1	PC	75101	Data Structures and Algorithm Analysis	2	2	-	3	40	60	100
2	PC	75102	Computer System Architecture	2	2	-	3	40	60	100
3	PC	75103	Network Programming Essentials	2	2	-	3	40	60	100
			Professiona	Eleo	ctive	- I				1
	PE	75111	Pervasive Computing							
4	PE	75112	Mobile Databases						60	100
	PE	75113	Pattern Recognition	2	2	-	3	40		
	PE	75114	Information Retrieval Systems							
			Professional	Elec	tive -	II				
	PE	75115	Android Application Development	2		2 -	3	40	60	100
5	PE	75116	Distributed and Cloud Computing		2					
	PE	75117	Internet of Things							
	PE	75118	Software Architecture and Design Patterns							
			Open Ele	ectiv	e - I					
	OE	75127	Machine Learning							
6	OE	75128	Parallel and Distributed Algorithms	2	2	_	3	40	60	100
	OE	75129	Artificial Intelligence	1 -	-		5	10	00	
	OE	75130	Distributed Systems	1						
7	PC	75104	Data Structures and Algorithm Analysis Lab	-	-	4	2	40	60	100
8	PR	75105	Seminar-I	-	-	4	2	100		100
	Total				12	8	22	Conta	ct Period	s: 32

MALLA REDDY ENGINEERING COLLEGE (Autonomous) COURSE STRUCTURE – M.Tech. COMPUTER SCIENCE AND ENGINEERING (Choice Based Credit System) (MD17 Regulations Effective from Academic Year 2017, 18 anwards)

(MR17 Regulations	- Effective from Academi	c Year 2017-18 onwards)
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	II SEMESTER									
s	Course		Contact Hours/Wook				Scheme of		Total	
No	Category	Code	Name of the Course	T	и <u>15/77</u>	р	Credits	Internal	External	Marks
				Ľ	1	1		(CIE)	(SEE)	
1	PC	75106	Cyber Security	2	2	-	3	40	60	100
2	PC	75107	Big Data Analytics	2	2	-	3	40	60	100
3	PC	75108	Research Methodologies	2	2	-	3	40	60	100
			Professional	Elect	tive -	III				
	PE	75119	Web Services and Service							
1		75117	Oriented Architecture							
4	PE	75120	Scripting Languages	2	2	_	3	40	60	100
	PE	75121	Wireless Sensor Networks	2	2	-	- 3	40		
	PE	75122	High Performance							
		13122	Networks							
	Professional Elective - IV					T				
	PE	75123	Data Mining and Analysis	2						100
5	PE	75124	Storage Area Networks				- 3	40	60	
	PE	75125	Semantic Web and Social		2	-				
			Networks							
	PE	75126	software Quality Assurance							
			Onen Fle	ctive						
	OF	75121	Soft Computing		/ - 11					
	OE	/3131	Winelass Networks and							
6	OE	75132	Mobile Computing							
			Natural Language	2	2	-	3	40	60	100
	OE	75133	Processing							
	OE	75134	Database Systems							
7	PC	75109	Data Analytics Lab	-	-	4	2	40	60	100
8	PR	75110	Seminar-II	-	-	4	2	100		100
			Total	12	12	8	22	Contac	ct Period	ls: 32

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

III SEMESTER											
s.	Category	ory Course Code	Course Name of the course	Contact hours/week				Scheme of Valuation		Total	
No				L	Т	Р	Credits	Internal (CIE)	External (SEE)	Marks	
1	PR	75135	Comprehensive Viva-Voce	-	-	-	6		100	100	
2	PR	75136	Project work Part- I	-	-	-	16	100		100	
	Total					-	22		-		

IV SEMESTER										
s.	Category	Course	e Name of the course	Contact hours/week			Scheme of Valuation		Total	
No		Code		L	Т	Р	Credits	Internal (CIE)	External (SEE)	Marks
1	PR	75137	Project work Part -II	-	-	-	6	100	-	100
2	PR	75138	Project Viva-Voce	-	-	-	16	-	100	100
Total				-	22		-			

* PC-Professional Core, PE-Professional Elective, OE-Open Elective, PR-Project.

Prerequisites: Data structures and Object Oriented Programming

Course Objectives:

This course provides the students to learn and understand the theoretical and practical solutions for the fundamental design, analysis, and implementation of basic data structures like Stacks, Queues, Heaps, Searching, Sorting, Trees and Graphs, Significance of algorithms in the computer field, various aspects of algorithm development.

MODULE I: Introduction to Algorithms and Representations

Algorithms Notations: Algorithms, Performance analysis- time complexity and space complexity, Asymptotic Notation, Big Oh, Omega and Theta notations, Complexity Analysis Examples.

Data structures and Representations: 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 1D and 2D arrays, sparse matrices and their representation.

MODULE II: Linear Data Structures

Stack and Queue: Stack and Queue ADTs, array and linked list representations, infix to Postfix Conversion using Stack, Implementation of recursion, Circular Queue: Insertion- Deletion, Dequeue ADT, Array and Linked List Representations, Priority Queue ADT.

Heap: Implementation using Heaps, Insertion into Max Heap, Deletion from Max Heap, java.util package: Array List, Linked List, Vector classes, Stacks and Queues, Iterator.

MODULE III: Searching and Sorting

A: Searching: Linear and binary search methods, Hashing-Hash functions, Collision Resolution methods-Open Addressing, Chaining, Hashing in java.util- HashMap, HashSet, Hash table. B: Sorting: Bubble, Insertion, Quick, Merge, Heap, Radix, Comparison of sorting methods.

MODULE IV: Non-Linear Data Structures-I

Trees: Ordinary and Binary trees terminology, Properties of Binary trees, Binary tree ADT, representations, recursive and non-recursive 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.

MODULE V: Non-Linear Data Structures-II

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.

[10 Periods]

[10 Periods]

[9 Periods]

18

[10 Periods]

[9 Periods]

B-Trees: Definition, insertion and searching operations, Trees in java.util- Tree Set, Tree Map Classes, Tries (examples only), Comparison of Search trees. Text compression, Huffman coding and decoding, Pattern matching-KMP algorithm.

TEXT BOOKS

- 1. S. Sahni, "Data structures Algorithms and Applications in Java", Universities Press.
- 2. Clifford A. Shaffer, "**Data structures and Algorithm analysis in Java**", 3rd Edition, Courier Corporation.

REFERENCES

- 1. Deitel and Deitel, "Java for Programmers", Pearson Education.
- 2. R. Lafore, "Data structures and Algorithms in Java", Pearson Education.

E-RESOURCES

- 1. https://www.cise.ufl.edu/~sahni/cop3530/presentations.htm
- 2. https://books.google.co.in/books?id=KK3DAgAAQBAJ&printsec=frontcover&dq=data+struct ures+and+algorithm+analysis+in+java
- 3. https://www.cse.msu.edu/~cse802/Papers/sammon.pdf
- 4. http://nptel.ac.in/courses/106102064/1/

Course Outcomes:

- 1. Understand the fundamental concepts related to basic data structures.
- 2. **Design** and Analyze the implementation of linear data structures.
- 3. Apply the concept related to different searching and sorting techniques.
- 4. Learn and implement the concept of non linear data structures.
- 5. Acquire knowledge regarding search trees and applications.

2 | 2

Prerequisites: Computer Organization

Course Objectives:

This course will make the students to learn fundamental concepts of Computer Organization and architectures with the processor, to learn the advanced aspects of computer architecture design, instruction sets, analyze various hazards, implement instruction level parallelism, examine concepts of cache memory, multithreading concepts and deploy all levels of RAID, interconnection networks.

MODULE I: Fundamentals of Computer Design

Introduction to Computer Design: Defining Computer Architecture-Classes of Computers-Technology trends- cost price and their trends-Dependability.

Performance Issues: Measuring and reporting performance - quantitative principles of computer design-Amdahl's Law-Instruction cycle-Process performance equation.

MODULE II: Instruction Set Principles and Examples

Architecture and Addressing Modes: Classifying Instruction Set Architecture, Memory Addressing: Type and Size of operands.

Instruction Sets: Operations in Instruction Set, Instructions for Control Flow, Encoding.

MODULE III: ILP and its Dynamic Exploitation

A: Hazards: Concepts and challenges, Overcoming data hazards, Reducing branch costs with dynamic hardware prediction, High performance instruction delivery, Hardware based speculation. B: ILP: ILP software approach, Compiler techniques, Static branch protection, VLIW approach, Hardware support for more ILP at compile time.

MODULE IV: Memory Hierarchy Design

Cache Memory: Cache performance, Cache Optimizations, Reducing cache misses, penalty and miss rate, Virtual memory.

Multithreading and Memory Architecture: Multiprocessors and thread level parallelismsymmetric shared memory architectures- distributed shared memory- Synchronization- multi threading.

MODULE V: Storage systems

RAID: Types, Buses, Redundant Array of Independent Disks, Errors and Failures, Designing an I/O system in five easy pieces.

Interconnection Networks: Inter connection networks and clusters, Interconnection network media, Practical issues in interconnecting networks, Clusters, Designing a cluster.

[9 Periods]

[10 Periods]

[9 Periods]

[10 Periods]

[10 Periods]

TEXT BOOKS

1. John L. Hennessy & David A. Patterson, "Computer Architecture A quantitative approach", Morgan Kaufmann, An Imprint of Elsevier, 3rd Edition,

REFERENCES

- 1. Kai Hwang and A. Briggs, "**Computer Architecture and parallel Processing**", McGraw-Hill, International Edition.
- 2. DezsoSima, Terence Fountain, Peter Kacsuk, "Advanced Computer Architectures", Pearson Education.

E-RESOURCES

- 1. https://www.elsevier.com/books/computer-architecture/hennessy/978-0-12-383872-8
- 2. http://www.goodreads.com/book/show/70135.Computer_Architecture
- 3. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=10208
- 4. http://www.ijrdo.org/International-Journal-of-Research-&-Development-Organisationpdf/International-Journal-Of-Computer-Science-Engineering/Journal-Of-Computer-Science-Engg-Jan-15/JAN% 20(2).pdf
- 5. http://nptel.ac.in/courses/106105033/
- 6. http://nptel.ac.in/courses/106102062/

Course Outcomes:

- 1. Analyze the Computer architecture and different processor architectures.
- 2. **Explore** Understand the components and operation of a memory hierarchy.
- 3. **Illustrate** organization and operation of current generation parallel computer systems, including multiprocessor and multi-core systems.
- 4. **Compare** different cache performance issues.
- 5. Identify the different storage organizations.

Onwards (MR-17) MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M.Tech I Sem		
Code: 75103 NETWORK PROGRAMMING ESSENTIALS	, '	Т	Р
Credits: 3		2	-

Prerequisites: Operating Systems

Course Objectives:

This course makes the students to learn and understand the concepts of Linux and C programming, to study the Shell programming, file concepts and directory management in network programming for inter process communication using pipes, FIFOs, signals, semaphores, message queues and explain socket programming to design the client/server environment, to examine network Programming for performing TCP, and UDP connections.

MODULE I: Introduction to Linux and Shell Programming

Introduction to Linux: Linux Utilities, File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking utilities, Filters, Text processing utilities, Backup utilities. Bourne again shell (bash).

Shell Programming: Introduction, Pipes and Redirection, Running a Shell Script, Shell as a Programming Language, Shell meta characters, File name substitution, Shell variables, Command substitution, Shell commands, Environment, Quoting, Test command, Control & Arithmetic structures, Shell script examples. Review of C Concepts: Arrays, Strings, Pointers, Function pointers, Structures, Unions.

MODULE II: Files and Directory Management

Files: 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, links-soft links and hard links – symlink, link, unlink.

Directory Management: File and Directory management, Directory contents, Scanning Directories, Directory file APIs. Process concept, Kernel support for process, Process Attributes, Control and Creation, Replacing a process image, Waiting for process, Process termination, Zombie process, Orphan process.

MODULE III: Signals and IPC

A: 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.

B: Interprocess Communication (IPC): Introduction, 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, Message queues, semaphores and shared memory. Message Queues, Kernel support, UNIX system V APIs for messages, client/server example. Semaphores-Kernel support for semaphores, UNIX system V APIs for semaphores.

[10 Periods]

[9 Periods]

[9 Periods]

MODULE IV: Shared Memory and Sockets

Shared Memory: Shared Memory, Kernel support, UNIX system V APIs for Shared memory, Client/Server example.

Sockets: Network IPC, Introduction to Unix Sockets, IPC over a network, Client-Server model, Address formats, 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, Set sock opt, get sock opt, fcntl.

MODULE V: Network Programming and Remote Method Invocation (RMI) [10 Periods] **Network Programming:** Network Programming in Java, Network basics, TCP sockets, UDP sockets (datagram sockets), Server programs to handle one and multiple connections (using multithreaded server).

RMI: Basic RMI Process, Implementation details-Client-Server Application.

TEXT BOOKS

- 1. T. Chan, "Unix System Programming using C++", PHI.
- 2. Sumitabha Das, "Unix Concepts and Applications", TMH, 4th Edition.

REFERENCES

- 1. W.R.Stevens, "Advanced Programming in the UNIX environment", Pearson Education, 2nd Edition.
- 2. W. R. Stevens, Bill Fenner, A. M. Rudoff, "Unix Network Programming The Sockets Networking API", Pearson Education, Vol.-I.

E-RESOURCES

- 1. https://openlibrary.org/books/OL24607430M/UNIX_system_programming_using_C https://zimslifeintcs.files.wordpress.com/2011/12/sumitabahdas.pdf
- 2. http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=414638
- 3. http://www.springer.com/in/book/9781447152538
- 4. http://nptel.ac.in/courses/117106113/

Course Outcomes:

- 1. Learn the basic set of commands and utilities in Linux/UNIX systems.
- 2. **Originate** file and directories in UNIX programming.
- 3. **Devise** the signals, Inter process communication systems.
- 4. Make use of socket to implement client/server environment.
- 5. Explore the Network Programming and RMI in detail.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M I	ech m	
Code: 75111	PERVASIVE COMPUTING	L	Т	P
Credits: 3	(Professional Elective – I)	2	2	-

Prerequisites: Nil

Course Objectives:

This course aims to provide the basic knowledge in pervasive computing along with the device connectivity through WAP, analyze the advent of Voice technology, PDAs, Server-side Programming and Pervasive Web application architecture, to discover the applications of pervasive computing and accessing via WAP.

MODULE I: Introduction to Pervasive Computing

Past, Present, Future: Vine and Fig Tree Dream, Pervasive Computing, Pervasive Computing Market, Application Examples.

Device Technology: Hardware, Human - Machine Interfaces, Biometrics, Operating Systems, Java for Pervasive Devices, Outlook.

MODULE II: Device Connectivity and WAP

Device Connectivity: Protocols, Security, Device Management, Web Application Concepts: WWW Architecture, Protocols, Transcoding, Client Authentication via Internet.

WAP: Components of WAP Architecture, WAP Infrastructure, WAP Security Issues, Wireless Markup Language, WAP Push, Products, i-Mode.

MODULE III: Voice Technology and PDA

A: Voice Technology: Basics of Speech Recognition, Voice Standards, Speech Applications, Speech and Pervasive Computing, Security.

B: Personal Digital Assistants: Device Categories, PDA OS, Device Characteristics, Software Components, PDA Browsers.

MODULE IV: Server-side Programming and Pervasive Application Architecture [9 Periods]

Server-side Programming: Overview, Servlets, Enterprise Java Beans, Java Server Pages, Extensible Markup Language, Web services, Model View Controller Pattern.

Pervasive Application Architecture: Background, Scalability and Availability, Development of Pervasive Computing Web Applications, Pervasive Application Architecture.

MODULE V: Applications and Access via WAP

Applications: Introduction, User Interface Overview, Architecture, Implementation, Access from PCs, Smart card-based Authentication via the Internet, Ordering Goods.

Access via WAP: WAP Functionality, Implementation, Access from PD Extending the Example Application, Implementation for Synchronized Devices, Implementation for Intermittently Connected Devices, Implementation for Connected Devices.

[9 Periods]

[10 Periods]

[10 Periods]

[10 Periods]

TEXT BOOKS

- 1. Ivan Stojmenovic, "**Handbook of Wireless Networks and Mobile Computing**", John Wiley & Sons Inc, Canada, 2002.
- 2. Jochen Burkhardt Dr Horst Henn, "**Pervasive computing**", Pearson Education, Sixth Edition, 2009.

REFERENCES

- 1. Asoke K Taukder, Roopa R Yavagal, "**Mobile Computing**", Tata McGraw Hill Publications. New Delhi, 2005.
- 2. Seng Loke, "**Context-Aware Computing Pervasive Systems**", Auerbach Publications, New York, 2007.

E-RESOURCES

- 1. http://media.wiley.com/product_data/excerpt/28/04714190/0471419028.pdf
- 2. https://books.google.co.in/books?id=S9xaDcvd5EsC&printsec=frontcover&source=gbs_ge_su mmary_r&cad=0#v=onepage&q&f=false
- 3. https://www.journals.elsevier.com/pervasive-and-mobile-computing
- 4. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?reload=true&punumber=7756
- 5. https://www.youtube.com/watch?v=IfefQ0Itbik

Course Outcomes

- 1. **Understand** the role of the Wireless Application Protocol in enabling mobile devices to access the Internet and have learned how to write simple WML decks.
- 2. **Describe** wireless and mobile communications systems with use of device connectivity, WAP architecture, infrastructure, security, Wireless Markup Languages.
- 3. Analyze mobility networks voice technology and PDA.
- 4. Design and Develop Java applications using Servlets, JSP, XML
- 5. Explore the applications of WAP sensor networks to access PCs using security via internet with connected devices and examples.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M I	ech m	
Code: 75112	MOBILE DATABASES	L	Т	Р
Credits: 3	(Professional Elective - I)	2	2	-

Prerequisites: Database Management Systems

Course Objectives:

This course enables the students to gain knowledge about the basics of mobile computing, database architecture with its transactions including concurrency control and transaction management, and analyze in detail about mobile transaction model and describe mobile database recovery.

MODULE I: Mobile Database System

Introduction: Types of Mobility, Wireless Network Communication. Connectivity: Continuous Connectivity, Location and Handoff Management.

MODULE II: Fundamentals of Database Technology

Database Architecture: Conventional Database Architecture, Database Processing. Transactions: Serialization of Transactions, Advanced Transaction Models.

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

A: Concurrency Control Mechanisms: Introduction, Data Processing and Mobility-Introduction, Effect of Mobility on management of Data.

B: Transaction Management: Transaction Management in Mobile Database Systems, Mobile Database System, Transaction Execution in MDS.

MODULE-IV: Mobile Transaction Model

ACID properties: Execution Model Based on ACID Transaction Framework, Pre-write Transaction Execution Model, Mobile Transaction Model, Data Consistency in Intermittent Connectivity, Consistency Model, Weak Connectivity Operation, Consistency Restoration Schema. Concurrency and Transaction: Concurrency Control Mechanism, Transaction Commit, Commitment of Mobile Transactions, Transaction Commitment in Mobile Database Systems.

MODULE V: Mobile Database Recovery, Indexing and Scheduling [10 Periods] Recovery: Introduction, Log Management in Mobile Database Systems, Mobile Database

Recovery Schemes. Wireless Information Broadcast, Broadcast Disk, Broadcast Infrastructure. Indexing and Scheduling: Exponential Index, Location-Based Indexing, On-Demand Data Scheduling, Data Dissemination System.

TEXT BOOKS

- 1. Vijay Kumar, "Mobile Database System", John Wiley (2006).
- 2. Ceri and Pelagatti, "Distributed Database Principles and Systems", McGraw Hill (2003).

[9 Periods]

[9 Periods]

[10 Periods]

REFERENCES

- 1. Coulouris, Dollimore, and Kindberg, "Distributed Systems: Concept and Design", Pearson 2008.
- 2. Kumar and Hsu, "Recovery Mechanisms in Database Systems", Prentice Hal, 1997.
- 3. Bernstein, Hadzilacos and Goodman, "Concurrency Control and Recovery in Database Systems", 1987.

E-RESOURCES

- 1. http://www.dsc.ufcg.edu.br/~sampaio/cursos/2007.1/PosGraduacao/BancoDeDados/Mobile.Dat abase.Systems.pdf
- 2. http://www.sersc.org/journals/IJDTA/vol8_no2/6.pdf
- 3. http://nptel.ac.in/courses/106106093/
- 4. http://nptel.ac.in/courses/106106093/18
- 5. http://nptel.ac.in/courses/106106093/19

Course Outcomes:

- 1. Learn and Understand Mobile databases with network communication and management.
- 2. Design and Develop database architectures, and Transaction models
- 3. Apply the Mobility management, and transaction management concepts.
- 4. **Describe** the Transactions models with ACID properties, and concurrency and transactions used in mobile devices.
- 5. Explore the Mobile database recovery, indexing and scheduling and applications.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M.Tech I Sem		
Code: 75113	PATTERN RECOGNITION	L	Τ	P
Credits: 3	(Professional Elective – I)	2	2	-

Prerequisites: Machine Learning and Biometrics

Course Objectives:

This course enables the students to apply the pattern recognition concepts, introduction, decision and distance functions, use of probability, statistical decision making techniques, Non parametric decision making, clustering and partitioning algorithms. Understand the pattern processing feature selection. Then, applications of pattern recognitions using various methods that are used in biometric, facial recognition, IRIS and Finger prints are discussed in detail.

MODULE I: Introduction, Decision and Distance Functions

Introduction: Basic concepts, Applications, Fundamental problems in Pattern Recognition, Design concepts and methodologies, Examples and Models of Automatic Pattern recognition systems.

Decision and Distance Functions: Linear and generalized decision functions, Pattern space and weight space, Geometrical properties, implementations of decision functions, Minimum-distance pattern classifications.

MODULE II: Probability and Statistical Decision Making

Probability: Probability of events: Random variables, Joint distributions and densities, Movements of random variables, Estimation of parameter from samples.

Statistical Decision Making: Introduction, Baye's theorem, Multiple features, Conditionally independent features, Decision boundaries, Unequal cost of error, Estimation of Error Rates, Leaving-one-out-techniques, Characteristic curves, Estimating Composition of Populations, Baye's Classifier for Patterns.

MODULE III: Non-Parametric Decision Making, Clustering and Partitioning [10 Periods] A: Non Parametric Decision Making: Non Introduction, histogram, kernel and window estimation, nearest neighbor classification techniques. Adaptive decision boundaries, adaptive discriminate functions, Minimum squared error discriminate functions, choosing decision-making techniques.

B: Clustering and Partitioning: Hierarchical Clustering: Introduction, agglomerative clustering algorithm, Single-linkage, complete-linkage and average-linkage algorithm. Ward's method Partition clustering-Forg's algorithm, K-means's algorithm, Isodata algorithm.

MODULE IV: Pattern Preprocessing and Feature Selection [9 Periods]

Pattern Preprocessing: Introduction, distance measures, Clustering transformation and Feature ordering.

Feature Selection: Clustering in feature selection through entropy minimization, features selection through orthogonal expansion, binary feature selection.

[10 Periods]

[9 Periods]

MODULE V: Syntactic Pattern Recognition and Applications

[10 Periods]

Syntactic Pattern Recognition: Introduction, concepts from formal language theory- formulation of syntactic pattern recognition problem-syntactic pattern description- recognition grammars, automata as pattern recognizers-

Applications: Application of pattern recognition techniques in biometric, facial recognition, IRIS, Finger prints.

TEXT BOOKS

- 1. Gose Johnsonbaugh Jost, "Pattern recognition and Image Analysis", PHI Edition, 2005.
- 2. Tou Rafael Gonzalez, "Pattern Recognition Principle", Pearson Education, 1998.

REFERENCES

- 1. Earl Gose, Richard Johnsonbaugh, Steve Jost, "**Pattern Recognition and Image Analysis**", Prentice Hall of India Pvt. Ltd., New Delhi, Edition-1999.
- 2. Richard duda, Hart, David Strok, "Pattern Classification", John Wile, 2005.
- 3. Anji Reddy, Hari Shankar, "Digital Image Processing", BS Publications, 1998.

E-RESOURCES

- 1. http://ebook-dl.com/book/541
- 2. http://sites.google.com/site/fghjgfghgfgggh/ghjgjh/Pattern-Recognition-Fourth-.pdf
- 3. http://www.journals.elsevier.com/pattern-recognition
- 4. http://www.sciencedirect.com/science/journal/00313203
- 5. http://nptel.ac.in/downloads/117108048/
- 6. http://textofvideo.nptel.iitm.ac.in/117105101/

Course Outcomes:

- 1. Understand the basic concepts and methodologies of pattern recognition systems.
- 2. Analyze basic problems to solve using probability, statistical and decision making methods.
- 3. **Devise** pattern reorganization methods like non decision making, clustering and partitioning methods for various problems
- 4. **Describe and apply the** pattern preprocessing, feature selection methods like distance measure, feature ordering, clustering and other feature selection techniques.
- 5. **Application** of pattern recognition systems used in various areas for example bio-metric, facial recognition, IRIS scone, Finger prints and others.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M I	M.Tech I Sem				
Code: 75114	INFORMATION RETRIEVAL SYSTEMS	L	Т	P			
Credits: 3	(Professional Elective - I)	2	2	-			

Prerequisites: Data Base Management Systems

Course Objectives:

This course enables the students to gain knowledge in different Information Retrieval (IR), fundamental concepts, Retrieval and Information Search techniques in various application areas, apply IR and Classification methods, Machine Learning techniques, SVM, Clustering and Classification methods. These principles are used to locate relevant information large collections of data, to analyze performance of retrieval systems when dealing with unmanaged data sources, and implement retrieval systems for web search tasks.

MODULE I: Information System Capabilities and Retrieval Techniques [9 Periods]

Retrieval Techniques-I: Boolean Retrieval, Term Vocabulary, Postings Lists, Indexing Techniques

Retrieval Techniques-II: Dictionaries and tolerant retrieval, Index Construction and Compression.

MODULE II: Information Search Techniques

Score Computation: Scoring, Term Weighting and Vector Space Model, Computing scores in Complete search system, Information System Evolution.

Evaluation: Evaluation in information retrieval, Relevance feedback and query expansion.

MODULE III: Retrieval and classification techniques

A: Retrieval Techniques: XML retrieval, Probabilistic information retrieval, Language models for information retrieval.

B: Classification Techniques: Text classification, Vector space classification.

MODULE IV: Machine Learning Retrievals

Support Vector Machines and machine learning on documents: Support Vector Machines, Extensions to SVM model-Issues in classification of Text documents-Machine Learning methods in Adhoc Information Retrieval.

Clustering Techniques: Flat clustering, Hierarchical clustering, Matrix decompositions and latent semantic indexing.

MODULE V: Web Search Linking

Web Search Basics: Web characteristics- Advertising as the Economic Model- Search user experience-Index size and estimation-Near-duplicates and Shingling.

Web crawling and indexes: Overview, Crawling, Distributing Indexes, Connectivity Servers, Link analysis, Web as a graph, Page Rank, Hubs and authorities.

[9 Periods]

[10 Periods]

[10 Periods]

[10 Periods]

TEXT BOOKS

- 1. Kowalski, Gerald J. Maybury, Mark T, "**Information Storage and Retrieval systems Theory** and Implementation", Second Edition, 2000.
- 2. Christopher D. Manning and Prabhakar, Raghavan and Hinrich Schütze, "Introduction to Information Retrieval", Cambridge University Press, 2008.
- 3. Ricardo Baeza Yate, "Modern Information Retrieval", Pearson Education, 2007.

REFERENCES

- 1. David A Grossman and Ophir Frider, "Information Retrieval: Algorithms and Heuristics", 2nd Edition, Springer.
- 2. Robert Korfhage, "Information Storage & Retrieval", John Wiley & Sons.

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- 1. www.unistmo.edu.mx/~daniel.garcia/.../Librorecuperacioninformacion.pdf
- 2. https://nlp.stanford.edu/IR-book/pdf/irbookonlinereading.pdf
- 3. www.sciencedirect.com/science/article/pii/S1877050916000739
- 4. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY71DYMut02wjKcXilXOeS46dD WYndV38tDO50i_mnMwZjXcF6XgqkVglL9ordVB7VBQ

Course Outcomes:

- 1. Understand the Information retrieval techniques.
- 2. **Explore and Analyze** Information search techniques like Vector Space Model, and Probabilistic Model, system evaluation methods.
- 3. **Identify and Apply** Classification Methods and classification techniques used various applications
- 4. Describe and apply Machine learning retrieval methods like SVM and clustering techniques.
- 5. **Illustrate** web search technique in Information Retrieval system used in web search, crawling and indexes

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M I	ch n	
Code: 75115	ANDROID APPLICATION DEVELOPMENT	L	Т	Р
Credits: 3	(Professional Elective - II)	2	2	-

Prerequisites: Computer Networks and Mobile Computing

Course Objectives:

This course aims the students to learn the essentials of mobile application development and aids in developing simple android applications, identify the essentials of android design, file settings, study about user interface design and develop android APIs.

MODULE I: Mobile and Information Architecture

Introduction to Mobile: A brief history of Mobile, Mobile Eco system, Necessity for Mobile, Types of Mobile Applications.

Mobile Information Architecture: Mobile Design, Mobile 2.0, Mobile Web development, Small Computing Device Requirements.

MODULE II

Introduction to Android: History of Mobile Software Development, Open Handset Alliance, Android Platform Differences.

Android Installation: Android Platform, Android SDK, Eclipse Installation, Android Installation, Building a Sample Android application.

MODULE III

A: Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents.

B: Android File Settings: Android Manifest File and its common settings, Using Intent Filter, Permissions, Managing Application resources in a hierarchy, working with different types of resources

MODULE IV

Android User Interface Design: Essentials User Interface Screen elements, Designing User Interfaces with Layouts.

Animation Techniques: Drawing and Working with Animation- Drawing on Screen, Working with Text, Working with Bitmaps, Working with shapes, Working with Animation.

MODULE V

Android APIs-I: Using Common Android APIs using Android Data and Storage APIs, Managing data using SQLite, Sharing Data between Applications with Content Providers,

Android APIs-II: Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to World.

[9 Periods]

[10 Periods]

[10 Periods]

[10 Periods]

[9 Periods]

TEXT BOOKS

- 1. James Keogh, "J2ME: The Complete Reference", Tata Mc-Graw Hill.
- Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd Edition, 2011.

REFERENCES

- 1. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd.
- 2. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd.
- 3. Sayed Y Hashimi and Satya Komatineni, "Pro Android", Wiley India Pvt Ltd.
- 4. Barry Burd, "Android Application Development All in One", 1st Edition, Wiley Publications.

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- 2. https://developer.android.com/training/index.html
- 3. https://developers.google.com/training/android/
- 4. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=7755
- 5. http://online-journals.org/i-jim/issue/archive
- 6. http://nptel.ac.in/courses/106106147/

Course Outcomes

- 1. **Classify** different types of Platforms
- 2. Appreciate the Mobility landscape
- 3. Familiarize with Mobile apps development aspects
- 4. **Design** and **develop** mobile apps, using Android as development platform, with key focus on user experience design, native data handling and background tasks and notifications.
- 5. Perform testing, signing, packaging and distribution of mobile apps

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M I	M.Tech I Sem		
Code: 75116	DISTRIBUTED AND CLOUD COMPUTING	L	Т	Р	
Credits: 3	(Professional Elective - II)	2	2	-	

Prerequisites: Computer Networks

Course Objectives:

This course focuses on the basic concepts of distributed communication, implement various resource allocation algorithms, deadlocks, and explain the concepts of cloud computing to analyze virtualization techniques, investigate issues on cloud resource management.

MODULE I: Distributed Communication

Distributed systems: Introduction to Distributed Systems, Characterization of Distributed Systems, Distributed Architectural Models, Remote Invocation, Request-Reply Protocols, RPC, RMI.

Communication: Group Communication, Coordination in Group Communication, Ordered Multicast, Time Ordering, Physical Clock Synchronization, Logical Time and Logical Clocks.

MODULE II: Distributed Resource Management

Resource Allocation Algorithms: Global States, Distributed Mutual Exclusion, Election Algorithms

Deadlocks and HDFS: Distributed Deadlock, Distributed File System Architecture, HDFS, Map Reduce.

MODULE III: Cloud Computing

A: Introduction to Cloud Computing: Cloud Computing Overview, Origins of Cloud computing, Cloud components, Essential characteristics, On-demand self-service, broad network access, Location independent resource pooling, Rapid elasticity, measured service.

B: Cloud services and Models: Architectural influences, High-performance Computing, Utility and Enterprise Grid Computing, Autonomic Computing, Service Consolidation, Horizontal scaling, Web services, High scalability Architecture. Cloud Benefits, Cloud Deployment Model: Public Clouds, Private Clouds, CommMODULEy Clouds, Hybrid Clouds, Advantages of Cloud Computing.

MODULE IV: Virtual Machines and Virtualization Techniques

Virtual Machines: Introduction to Virtual Machines, Emulation: Interpretation and Binary Translation, Process Virtual machines and System Virtual machines Virtualization: Virtualization and cloud computing, Need of virtualization, limitations.

Hardware Virtualization: Types of Hardware Virtualization: Full Virtualization, Para Virtualization. Case Studies: Xen, VMware, Desktop Virtualization, Network Virtualization.

[9 Periods]

[10 Periods]

[10 Periods]

[9 Periods]

MODULE V: Cloud Resources Management and Issues

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[10 Periods]
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Software as a Service (SaaS): Cloud architecture: Cloud delivery model, Cloud Storage Architectures, Software as a Service with Service providers, Google App Engine, Salesforce.com and google platform, Benefits, Operational benefits, Economic benefits, Evaluating SaaS.

Platform as a Service (PaaS) and Infrastructure as a Service (IaaS):PaaS: PaaS Service Providers, Right Scale, Salesforce.com, Rackspace, Force.com, Services and Benefits, IaaS: Service Providers, Amazon EC2, GoGrid.

TEXT BOOKS

- 1. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems Concepts and Design", Fifth Edition, Pearson Education Asia, 2012.
- 2. Anthony T.Velte, Toby J. Velte, Robert Elsenpeter, "Cloud Computing A Practical Approach", Tata-McGraw-Hill, New Delhi, 2010.

REFERENCES

- 1. Kai Hwang, Geofrey C. Fox and Jack J. Dongarra, "**Distributed and Cloud Computing**", Morgan Kaufmann, 2012.
- 2. Boris Lublinsky, Kevin T. Smith, Alexey Yakubovich, "**Professional Hadoop Solutions**", Wrox, Wiley, 2013.

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- 2. http://www.ishuchita.com/C.S.E/Cloud%20Computing/Cloud%20Computing%20Practical%20 Approach.pdf
- 3. http://dsc.soic.indiana.edu/publications/10-ajy-igcc.pdf
- 4. http://www.buyya.com/papers/STAR-Cloud-TCC.pdf
- 5. http://nptel.ac.in/courses/126104006/41

Course Outcomes:

- 1. Analyze the basic concepts of distributed communication.
- 2. Illustrate different types of resource allocation algorithms and deadlocks.
- 3. **Identify** the basics of cloud computing services and models.
- 4. Implement virtualization techniques.
- 5. Investigate cloud resource management and issues.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M. I	ch n	
Code: 75117	INTERNET OF THINGS	L	Т	Р
Credits: 3	(Professional Elective – II)	2	2	-

Prerequisites: Computer Networks and Web Technologies

Course Objectives:

This course is to provide the students the clear understanding of terminology, technology, and IoT applications, demonstrate the concept of Machine to Machine with necessary protocols, and apply the features of Python Scripting Language, concepts of Raspberry PI platform and to explore web based services on IoT devices.

MODULE I: Introduction and Concepts

Introduction to Internet of Things: Definition and Characteristics of IoT, Physical Design of IoT, IoT Protocols, IoT communication models, IoT Communication, APIs: IoT enabled Technologies, Wireless Sensor Networks.

Domain Specific IoTs: Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs: Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle.

MODULE II: IoT- Machine to Machine (M2M) and System Management [9 Periods] IoT and M2M: Software Defined Networks, Network function virtualization, Difference between SDN and NFV for IoT.

IoT System Management: Basics of IoT System Management with NETCONF, YANG-NETCONF, YANG, SNMP NETOPEER.

MODULE III Python Programming

A: Introduction to Python: Features of Python, Data types, data structures Control of flow, Functions, Modules, Packaging.

B: Advanced Concepts in Python: File handling, data/time operations, classes, Exception handling - Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib.

MODULE IV: IoT Physical Devices and Endpoints

Physical Devices: Basic building blocks of IoT Device, Introduction to Raspberry PI, Interfaces (serial, SPI, I2C) Programming.

Raspberry PI interfaces: Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, Reading input from pins.

MODULE V: IoT Physical Servers and Cloud Offerings

Introduction to Physical Servers: Introduction to Cloud Storage models and communication APIs Web server, Web server for IoT, Cloud for IoT, Python web application framework.

Web Services for IoT: Designing a RESTful web API, Amazon web services for IoT, Case studies.

[9 Periods]

[10 Periods]

[10 Periods]

[10 Periods]
TEXT BOOKS

- 1. Arshdeep Bahga and Vijay Madisetti, "Internet of Things A Hands-on Approach", Universities Press, 2015, ISBN: 9788173719547
- 2. Richardson & Shawn Wallace, "Getting Started with Raspberry Pi", Matt O'Reilly, 2014.

REFERENCES

- Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
- 2. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things-Key applications and Protocols", Wiley, 2012

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- 2. http://www.isical.ac.in/~acmsc/WBDA2015/slides/hg/Oreilly.Hadoop.The.Definitive.Guide.3rd .Edition.Jan.2012.pdf
- 3. http://file.scirp.org/pdf/JCC_2015052516013923.pdf
- 4. https://pdfs.semanticscholar.org/474a/4a3d4be882f6a40fe655f4b9ec3cf7dc08e0.pdf
- 5. https://thingsboard.io/docs/iot-video-tutorials/
- 6. https://thenewboston.com/videos.php?cat=98&video=20109

Course Outcomes

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

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M. I	.Teo Sen	ch n
Code: 75118	SOFTWARE ARCHITECTURE AND DESIGN	L	Т	Р
Credits: 3	(Professional Elective-II)	2	2	-

Prerequisites: Computer Organization

Course Objectives:

This course makes the students to learn the different types of Software Architectures and analyze various architectures such as Comprehensive and Quantitative approaches to implement the different types of Design patterns such as Creational, Structural and Behavioral patterns.

MODULE I: Introduction to Software Architecture

Envisioning Architecture: Architecture Business Cycle, Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views.

Creating Architecture: Quality Attributes, Achieving qualities, Architectural styles and patterns, Designing Architecture, Documenting Software Architectures, Reconstructing Software Architecture.

MODULE II: Analyzing Architectures

Comprehensive Approach: Architecture Evaluation, Architecture design decision making ATAM.

Quantitative Approach: Decision Making Context, Basics of CBAM, Implementing CBAM, Case Study.

MODULE III: Moving from one system to many

A: Software Product Lines: Overview, Software Product Lines, Scoping, Building Systems from Off-the-Shelf Components.

B: Architecture: What Makes Software Product Lines Difficult?, Software Architecture in Future.

MODULE IV: Design Pattern Catalog-1

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, Proxy.

MODULE V: Design Pattern Catalog-2

Behavioral Patterns: Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor. Case Studies: A-7E-A case study in utilizing architectural structures.

World Wide Web: A Case study in interoperability, Air Traffic Control-Case Study in designing for high availability, Celsius Tech - Case Study in product line development

[10 Periods]

[9 Periods]

[9 Periods]

[10 Periods]

TEXT BOOKS

- 1. Len Bass, Paul Clements & Rick Kazman, "Software Architecture in Practice", Third Edition, Pearson Education, 2013.
- 2. Erich Gamma, "Design Patterns", Pearson Education, 1995.

REFERENCES

1. Luke Hohmann, "Beyond Software Architecture", Addison Wesley, 2003.

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- 1. http://disi.unal.edu.co/dacursci/sistemasycomputacion/docs/SWEBOK/Addison%20Wesley%2 0-%20Software%20Architecture%20In%20Practice%202nd%20Edition.pdf
- 2. https://goo.gl/XHf4Skr
- 3. http://handbookofsoftwarearchitecture.com
- 4. http://technav.ieee.org/tag/1570/software-architecture
- 5. http://www.springer.com/in/book/9783319658308#otherversion=9783319658315
- 6. http://ndl.iitkgp.ac.in/document/xttk-4kfhvUwVlXBW-YWRHK2WM4hGzyP-7P1EGjmLQteaTTfT9e5x3lNfo1dkNFKA2TH8BFRA34WT93f7vOClg
- 7. http://ndl.iitkgp.ac.in/document/xttk-4kfhvUwVlXBW-YWRHHjhOkwn-Nw1F1n-B5L9QQwwLxs5C_RQWWA-I82gWvUowtpyPjqm26fq2PVA1VaOg

Course Outcomes:

- 1. Analyze the Computer architecture and different processor architectures
- 2. **Explore** and analyze the architectures
- 3. **Illustrate** organization and operation of current generation parallel computer systems, including multiprocessor and multi-core systems
- 4. **Understand** patterns descriptions and solving problems and use of creational and structural patterns.
- 5. Apply design patterns, behavioral patterns and World Wide Web to case studies.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M I	.Teo Sen	ch n
Code: 75127	MACHINE LEARNING	L	Τ	P
Credits: 3	(Open Elective - I)	2	2	-

Course Objectives:

This course provides the students a broad introduction to machine learning, discuss about various learning algorithms like decision tree learning, Bayesian learning, computational learning, instance based learning, combined inductive and analytical learning methods, analyze genetic algorithms and various learning set of rules.

MODULE I: Machine Learning (ML)

[10 Periods]

Introduction: Well-posed Learning Problems, Designing a learning system, Perspectives and issues in ML

Concept Learning: Introduction, Concept Learning task, Concept learning as search, Find-S: Finding a maximally specific hypothesis, Version spaces and candidate elimination algorithm, Remarks on version spaces and Candidate elimination, Inductive bias.

MODULE II: Decision Tree Learning and Artificial Neural Networks (ANN)[9 Periods]Decision Tree Learning: Introduction, Decision Tree representation, Appropriate Problems,
Decision Tree learning algorithm, Hypothesis Space Search, Inductive bias, Issues.[9 Periods]

ANN: Introduction, Neural Network Representation, Problems for Neural Network Learning, Perceptions, Multilayer networks and Back Propagation algorithm, Remarks on back propagation algorithm, Evaluation Hypotheses, Motivation, Estimation hypothesis accuracy, Sampling theory, General approach for deriving confidence intervals, Difference in error of two hypotheses.

MODULE III: Bayesian learning and Instance based Learning [10 Periods]

A: Bayesian learning: Introduction and concept learning, Maximum Likelihood and Least Squared Error Hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle.

B: Instance-based Learning: K-Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Lazy and Eager Learning, Genetic Algorithm: Motivation, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms.

MODULE IV: Rules and Analytical Learning

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

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

[9 Periods]

MODULE V: Learning Techniques

Combining Inductive and Analytical Learning :Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to initialize Hypothesis, Using Prior Knowledge to alter Search Objective, Using Prior Knowledge to Augment Search Operators.

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

TEXT BOOKS

- 1. Tom M. Mitchell, "Machine Learning", MGH, 1st Edition, 2013.
- Stephen Marsland, "Machine Learning: An Algorithmic Perspective", Chapman and Hall / CRC, 2nd Edition, 2014.

REFERENCES

- 1. Neural Networks, William WHsieh, "Machine Learning Methods in the Environmental Sciences"
- 2. Richard O. Duda, Peter E. Hart and David G. Stork, "**Pattern Classification**", John Wiley & Sons Inc., 2001
- 3. Chris Bishop, "Neural Networks for Pattern Recognition", Oxford University Press, 1995

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- 2. https://goo.gl/FKioSh
- 3. http://www.ntu.edu.sg/home/egbhuang/pdf/ieee-is-elm.pdf
- 4. www.fxpal.com/publications/a-genetic-algorithm-for-video-segmentation-and-summarization.pdf
- 5. http://nptel.ac.in/courses/106106139/
- 6. http://nptel.ac.in/courses/106105152/

Course Outcomes:

- 1. Formulate machine learning problems corresponding to different applications.
- 2. Understand a range of machine learning algorithms like decision trees, and ANN.
- 3. Apply Machine Learning algorithms, Bayesian and Instance based Learning techniques.
- 4. Use of machine learning algorithms to solve problems using rules, and analytical learning techniques
- 5. **Illustrate** the Combining Inductive and Analytical Learning and applications of Reinforcement Learning

	11 1
Code: 75128PARALLEL AND DISTRIBUTED ALGORITHMSLT	Р
Credits: 3 (Open Elective - I) 2 2	-

Prerequisites: Computer Architecture

Course Objectives:

This course provides the students to learn and understand the basic of parallel and distributed algorithms, message passing, Partitioning, Divide and Conquer strategies. The use of Pipelined Computations Synchronization and Programming with shared memory. Apply these algorithms in Distributed shared memory systems and programming to solve problems in distributed, internet, and various other applications.

MODULE I: Parallel Computers

Basic Techniques: Parallel Computers for increase Computation speed, Types of Parallel Computers.

Cluster Computing: Interconnected Computers as a computing platform, Cluster Configurations, Setting up a dedicated Beowulf style cluster.

MODULE II: Message-Passing Computing

Message Passing: Basics, Evaluating Parallel programs, Debugging and evaluating parallel programs empirically.

Partitioning and Divide and Conquer strategies: Introduction to Partitioning Strategies, Partitioning and Divide and Conquer with Examples.

MODULE III: Pipelined Computations

A: Pipelining: Pipeline Techniques, Computing platform for pipelined applications.

B: Pipeline Programs: Examples, Adding numbers, Sorting numbers, Prime number generation, Solving a system of linear equations.

MODULE IV: Synchronization and Programming with shared memory [9 Periods]

Synchronization: Synchronous Computations, load balancing, distributed termination examples. **Programming with Shared memory:** Shared memory multiprocessor constructs for specifying parallel list sharing data parallel programming languages and constructs, open MP.

MODULE V: Distributed shared memory systems and programming [10 Periods] **Distributed shared memory systems:** Distributed shared memory, achieving constant memory

distributed shared memory programming primitives.

Algorithms: Sorting algorithms, Compare and Exchange sorting algorithms, Sorting on specific networks, Other sorting algorithms, Numerical algorithms, Matrix multiplication, Solving a system of linear equations.

TEXT BOOKS

1. Barry Wilkinson, Michael Allen, "Parallel Programming", Pearson Education, 2nd Edition.

2. B. Chapman, G. Jost, and Ruud van der Pas, "Using OpenMP", MIT Press, 2008.

[10 Periods]

[9 Periods]

REFERENCES

- 1. Peter S. Pacheco, "An introduction to parallel programming", Morgan Kaufmann, 2011.
- 2. Quinn, "Parallel programming in C with MPI and OpenMP", Tata McGraw Hill, 2003.

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- http://ndl.iitkgp.ac.in/document/xttk-4kfhvUwVlXBW-YWREHSqJNXZ5-IVmA63e1fa_-0_8cKDQQ5jyqonM7KTHNTudziB4dzdyILzljXhs6BWw

Course Outcomes:

- 1. **Understand** the basic concepts related to parallel and distributed computing, use of parallel computers for enhance performance with cluster computing.
- 2. Illustrate message passing parallel algorithms of Portioning and Divide and Conquer strategies.
- 3. Design and develop applications with use of pipelined computations and pipeline programs
- 4. Use of Synchronization and Programming with shared memory in parallel programming languages like Open MP.
- 5. **Explore** various parallel algorithms and programming concepts for solving the problems to achieve constant distributed shared memory.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M. I	.Teo Sen	ch n
Code: 75129	ARTIFICIAL INTELLIGENCE	L	Т	Р
Credits: 3	(Open Elective - I)	2	2	-

Course Objectives:

This course makes the student to learn and understand the fundamentals of artificial intelligence to analyze the ways of knowledge representation, critical analysis; problem solving that contributes to the development of search techniques, knowledge representation, knowledge rules and representation, reasoning. And the structures used in conceptual design, planning and applications. The applications of Natural Language Processing and Artificial Neural Networks in real time applications.

MODULE I: Introduction of Artificial Intelligence (AI)

Introduction to AI: AI Problems, AI Techniques, Problem space and search, Defining problem as a state space search, Production System, Problem characteristics.

Searching Techniques: Heuristic Search Technologies Generate and Test Hill Climbing, Best First search, Problem reduction, Constraint satisfaction, Means End Analysis.

MODULE II: Representation of Knowledge

Introduction to Knowledge Representation: Knowledge Representation, Knowledge using Predicate Logic, Representing simple facts in Logic, Representing Instance and is Relationships, Computable Functions and Predicates Resolution.

Representing Knowledge Using Rules: Procedural Vs Declarative Knowledge, Logic Programming, Forward Vs Backward Reasoning, Matching, Control Knowledge.

MODULE III: Symbolic Reasoning under uncertainty

A: Introduction to Non-monotonic Reasoning: Logics for Non-monotonic Reasoning, Implementation: Depth first search, Dependency, Directed Backtracking, Justification based truth maintenance.

B: Logic based Truth Maintenance Systems: Statistical Reasoning-Probability and Bayes Theorem, Certainty factors and Rule-base systems, Bayesian networks, Dempster - Shaffer Theory, Weak Slot and Filler Structures, Semantic nets, Frames.

MODULE IV: Structures

Strong slot and filler structures: Conceptual dependencies, Scripts, Game Planning Overview, Example domain-Block world.

Planning: Components of a Planning System, Goal State Planning, Non Linear Planning using constraint posting, Hierarchical Planning.

MODULE V: Natural Language Processing

Basics: Introduction, Syntactic Analysis, Semantic Analysis, Discuses and Pragmatic Processing.

[10 Periods]

[10 Periods]

[9 Periods]

[9 Periods]

Artificial Neural Networks: Introduction and Fundamentals of Artificial Neural Networks: Biological prototype, Artificial Neuron, Single layer Artificial, Neural Networks, Multilayer Artificial Neural Networks, Training of Artificial Neural Networks.

TEXT BOOKS

- 1. Elaine Rich, Kevin Knight, Shivashankar B Nair, "Artificial Intelligence", 3rd Edition, TMH, 2009.
- 2. Philip Waserman, "Neural Computing: Theory and Practice", Coriolis Group Publisher.

REFERENCES

1. George F. Lugar, "Artificial Intelligence Structures and Strategies Complex Problem Solving", Pearson Education.

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- 1. https://i4iam.files.wordpress.com/2013/08/artificial-intelligence-by-rich-and-knight.pdf
- 2. https://docs.google.com/file/d/0B5nnI0VCa9KCVFJYNGN2MjlBbGc/view
- 3. https://www.journals.elsevier.com/artificial-intelligence/
- 4. http://www.ceser.in/ceserp/index.php/ijai
- 5. http://aij.ijcai.org/
- 6. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7_M07uyea_7zp_zRG3BvdUVy2 TIab45fvPeNJfynQsAbmBEgDSUqzidwcse6xwotJA
- http://ndl.iitkgp.ac.in/document/xttk-4kfhvUwVlXBW-YWRBg_vrHK12-lgOzTVbb5oZ6eQ OBjCWDfRvquHJLEOFENjI5AmOqRc9Ar3eJF4CGFrw

Course Outcomes:

- 1. Describe the key components of the Artificial Intelligence domain
- 2. **Illustrate** the knowledge representation techniques.
- 3. Interpret various types of reasoning and processing.
- 4. Explore different types of planning and structures in Artificial Intelligence.
- 5. Demonstrate Natural Language Processing and Artificial Neural Networks.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		ch n	
Code: 75130	DISTRIBUTED SYSTEMS	L	Т	Р
Credits: 3	(Open Elective-I)	2	2	-

Prerequisites: Operating System and Database Management System

Course Objectives:

This course makes the students to learn and understand the theoretical and practical solutions for design and development of secured and distributed applications using Java RMI and RPC, also deals with operating system layers, peer to peer systems, transaction and concurrency control with other distributed systems.

MODULE I: Introduction to Distributed Systems and Networking [10 Periods]

Characterization of Distributed Systems: Introduction, Examples of Distributed systems, Resource sharing and web, challenges, System models- Introduction, Architectural and Fundamental models.

Networking and Internetworking: Inter process communication. Distributed objects and Remote Invocation-Introduction, Communication between distributed objects, RPC, Events and notifications, Case study-Java RMI.

MODULE II: Operating System Support and File Systems

Operating System Support: Introduction, OS layer, Protection, Processes and Threads, Communication and Invocation, Operating system architecture.

Distributed File Systems: Introduction, File Service Architecture, Case Study: SUN Network File Systems. Name Services: Introduction: Name Services and Domain Name System, Case study: Global Name Service & X.500 Directory Service.

MODULE III: P2P and Synchronization

A: Peer to Peer Systems: Introduction, Napster and its legacy, Peer to Peer middleware, Routing overlays, Overlay case studies-Pastry, Tapestry, Application case studies-Squirrel, Ocean Store.

B: Time and Global States: Introduction, Clocks, Events and Process states, Synchronizing physical clocks, Logical time and Logical clocks, Global states, Distributed debugging, Coordination and Agreement, Distributed mutual exclusion, Elections, Multicast communication, Consensus and related problems.

MODULE IV: Transaction and Recovery

Transactions and Concurrency Control: Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency controls. Distributed Transactions - Flat and Nested Distributed Transactions, Atomic Commit Protocols, Concurrency control in distributed transactions, Distributed Deadlocks.

Transaction recovery: Replication, System model and group communication, Fault tolerant services, Transactions with replicated data.

MODULE V: Security Services and Case Study

[10 Periods]

[10 Periods]

[9 Periods]

[9 Periods]

Security: Overview of Security techniques, Cryptographic algorithms, Digital signatures, Case studies-Kerberos, TLS, 802.11 Wi-Fi. Distributed shared memory, Design and Implementation issues, Sequential consistency and case study, Release consistency and Munin case study, other consistency models.

Case Studies: CORBA: Introduction, CORBA RMI, CORBA Services.

TEXT BOOKS

- 1. G. Coulouris, J. Dollimore and T. Kindberg, "**Distributed Systems Concepts and Design**", 4th Edition, Pearson Education, 2009
- 2. S. Ghosh, "Distributed Systems", Chapman & Hall/CRC, Taylor & Francis Group, 2010.

REFERENCES

- 1. S. Mahajan and S. Shah, "Distributed Computing", Oxford University Press, 2010
- 2. M. V. Steen, "Distributed Systems-Principles and Paradigms", Pearson Education, 2016

E-RESOURCES

- $1. \ https://azmuri.files.wordpress.com/2013/09/george-coulouris-distributed-systems-concepts-and-design-5th-edition.pdf$
- 2. https://www.studyblue.com/notes/b/distributed-systems-concepts-and-design-4th-edition/ 16519/0
- 3. https://www.cl.cam.ac.uk/~rja14/Papers/SE-06.pdf
- 4. http://pages.cs.wisc.edu/~remzi/OSTEP/dist-intro.pdf
- 5. http://www.cloudbus.org/papers/InfoNet-Article06.pdf
- 6. http://nptel.ac.in/courses/106106107/

Course Outcomes:

- 1. **Understand** the fundamental concepts related to distributed systems, challenges, models, architectures, networking and internetworking, RMI and RPC.
- 2. **Apply** the concepts related to OS layer, protection, process, threads, and understand various files systems, for example, SUN network file system.
- 3. **Analyze** a peer to peer system using concepts distributed applications, Middle ware with various case studies. Ex. Tapestry.
- 4. **Design** and develop a distributed application. Learn and apply transaction, concurrency, lock and recovery concept for distributed communications.
- 5. Apply security concepts for distributed applications, cryptography, digital signature, Wi-Fi, CORBA and RMI.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M I	M.Tecl I Sem		
Code: 75104	DATA STRUCTURES AND ALCORITIM ANALVSIS LAD	L	Т	P	
Credits: 2	DATA STRUCTURES AND ALGORITHM ANALTSIS LAB	-	-	4	

Prerequisites: Computer Programming

- 1. Write Java programs to implement the following (using arrays and linked lists): a) List ADT, b) Stack ADT, c) Queue ADT
- 2. Write a Java program to read an infix expression and convert into postfix using stacks ADT.
- 3. Write a Java program to implement circular queue ADT using an array
- 4. Write a Java program using stack and queue to test the given string is a palindrome or not.
- 5. Write Java programs to implement the following using a singly linked list. a) Stack ADT, b) Queue ADT, c) priority queue ADT
- 6. Write Java programs to implement the deque (double ended queue) ADT using a) Array, b) Singly linked list, c) Doubly linked list.
- 7. Write a Java program to perform the following operations in binary search tree: a) Creation,b) Insert a key, c) Search for a key, c) Delete an element.
- 8. Write a Java program to implement all the functions of a dictionary (ADT) using Hashing.
- 9. Write a Java program to implement the following:
 - a) Dijkstra's algorithm for Single source shortest path problem.
 - b) Kruskal's algorithm to generate minimum cost spanning tree.
 - c) KMP algorithm for Pattern matching.
- 10. Write Java programs for the implementation of BFS and DFS for a given graph.
- 11. Write Java programs for implementing the following sorting methods:
- a) Bubble, b) Insertion, c) Quick, d) Merge, e) Heap, f) Radix, g) Binary Tree
- 12. Write a Java program to perform the following operations in B-tree: a) Insertion b) Searching.

REFERENCES

- 1. S.Sahni, "Data Structures Algorithms and Applications in Java", Universities Press.
- 2. Clifford Shaffer, "Data structures and Algorithm analysis in Java", 3rd Edition, Courier Corporation.

Course Outcomes:

- 1. Design and Analyze the implementation of linear data structures and applications.
- 2. Apply the concept related to different searching and sorting techniques.
- 3. Learn and implement the concept of non linear data structures and applications.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		M.Tec I Sen	
Code: 75105	SEMINAD I	L	Τ	P
Credits: 2	SEIVIINAK-I	-	-	4

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M II	M.Te II Sei	
Code: 75106	CVDED SECUDITY	L	Τ	P
Credits: 3	CIDER SECURITY	2	2	-

Course Objectives:

This course makes the students to understand the basic concepts of security policies, interpret security objectives, various catalogs approaches and understand Policy Catalog and Issues related to cyber security. The use of cyber security, cyber management, Cyber Infrastructure Issues and solutions, applications and case studies

MODULE I: Policies and Security Evolution

[9 Periods] Introduction: Cyber Security, Cyber Security policy, Domain of Cyber Security Policy, Laws and Regulations

Cyber Security Evolution: Enterprise Policy, Technology Operations, Technology Configuration, Strategy Versus, Policy, Cyber Security Evolution, Productivity, Internet, E-Commerce, Counter Measures, Challenges.

MODULE II: Cyber Security Objectives and Guidance

Security Objectives: Cyber Security Metrics, Security Management Goals, Counting Vulnerabilities, Security Frameworks, E-Commerce Systems, Industrial Control Systems, Personal Mobile Devices, Security Policy Objectives, Guidance for Decision Makers, Tone at Top, Policy as a Project.

Catalog Approach: Cyber Security Management, Arriving at Goals, Cyber Security Documentation, Catalog Approach, Catalog Format, Cyber Security Policy Taxonomy

MODULE III: Policy Catalog and Issues

A: Cyber Security Policy Catalog: Cyber Governance Issues, Net Neutrality, Internet Names and Numbers, Copyright and Trademarks, Email and Messaging, Cyber User Issues, Malvertising, Impersonation.

B: Cyber user and conflict Issues: Appropriate Use, Cyber Crime, Geo location, Privacy, Cyber Conflict Issues, Intellectual property Theft, Cyber Espionage, Cyber Sabotage, Cyber Welfare.

MODULE IV: Cyber Management and Infrastructures Issues

Cyber Management Issues: Fiduciary Responsibility, Risk Management, Professional Certification, Supply Chain, Security

Cyber Infrastructure Issues: Principles, Research and Development, Cyber Infrastructure Issue, Banking and finance, Health Care, Industrial Control systems.

MODULE V: Case Study

Government's Approach to Cyber Security Policy: Cyber security strategy, History, Public policy developments in the Government of India, Industry, Institution, and Individuals

[10 Periods]

[10 Periods]

[9 Periods]

Espionage: Rise of Cyber Crime, Espionage and Nation, State Actions, Policy response to growing Espionage threats, Congressional Action.

TEXT BOOKS

- 1. Jennifer L. Bayuk, J. Healey, P. Rohmeyer, Marcus Sachs, Jeffrey Schmidt, Joseph Weiss, "Cyber Security Policy Guidebook", John Wiley & Sons 2012.
- 2. Rick Howard, "Cyber Security Essentials" Auerbach Publications 2011.

REFERENCES

- 1. Richard A. Clarke, Robert Knake, "Cyberwar: The Next Threat to National Security & What to Do About It" ECCO, 2010
- 2. Dan Shoemaker "Cyber security The Essential Body Of Knowledge", 1st Edition, Cengage Learning, 2011.

E-RESOURCES

- $1. \ http://www.esoln.net/edownload/Download/Cyber_Security_Policy_Guidebook.pdf$
- 2. http://index-of.es/Hack/CyberSecuity.pdf
- 3. https://www.acm.org/education/TowardCurricularGuidelinesCybersec.pdf
- 4. https://www.cs.cmu.edu/~hovy/papers/14dgo-cybersecurity-taxonomy.pdf
- 5. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY77N9KJP4BJuXxkVQSJo9fLOOf 1gtbY8enNTX_Gat1aW0f-JrSQu1YTNmVwRFJ_mJ7Q
- http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY737OFS2a5kP6Ph6KB9KG9RiR GN-S5LJoIuO6-Z-TBERz0mAxCmQX4GTFW2WfvuCVAg

Course Outcomes:

- 1. **Understand** the cyber security fundamentals, various security policies and evolution of security.
- 2. **Describe** more on various cyber security objectives, catalog approach and cyber security management.
- 3. Devise and Understand Cyber security policy catalog, cyber users and conflict issues.
- 4. **Review** of cyber management and infrastructure issues in Research, banning, finance and Industrial control systems.
- 5. **Examine** various case studies on cyber security policies and applications.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M II	.Teo Ser	ch m
Code: 75107	DIC DATA ANALVTICS	L	Τ	P
Credits: 3	BIG DATA ANALT TICS	2	2	-

Course Objectives:

This course makes the students to understand the basic concepts of big data, importance of Big Data, various types of analytical approaches and big data. Use of MapReduce Framework and HBase, with various analytic tools, identify the streaming concepts, Hadoop's HDFS, Social media analytics, text mining applications, and mobile analytics with applications.

MODULE I: Introduction to Big Data Analytics

Introduction: Introduction to Big Data, History of Data Management, Structuring Big Data, Elements, Distributed and Parallel Computing for Big Data. Big Data Analytics: What is Big Data Analytics, What Big Data Analytics Isn't, Why this sudden Hype around Big Data Analytics, Classification of Analytics.

Importance of Big Data: Greatest Challenges that Prevent Business from Capitalizing Big Data. Top Challenges Facing Big Data, Why Big Data Analytics Important, Data Science, Data Scientist, Terminologies used in Big Data Environments, Basically available Soft State Eventual Consistency (BASE), Open source Analytics Tools.

MODULE II: Analytics and Analytical Approaches

Understanding Analytics and Big Data: Comparing Reporting and Analysis, Types of Analytics, Points to Consider during Analysis, Developing an Analytic Team, Understanding Text Analytics, Analytical Approach and Tools to Analyze Data.

Analytical Approaches: History of Analytical Tools, Popular Analytical Tools, Comparing Various Analytical Tools.

MODULE III: MapReduce Framework and HBase [10 Periods]

A: Understanding MapReduce Fundamentals: MapReduce Framework, Techniques to Optimize MapReduce Jobs, Uses of MapReduce, Role of HBase in Big Data Processing, Storing Data in Hadoop, HDFS, Architecture, HDFS Files, File system types, commands, org.apache.hadoop.io package, HDF, HDFS High Availability.

B: HBase: Introduction, Architecture, Storing Big Data with HBase, Interacting with Hadoop Ecosystem, HBase in Operations-Programming with HBase, Installation, Combining HBase and HDFS.

MODULE IV: Hadoop and HDFS

Hadoop: Big Data Technology Landscape and Hadoop - NoSQL, Hadoop, RDBMS Vs Hadoop, Distributed Computing Challenges, Hadoop: History, Overview, Use Case, Hadoop Distributors. **HDFS:** Hadoop Distributed File System, HDFS Daemons, read, Write Replica Processing of Data with Hadoop; Managing Resources and Applications with Hadoop YARN.

[9 Periods]

[9 Periods]

MODULE V: Media and Mobile Analytics

Media Analytics: Social Media Analytics and Text Mining, Introducing Social Media, Key elements of Social Media, Text mining, Understanding Text Mining Process, Sentiment Analysis, Performing Social Media Analytics and Opinion Mining on Tweets.

Mobile Analytics: Introduction, Mobile Analytics and Web Analytics, Types of Results from Mobile Analytics, Types of Applications for Mobile Analytics, Introducing Mobile Analytics Tools.

TEXT BOOKS

- 1. Seema Acharya, Subhashini Chellappan, "Big Data and Analytics", 1st Edition, Wiley Publications.
- 2. DT Editorial Services, "Big Data Black Book", Dream Tech Press, 2015 Edition.
- 3. Albright Winston, "Business Analytics", 5th Edition.
- 4. S. Christian Albright, Wayne L. Winston, "Business Analytics: Data Analysis & Decision Making", South-Western College Publications, 5th Edition, 2014.

REFERENCES

- 1. Rajiv Sabherwal, Irma Becerra- Fernandez, "Business Intelligence Practice, Technologies and Management", John Wiley 2011.
- 2. Lariss T. Moss, Shaku Atre, "Business Intelligence Roadmap", Addison-Wesley IT Service.
- 3. Yuli Vasiliev, "Oracle Business Intelligence: The Condensed Guide to Analysis and Reporting", SPD Shroff, 2012.

E-RESOURCES

- 1. https://www.wileyindia.com/big-data-and-analytics.html
- 2. http://www.planet-data.eu/sites/default/files/presentations/Big_Data_Tutorial_part4.pdf
- 3. http://bigdata.ieee.org/publications
- 4. https://www.journals.elsevier.com/big-data-research/
- 5. https://onlinecourses.nptel.ac.in/noc16_cs12/preview
- 6. https://onlinecourses.nptel.ac.in/noc15_mg05/preview

Course Outcomes

- 1. **Explain** the foundations, definitions, and challenges of Big Data.
- 2. Explore more on various Analytical tools.
- 3. **Perform** programming using Map reduce and HBase.
- 4. Analyze Hadoop and HDFS.
- 5. Ability to understand importance of Big Data in Social Media and Mining.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M II	M.Tech II Sem		M.Tech II Sem	
Code: 75108	RESEARCH METHODOLOCIES	L	Т	Р		
Credits: 3	RESEARCH WETHODOLOGIES	2	2	-		

Course Objectives:

This course makes the students to learn and understand the basic concepts of Research Methodologies, identify the appropriate research domain, research design, sampling design, various data collection methods along with the processing ,analysis methods, Hypothesis Testing, summarize and prepare the research proposal, research report and evaluation procedures.

MODULE I: Introduction to Research Methodology and Research Problem[9 Periods]Introduction: Meaning of Research, Objectives of Research, Motivation in Research, Types ofResearch, Research Approaches, Significance of Research, Research Methods versus Methodology,Research and Scientific Method, Importance of Knowing How Research is Done, ResearchProcess, Criteria of Good Research, Problems Encountered by Researchers in India.

Defining the Research Problem: What is a Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique involved in Defining a Problem with Illustration.

MODULE II:

Research Design: Meaning of Research Design, Need for Research Design, Features of a Good Design, Concepts Relating to Research Design, Different Research Designs, Principles of experimental Design.

Sampling Design: Census and Sample Survey, Implications of a Sample Design, Steps in Sampling Design, Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Types, How to Select a Random Sample from an Infinite Universe, Complex Random Sampling Designs.

MODULE III: Data Collection and Analysis

A: Methods of Data Collection: Collection of Primary Data, Observation Method, Interview Method, Collection of Data through Questionnaires, Collection of Data through Schedules, Difference between Questionnaires and Schedules, Other Methods of Data Collection, Collection of Secondary Data, Selection of Appropriate Method for Data Collection, Case Study.

B: Processing and Analysis of Data:

Processing Operations, Problems in Processing, Elements/Types of Analysis, Statistics in Research, Measures of Central Tendency, Measures of Dispersion, Asymmetry Relationship, Simple Regression Analysis, Multiple Correlation and Regression, Partial Correlation.

MODULE IV:

Testing of Hypotheses I and II: Testing of Hypotheses I: Concepts, Concerning Testing of Hypotheses, Procedure, Flow Diagram, Measuring the Power, Tests of Hypotheses, Important Parametric Tests. Testing of Hypotheses II: Important Nonparametric or Distribution-free Test and Characteristic features.

[10 Periods]

[10 Periods]

[9 Periods]

Writing a Research Proposal: Research proposal in Quantitative and Qualitative Research, Contents, Work schedule.

MODULE V: Writing a Research Report and Evaluation

[10 Periods]

Writing a Research Report: Introduction, Developing an outline, Writing about a Variable Referencing, Writing a Bibliography

Research Methodology and Practice Evaluation: Introduction to Evaluation, Need, Intervention, Development, Evaluation process, Perspectives in classification of evaluation studies, Types of evaluation from a focus and philosophical perspective. Undertaking Evaluation: Process, Involving stakeholders in evaluation, Ethics in evaluation.

TEXT BOOKS

- 1. C. R. Kothari, "**Research Methodology: Methods and Techniques**", New Age International, Second Revised Edition, 2014.
- 2. Ranjith Kumar, "**Research Methodology: A Step-by-step guide for beginners**", 3rd Edition, SAGE Publications, 2010.

REFERENCES

- 1. Paul D. Leedy and Jeanne E. Ormrod, "**Practical Research: Planning and Design**", Pearson, 10th Edition, 2016.
- 2. Arun Kumar Singh, "Tests, Measurements and Research methods in Behavioural Sciences", Bharati Bhawan, P & D, 2015.

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- 1. http://ncset.uoregon.edu/index.php/resources-mainmenu-109/methodology-mainmenu-68/45-overview
- 2. http://www.bbamantra.com/research-methodology/
- 3. http://ndl.iitkgp.ac.in/document/2-bWjDw0vHnafkZOghfb7nmxUU4aI-6Kax0jnaWxgf6bxLnB Wl3uupZEcUkB8AOVbAGUf_49e5KauQ_IwQUCog
- 4. http://ndl.iitkgp.ac.in/document/L9ZmpWxG9HiRaLDQpQJHWGvgBcXcgGQj-uDrhs7pZxh csu-dm2xmo1Fz58t3NSTqSwRKl6ysh-341Oc59ZqcDA
- 5. http://ndl.iitkgp.ac.in/document/jwqxaNRTiOL0C4BU8TkcP4tDN2sa_lJgv-Xp9cVPWa41 Gwe_MyMPm2Snw_1bUfB3DfFnFhspIW6gqglmzQ9gHQ
- 6. http://ndl.iitkgp.ac.in/document/xttk-4kfhvUwVlXBW-YWRGRHTyHEKFwSEnrELJcYwM 5p TE-2dZ3cw_NnHEVkB-omx0SR4AFs1bjWdPDUuT7sUQ

Course Outcomes:

- 1. **Independently** identify and define the research problem.
- 2. List the features of Research design and Sampling design.
- 3. **Illustrate** the data collection methods, processing and analyzing it.
- 4. **Summarize** the statistical techniques using Hypothesis testing and methods of writing a Research Proposal.
- 5. **Prepare** a research report in a customized format with its evaluations.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M II	.Te Sei	ch m
Code: 75119	WEB SERVICES AND SERVICE ORIENTED	L	Т	Р
Credits: 3	(Professional Elective – III)	2	2	-

Prerequisites: Grid Computing

Course Objectives:

This course enables the students to learn, understand the basic concepts of web services, implementation model, study the architecture and its standards, illustrate the concepts of XML documents, SOAP for registering and discovering services and discuss SOA services and its security.

MODULE I: Distributed Computing and Web Services

Introduction 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).

Web Services: Introduction, Basic operational model of Web services, Tools and technologies enabling web services, Benefits and Challenges of using web Services.

MODULE II: Web Service Architecture and WSDL

Web Services: 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, and basic steps of implementing web services, Describing Web Services.

WSDL: WSDL introduction, non functional service description, WSDL 1.1 Vs WSDL 2.0, WSDL document, WSDL elements, WSDL binding, WSDL tools, WSDL port type, limitations of WSDL.

MODULE III: XML and SOAP

A: XML: Brief overview of XML–XML Document structure, XML name spaces, Defining structure in XML documents, Reuse of XML schemes, Document navigation and transformation.

B: Simple Object Access Protocol (SOAP): Introduction, 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, Enterprise Service Bus, SOA Development Life Cycle, SOAP HTTP binding, Communication model, Error handling.

MODULE IV: Services and UDDI

Registering and Discovering Services: Registering and Discovering Services: Role of Service Registries, Service discovery, Universal Description, Discovery and Integration.

UDDI: 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.

[10 Periods]

[10 Periods]

[9 Periods]

MODULE V: Web Services and Service Management

Web Services: SOA and web services security considerations, Network-level security mechanisms, Application-level security topologies, XML security standards, Semantics and Web Services, Semantic interoperability problem, Role of Meta Data, Service Meta Data.

Service Management: Overview of .NET and J2EE, SOA and Web Service Management, Managing Distributed System, Enterprise management Framework, Standard distributed management frame works, Web service management, Richer schema languages, WS-Meta data Exchange.

TEXT BOOKS

- 1. Michael P. Papazoglou, "Web Services & SOA Principles and Technology", Second Edition.
- 2. S. Chatterjee, J. Webber, "Developing Enterprise Web Services", Pearson Education.

REFERENCES

- 1. S. Graham and others, "Building web Services with Java", Pearson Education, 2nd Edition.
- 2. Sunil Mathew, Michael Stevens, Sameer Tyagi, James McGovern, "Java web Services Architecture", Elsevier Science, Morgan Kaufmann Publishers, 2005.

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- 1. https://www.abebooks.com/Web-Services-SOA-Principles-Technology-2nd/12698437230/bd
- 2. http://notes.specworld.in/web-services-notes-pdf/ws-notes-pdf/
- 3. http://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?punumber=4629386
- 4. http://dl.acm.org/citation.cfm?id=1088876
- 5. https://www.coursera.org/learn/python-network-data/lecture/0CpCx/video-service-oriented-architectures
- 6. http://nptel.ac.in/courses/105102015/11

Course Outcomes:

- 1. **Understand** the fundamental theoretical concept related to web services such as Client server, CORBA, JAVA RMI, Microsoft DCOM, MOM and Service oriented architectures.
- 2. **Develop** a web application architectures characteristics and applying WSDL concept to develop a web application.
- 3. **Design** and develop a web application using SOAP protocol, XML and Inter communication protocols.
- 4. Apply the concepts for UDDI registries, addressing and notifications.
- 5. **Analyze** a secure web application using network security mechanisms like, .NET, J2EE and Richer schema languages.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M II	.Teo Ser	ch n
Code: 75120	SCRIPTING LANGUAGES	L	Τ	P
Credits: 3	(Professional Elective – III)	2	2	-

Prerequisites: Object Oriented Programming

Course Objectives:

This course aims to learn, understand the basics of PERL and scripting, PHP, advanced topics including working with HTML, building websites to database connectivity, authentication encryption techniques. Implement the programs using TCL-Tk and python programming used to design and develop web applications.

MODULE I: Introduction to PERL and Scripting

PERL: Scripts and Programs, Origin of Scripting, Characteristics of Scripting Languages, Web Scripting, and Universe of Scripting Languages. PERL, Names and Values, Variables, Scalar Expressions, Control Structures, Arrays, List, Hashes, Strings, Pattern and Regular Expressions, Subroutines,

Advance PERL: Finer points of looping, pack and unpack, filesystem, eval, data structures, packages, modules, objects, Interfacing to Operating System, Creating Internet Applications, Security Issues.

MODULE II: PHP Basics

PHP Basics: Features, Embedding PHP Code in your Web pages, Outputting data to the browser, Data types, Variables, Constants, expressions, String Interpolation, Control Structures.

Advanced Concepts in PHP: Function, Creating a Function, Function Libraries, Arrays, Strings and Regular Expressions.

MODULE III: Advanced PHP Programming

A: Working with HTML forms: PHP and Web Forms, Files, PHP Authentication and Methodologies -Hard Coded, File Based, Database Based, IP Based, Login Administration, Uploading Files and Sending Email using PHP.

B: Building Web Sites: PHP Encryption Functions, Mcrypt package, Building and Translating Websites, Updating Web sites Scripts, Creating Localization Repository, Translating Files, Text, Generate Binary Files, Set the desired language in scripts, Localizing Dates, Numbers and Times.

MODULE IV: TCL-Tk

TCL: TCL Structure, Syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL-eval, source, exec and up level commands, Name spaces, trapping errors, event-driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.

Tk: Visual Tool Kits, Fundamental Concepts, Tk by Example, Events and Binding, Perl-Tk.

MODULE V: Python

[10 Periods]

[9 Periods]

[9 Periods]

[10 Periods]

Python Basics: Introduction, Python: Syntax, Statements, Functions, Built-in-functions, Methods, Modules.

Advanced Concepts: Exception Handling, Integrated Web Applications in Python, Building Small, Efficient Python Web Systems, Web Application Framework.

TEXT BOOKS

- 1. David Barron, "The World of Scripting Languages", Wiley India Pvt. Ltd., 2009.
- 2. Jason Gilmore, "Beginning PHP and MySQL", 4th Edition, Apress Publications, 2010.

REFERENCES

- 1. J. Lee and B. Ware, "Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP", Addison-Wesley Professional, 2002.
- 2. Chun, "Core Python Programming", Pearson Education, 2012.
- 3. John K. Ousterhout, Ken Jones, "Tcl and the Tk Toolkit", Pearson Education, 2009.

E-RESOURCES

- 1. http://ndl.iitkgp.ac.in/document/R7NGdyM0WaUtVEhTKyFEmGQ47DBOhxc8P2J0BzjVBhD IUrsELVmFOvWHSxptV12rjaYMleNXTl8Q4QWFD77vaw
- 2. http://ndl.iitkgp.ac.in/document/L9ZmpWxG9HiRaLDQpQJHWFsR0Ie2uV-UrmUMJfbow Lgn CPvGlddnqjqS1BygvxagtyYR6JTa-FRQXvlk0hbupg
- 3. http://ndl.iitkgp.ac.in/document/L9ZmpWxG9HiRaLDQpQJHWDYtFpQ2kr4f1u_9CZ9YND1 E5J-3St3UwS-3P1cisUvxKpLdiEG2kIUHf_gHTAw_fQ
- 4. http://spoken-tutorial.org/tutorial-search/?search_foss=Python
- 5. http://ndl.iitkgp.ac.in/document/5aWO1oMhhsLWsdKEMe-29vOiZL0cXo6hO9gkLT0JIUa7m sRiasx9JLS864WrV3nDSCqZYQSXIxYoixjzVtlbw
- 6. http://ndl.iitkgp.ac.in/document/5aWO1oMhhsLWsdKEMe-29ug-g0VoNT6zhFstIfuZXuVes PohBgXg_YZPbLSqChh734CkhKIPV88k6BilImG0dQ

Course Outcomes:

- 1. **Comprehend** the differences between typical scripting languages and PERL, and also acquire programming skills using scripting languages.
- 2. **Explore** the basic programming knowledge in PHP including string operations, control structures, functions, arrays and regular expressions used to build web application.
- 3. **Elaborate** the advanced programming knowledge in PHP including authentication, file handling, database access, encryption and localization repository.
- 4. **Explain** the basics and advanced features of TCL, Tk Visual toolkit and applications.
- 5. **Design** and Develop web applications using efficient Python programming.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M. II	M.Tech II Sem		4.Tech II Sem	
Code: 75121	WIRELESS SENSOR NETWORKS	L	Т	Р		
Credits: 3	(Professional Elective – III)	2	2	-		

Prerequisites: Computer Networks

Course objectives:

This course makes to understand and gain a broad coverage of challenges and latest concepts results related to the design and management of wireless sensor networks, design models, network architectures, node discovery and localization, analyze deployment strategies, node coverage, routing protocols, the systems with power management, protocols with medium access arbitration, fault-tolerance, network security and applications

MODULE I: Applications and Design Model

Applications: Introduction: Examples of Sensor nodes, Sample Sensor Networks Applications. **Design Issues:** Design Challenges and Models, Contemporary network architectures, Operational and computational models Performance metrics, Software and hardware setups.

MODULE II: Network Bootstrapping

Deployment: Sensor deployment mechanisms, Issues of coverage, Node discovery protocols **Localization:** Localization and control: Localization schemes, Network clustering.

MODULE III: Data Dissemination and Routing

A: Data-centric and Content-based Networking: Query models, In-network data aggregation. B: Routing Protocols: Robust route setup, coping with energy constraints.

MODULE IV: Physical and Link layers

Energy and Power: Radio energy consumption model, Power management. **Protocols:** MAC protocols: Medium access arbitration, Optimization mechanisms.

MODULE V: Dependability Issues

Security Issues: Security and synchronization-Security challenges, Threat and attack models, Quality of service provisioning.

Synchronization: Clock synchronization, fault tolerance- Supporting fault tolerant operation.

TEXT BOOKS

- 1. Holger Karl, Andreeas Willig "**Protocols and Architectures for Wireless Sensor Networks**" Wiley, ISBN: 0-470-09510-5, June 2005.
- 2. Cauligi S. Raghavendra, Krishna Sivalingam, and Taieb M. Znati "Wireless Sensor Networks", Springer, 2005

REFERENCES

1. Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice", John Wiley & Sons 2010

E-RESOURCES

1. http://profsite.um.ac.ir/~hyaghmae/ACN/WSNbook.pdf

[10 Periods]

[9 Periods]

[9 Periods]

[10 Periods]

[**10 Periods**] plications.

- 2. https://ia800207.us.archive.org/5/items/springer_10.1007-b117506/10.1007-b117506.pdf
- 3. ceng.usc.edu/~bkrishna/teaching/SensorNetBib.html
- 4. nesl.ee.ucla.edu/
- 5. www.intel.com/content/www/us/en/research/intel-research.html
- 6. www.libelium.com/
- 7. https://www.youtube.com/watch?v=e7jmXVxqS8s&t=1414s
- 8. https://www.youtube.com/watch?v=ipnrZUMHfpM

Course Outcomes:

- 1. Understand the wireless sensor networks for various applications and design models.
- 2. Explore coverage of Networking, planning, node deployment and localization control.
- 3. Devise appropriate data dissemination protocols and model links cost.
- 4. Determine suitable medium access protocols and radio energy consumption models.
- 5. **Implement** quality of service, fault-tolerance, security and other dependability requirements in wireless sensor networks.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		M.Tech II Sem				
Code: 75122	HIGH PERFORMANCE NETWORKS	L	Τ	P			
Credits: 3	(Professional Elective – III)	2	2	-			

Course Objectives:

This course makes to Understand, gain knowledge and apply techniques in High Performance Networks, switching networks, Internetworking with ATM, Multimedia and networking services, applications with advanced network concepts, VPN, Tunneling, use of Packet Queues and Delay Analysis in advanced network that analyze network performance factors, packet queues, delays and implement network security and management.

MODULE I: Switching Networks

Switching Techniques: Switching, Packet switching, Ethernet, Token Ring, FDDI, DQDB, Frame Relay, SMDS, Circuit Switched, SONET, DWDM, DSL, Intelligent Networks, CATV, ATM Features, Addressing Signaling & Routing, Header Structure.

ATM: ATM Adaptation layer, Management control, BISDN, Internetworking with ATM.

MODULE II: Multimedia Networking Applications

Multimedia Applications: Streaming stored Audio and Video, Best effort service, protocols for real time interactive applications, beyond best effort.

Services: Scheduling and policing mechanism, integrated services, RSVP differentiated services.

MODULE III: Advanced Networks Concepts

A: VPN: VPN-Remote-Access VPN, site-to-site VPN, Tunneling to PPP, Security in VPN. **B: Tunneling:** MPLS-operation, Routing, Tunneling and use of FEC, Traffic Engineering, and MPLS based VPN, overlay networks-P2P connections.-IPv4 vs. V6.

MODULE IV: Packet Queues and Delay Analysis

Queuing Disciplines-I: Little's theorem, Birth and Death process, Queuing discipline, Control & stability, Markovian FIFO queuing system, Non-Markovian, Pollaczek-Khinchin formula and M/G/1, M/D/1.

Queuing Disciplines-II: Self-similar models, Batch-arrival model, Networks of Queues, Burke's Theorem and Jackson Theorem.

MODULE V: Network Security and Management

Network Security: Principles of Cryptography, Elliptic-AES, Authentication, Integrity, Key distribution and certification, Access control and Firewalls, DoS attacks and counter measures, Security.

Network Management: Infrastructure for Network Management, Internet Standard Management Framework, SMI, MIB, SNMP, Security and Administration, ASN.1.

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[10 Periods]

TEXT BOOKS

- 1. Anurag Kumar, D. Manjunath, Joy Kuri, "**Communication Networking**", Morgan Kaufmann Publishers, 2011.
- 2. J.F. Kurose & K.W. Ross, "Computer Networking- A Top Down Approach Featuring the Internet", Pearson, 2nd Edition, 2003.

REFERENCES

- 1. Nader F. Mir, "Computer and Communication Networks", Pearson Education, 2009.
- 2. Walrand J. Varatya, "**High Performance Communication Network**", Morgan Kaufmann, Harcourt Asia Pvt. Ltd., 2nd Edition, 2000.
- 3. Larry L. Peterson & Bruce S. David, "Computer Networks: A System Approach", Morgan Kaufmann Publisher, 1996

E RESOURCES:

- 1. http://eng.uok.ac.ir/abdollahpouri/Network/Kurose_Ross/Computer%20Networking%20A%20 Top- Down%20Approach%20Featuring%20the%20Internet.pdf
- 2. http://doktora.kirbas.com/Kitaplar/Wireless%20Networking%20Complete.pdf
- 3. https://www.elsevier.com/books/communication-networking/kumar/978-0-12-428751-8
- 4. http://nptel.ac.in/courses/106108055/

Course Outcomes:

- 1. State the various types of Switching Networks and Internetworking with ATM.
- 2. Explain the Multimedia Networking Applications, services and policies.
- 3. **Relate** the advanced networks concepts VPN, Tunneling, Traffic Engineering, MPLS based VPN, Overlays, IPV4, IPv6.
- 4. Elaborate the network packet queue and delay analysis.
- 5. Explore the Network security and management issues, solutions, applications.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		M.Tech II Sem				
Code: 75123	DATA MINING AND ANALYSIS	L	Т	P			
Credits: 3	(Professional Elective-IV)	2	2	-			

Prerequisites: Database Management System

Course Objectives:

This course enables the students to learn and understand the concepts of data mining, advanced pattern mining, categorize various classification methods, describe various clustering algorithms and graphs, analyze methods in web, text mining and explore in detail about temporal and spatial mining.

MODULE I: Data and Pattern Mining

Data Mining Overview: Data mining tasks, Mining frequent patterns, Associations and correlations, Classification and regression for predictive analysis, Cluster analysis, Outlier analysis, **Advanced Pattern Mining:** Multilevel, Multidimensional Space-mining, Multilevel Associations, mining multidimensional associations, Mining quantitative association rules, Mining rare patterns and Negative patterns.

MODULE II: Advance Classification

Classification Methods: Classification by Back propagation, SVM, Classification using Frequent Patterns.

Other Classification Methods: Genetic algorithms, Rough set approach, Fuzzy Set Approaches.

MODULE III: Clustering Algorithms and Graphs

A: Advance Clustering: Density based methods: DBSCAN, OPTICS, DENCLUE; Grid based Methods: STING, CLIQUE.

B: Algorithms and Graphs: Exception, Maximization algorithm, Clustering High Dimensional Data, Clustering Graph and Network Data.

MODULE IV: Web and Text Mining

Web Mining: Introduction, Web Content Mining, Web Structure Mining, Web Usage Mining. **Text Mining:** Introduction, Unstructured text, Episode Rule Discovery for Texts, Hierarchy of Categories, Text Clustering.

MODULE V: Temporal and Spatial Data Mining

Temporal Mining: Introduction, Temporal Data Mining, Temporal Association Rules, Sequence Mining, GSP algorithm, SPADE, SPIRIT Episode Discovery, Time Series Analysis. **Spatial Mining:** Introduction, Spatial Mining Tasks, Spatial Clustering, Data Mining Applications.

TEXT BOOKS

- Jiawei Hang Micheline Kamber, Jian Pei, "Data Mining Concepts and Techniques", 3rd Edition, Morgan Kaufmann, 2011.
- 2. Arun K Pujari, "Data Mining Techniques", Universities Press.

[10 Periods] Mining

[9 Periods]

[10 Periods]

[9 Periods]

REFERENCES

- 1. Pang Ning Tan, Vipin Kumar, Michael Steinbach, "Introduction to Data Mining", Pearson.
- 2. Sveresh Kumar, Esware Reddy, Jagadish Kalimani, "Data Mining Principles & Applications", Reed Elsevier India Pvt. Ltd.

E-RESOURCES

- 1. https://www.tutorialspoint.com/data_mining/data_mining_tutorial.pdf
- 2. https://www-users.cs.umn.edu/~kumar/dmbook/dmslides/chap1_intro.pdf
- 3. https://link.springer.com/journal/10618
- 4. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?reload=true&punumber=69
- 5. http://nptel.ac.in/courses/106106093/35
- 6. http://nptel.ac.in/courses/110106064/

Course Outcomes:

- 1. Apply data mining techniques and methods to solve problems.
- 2. Use data mining techniques, Classification methods, Back propagation, Support Vector Machines, frequent patterns, Genetic algorithms, Rough set approach, Fuzzy Set Approaches.
- 3. Apply clustering algorithms and graphs.
- 4. **Impart** concepts in the area of web mining and text mining.
- 5. Devise the Temporal and Spatial Data Mining and applications

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M II	M.Tech II Sem		M.Tech II Sem	
Code: 75124	STORAGE AREA NETWORKS	L	Τ	P		
Credits: 3	(Professional Elective-IV)	2	2	-		

Prerequisites: Computer Networks

Course Objectives:

This course makes to study and understand storage area networks, fundamentals of data creation, storage, architecture, components, data protection, storage methods, information availability, and monitoring and management of data centers. Further, policies, backup recovery techniques, storage virtualization, security management are discussed in detail using case studies and concern applications.

MODULE I: Introduction to Information Storage and Management [9 Periods]

Introduction: Review data creation, Amount of data being created and understand the value of data to a business, Challenges in data storage and data management.

Data Centre Infrastructure: Solutions available for data storage, Core elements of a data center infrastructure, Role of each element in supporting business activities.

MODULE II: Storage Systems Architecture

Physical Components: Hardware and Software Components of Host Environment, Key protocols and concepts used by each component, Physical and Logical components of connectivity environment, Physical components of a Disk Drive and function, Logical Constructs of a Physical Disk, Access characteristics, and Performance Implications.

Data Protection: Different RAID levels and their suitability for different application environments: RAID 0, 1, 3, 4, 5, RAID 0+1, 1+0, 6, Compare and contrast integrated and modular storage systems, High-level architecture and working of an intelligent storage system.

MODULE III: Introduction to Networked Storage

A: Evolution of networked storage: Architecture, Components, Topologies of FC-SAN, NAS, and IPSAN, Benefits of different networked storage options.

B: Storage Methods: Need for long-term archiving solutions, CAS fulfills the need, Different networked storage options for different application environments.

MODULE IV: Information Availability, Monitoring & Managing Datacenter [10 Periods] Business Continuity and Disaster Recovery: Planned/unplanned outages and impact of downtime, Impact of downtime, Business Continuity Vs Disaster Recovery, RTO and RPO, Identify single points of failure in storage infrastructure, Solutions to mitigate failures.

Backup/Recovery Topologies: Replication technologies, Business Continuity, Remote Replication technologies, Identify key areas to monitor in a data center, Industry standards for data center monitoring and management, Key metrics to monitor different components in a storage infrastructure, Key management tasks in a data center.

[10 Periods]

[9 Periods]

MODULE V: Storage Virtualization and Case Studies

Securing Storage and Storage Virtualization: Information security, Critical security attributes for information systems, Storage security domains, List and analyzes common threats in each domain, Virtualization technologies, Block-level and File level virtualization technologies and processes.

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

TEXT BOOKS

- 1. G. Somasundaram, Alok Shrivastava, "Information Storage and Management", Wiley, 2010.
- 2. Meeta Gupta, "Storage Area Network Fundamentals", Pearson Education Limited, 2002.

REFERENCES

- 1. Robert Spalding, "Storage Networks: The Complete References", Tata McGraw Hill, 2003.
- 2. Marc Farley, "Building Storage Networks", Tata McGraw Hill, 2001.

E RESOURCES:

- 1. https://www.mikeownage.com/mike/ebooks/Information%20Storage%20and%20Management.pdf
- 2. https://books.google.co.in/books?isbn=158705065X
- 3. https://books.google.co.in/books?isbn=158705065X
- 4. http://ndl.iitkgp.ac.in/document/uT7ohQ3kN8pP8OwteoNZ9LnctkAcqauU6wfPkbQYZW6tW 3GrMe8ltD4hlD7okN1Oxl_e6yKh2APw_XypNAE6qg
- 5. http://ieeexplore.ieee.org/document/5386862/?reload=true
- $6. \ http://www.lazysystemadmin.com/2010/04/storage-area-network-san-video-tutorial.html$

Course Outcomes:

- 1. Identify and describe the functions to build data center networking for switch network.
- 2. **Describe** different components of a storage infrastructure, types of RAID implementations and data protection.
- 3. Evolution of Network storage and storage methods for application environments.
- 4. **Demonstrate** Information Availability, Monitoring & Managing Datacenter and list solutions for failures and recovery
- 5. **Apply** the Secure storage virtualization and case studies and applications.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M II	.Teo [Sei	ch m
Code: 75125	SEMANTIC WEB AND SOCIAL NETWORKS	L	Τ	P
Credits: 3	(Professional Elective-IV)	2	2	-

Prerequisites: Web Technology

Course Objectives:

This course enables the students to learn and understand the fundamental technologies for enabling web intelligence, next generation web, and web ontology, logic using RDF, UML, XML, the Ontology rules, development tools, methods, logics used in Ontology Engineering. The semantic web applications, search techniques, Engineering and Inference Engines, Social Network Analysis and Applications

MODULE I: Web Intelligence

Empowering the Information age: Thinking and Intelligent Web Applications, Information Age, World Wide Web, Limitations of today's Web

Next Generation Web: Machine Intelligence, Artificial Intelligence, Ontology, Inference Engines, Software Agents, Berners-Lee WWW, Semantic Road Map, Logic on Semantic Web.

MODULE II: Web Ontology and Logic

Knowledge Representation for Semantic Web: Ontologies and their role in Semantic web, Ontologies Languages for Semantic Web.

Web-Resource Description Framework (RDF): RDF Schema, Ontology Web Language, UML, XML/XML Schema.

MODULE III: Ontology Engineering and Inference Engines

A: Ontology Engineering: Ontology Engineering, constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology mapping,

B: Logic, Rule and Inference Engines: Overview, Logic and Inference, Monotonic and Nonmonotonic Rules, Descriptive logic and Inference Engines, RDF Inference Engine

MODULE IV: Semantic web applications and Semantic Search Technology[10 Periods]Semantic Web Applications: Semantic applications, Services and Technology Semantic Webapplications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base,XML Based Web Services.Services

Web Ontology and Semantic Search Technology: Creating OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods.

MODULE V: Social Network Analysis and Applications

Social Network Analysis and Semantic Web: Introduction to Social Networks Analysis, Development of social networks analysis, Electronic Sources for Network Analysis.

Electronic Discussion networks: Blogs and Online Communities, Web Based Networks, Building Semantic Web Applications with social network features.

[9 Periods]

[9 Periods]

[10 Periods]

TEXT BOOKS

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

REFERENCES

- 1. J. Davies, R. Studer, P. Warren, Johri, "Semantic Web Technologies, Trends and Research in Ontology Based Systems", Wiley & Sons, April 2006.
- 2. Liyang Lu Chapman, Hall, "Semantic Web and Semantic Web Services", CRC Publishers, Taylor & Francis Group.

E-RESOURCES

- 1. http://as.wiley.com/WileyCDA/WileyTitle/productCd-0471768669.html
- 2. http://www.springer.com/in/book/9780387710006
- 3. https://research.vu.nl/ws/portalfiles/portal/2312133
- 4. https://www.youtube.com/watch?v=e5RPhWIBcY4&list=PLea0WJq13cnDDe8V7eVLReIaOn FztOEAq

Course Outcomes:

- 1. **Understand** the fundamental of Semantic web and social networks, intelligent web applications, next generation web applications.
- 2. **Relate** Knowledge Relate knowledge representation methods for semantic web, RDF, UML, XML.
- 3. Explain the key aspects of ontology engineering, logics, rules, Inference engines.
- 4. **Design** web services and its applications like e-learning, bio informatics, knowledge base, web Ontology and Semantic Search Technology.
- 5. Analyze and build a social network and its applications.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		M.Tech II Sem		
Code: 75126	SOFTWARE QUALITY ASSURANCE AND TESTING	L	Τ	P	
Credits: 3	(Professional Elective-IV)	2	2	-	

Prerequisites: Software Engineering

Course Objectives:

This course provides the students to learn, describe and determine the purpose, importance of Software Quality Assurance (SQA) Framework and its Standards, state the metrics, measurements and methodology in quality assurance, study the Standards, metrics, methodologies, establishing policies, SDLC process, techniques and software testing tools like automated testing tools, Load Runner, Win runner and Rational Testing Tools, Silk test, Java Testing Tools, J Meter testing, assessing, project management in Client / Server and web applications by providing security.

MODULE I: SOA Framework and Ouality Standards

SQA Framework and Standards: What is Quality in SQA, Components, SQA Plan, Steps to develop and implement a SQA Plan.

Ouality Standards: ISO 9000 and Companion ISO Standards, CMM, CMMI, PCMM, Malcom Balridge, 3 Sigma and 6 Sigma.

MODULE II: Metrics and Methodologies

SQA Metrics and Measurement Software Quality Metrics: Product Quality metrics, In-Process Quality Metrics, Metrics for Software Maintenance, Examples of Metric Programs

Software Quality Metrics methodology: Establish Quality Requirements, Identify Software quality metrics, Implement software quality metrics, Analyze software metrics results, Validate Software Quality Metrics, Software Quality Indicators, Fundamentals in Measurement theory.

MODULE III: Software Testing Methodologies

A: Software Testing Strategy and Environment: Establishing testing policy, structured approach to testing, test factors, Economics of System Development Life Cycle (SDLC) Testing.

B: Software Testing Methodology: Defect shard to find, verification and validation, functional and structural testing, work bench concept, eight considerations in developing testing methodologies, testing tactics checklist.

MODULE IV: Techniques and Tools

Software Testing Techniques: Black-Box, Boundary value, Bottom-up, Branch coverage, Cause-Effect graphing, CRUD, Database, Exception, Gray-Box, Histograms, Inspections, JADs, Pareto Analysis, Prototyping, Random Testing, Risk-based Testing, Regression Testing, Structured Walkthroughs, Thread Testing, Performance Testing, White-Box Testing.

Software Testing Tools: Taxonomy of Testing tools, Methodology to evaluate automated testing tools, Load Runner, Win runner and Rational Testing Tools, Silk test, Java Testing Tools, J Meter, J MODULE and Cactus.

[10 Periods]

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MODULE V: Testing Process and Applications

Testing Process: Eleven Step Testing Process: Assess Project Management Development Estimate and Status, Develop Test Plan, Requirements Phase Testing, Design Phase Testing, Program Phase Testing, Execute Test and Record Results, Acceptance Test, Report test results, testing software installation, Test software changes, Evaluate Test Effectiveness.

Testing Specialized Systems and Applications: Testing Client/Server and Web applications, testing off the Shelf Components, Testing Security, Testing a data Warehouse.

TEXT BOOKS

- 1. William E. Perry, "Effective Methods for Software Testing", Wiley India, 2nd Edition, 2006.
- 2. Mordechai Ben-Menachem Garry S. Mar Liss, "Software Quality", Thomson Learning Publication, 1997.
- 3. K.V.K.K. Prasad, "Software Testing Tools", Dream Tech Publishers, Third Edition 2009.

REFERENCES

- 1. Bories Beizer, "Software Testing Techniques", 2nd Edition, Dream Tech Press.
- 2. G.Gord on Schulmeyer, James I. Mc Manus, "**Hand book of Software Quality Assurance**", International Thomson Computer Press, 2nd Edition.

E-RESOURCES

- 1. https://hientl.files.wordpress.com/2011/12/effective-methods-for-software-testing2.pdf
- 2. http://www.softwaretestinggenius.com/download/EMFST.pdf
- 3. https://www.adturtle.biz/LP_TA/index.cfm?T=436379
- 4. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=32
- 5. http://dl.acm.org/citation.cfm?id=2597724
- 6. http://nptel.ac.in/courses/106101061/18
- 7. http://ndl.iitkgp.ac.in/document/zyMnqgZQXCJME6wgSqrU87VCGcelOw5mZ-5ybmrhKB j79VQPP0_ZQHLqcOopPDoaFWhZybCrPg_joTbBU8ZpGA

Course Outcomes:

- 1. **Define** state-of-the-art, and apply their findings to framework for software testing and quality assurance.
- 2. Analyze different approaches to software testing and quality assurance, metrics measurement, and select optimal solutions for different situations and projects.
- 3. **Demonstrate** software testing & quality assurance and apply that knowledge in SDLC, functional, structural testing other testing methods their future research & its practice.
- 4. Evaluate different testing tools and techniques
- 5. **Justify** the testing process and its applications in quality assurance for client/server, web applications with security.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		M.Tech II Sem			
Code: 75131	SOFT COMPUTING	L	Τ	P		
Credits: 3	(Open Elective – II)	2	2	-		

Course Objectives:

This course enables to understand the fundamentals of soft computing methods, fundamental concepts, soft computing methods, Genetic algorithms, the neural networks and architectures, analyze various training algorithms, explore the concepts of fuzzy logic, operations and apply the fuzzy concepts in various applications.

MODULE I: Soft Computing Methods

Introduction: Introduction of Soft Computing Methods, Fundamentals of Genetic Algorithms. **Genetic Algorithm:** Encoding, Fitness function, Genetic modeling, Applications of GA.

MODULE II: Neural Networks

Neural Networks: Introduction, Learning methods, Perceptrons, Perceptron training algorithm, Single layer perceptron, Multiplayer perceptron,

Architecture: Neural Network Architectures, ADALINE, MADALINE.

MODULE III: Adaptive Reasoning Theory

A: Learning Algorithms: Adaptive filtering, LMS algorithm, Back propagation algorithm. **B: ART:** RBF networks, ART Networks, self-organizing feature maps, Applications of ANN.

MODULE IV: Fuzzy Sets and its Operations

Fuzzy Sets: Fuzzy Sets Vs Crisp Sets, Crisp Sets, Fuzzy sets and Representations, Extension principle.

Operations: Operations on Fuzzy sets, Fuzzy compliments, t-norms and t-conforms.

MODULE V: Fuzzy Arithmetic and Applications

Fuzzy Arithmetic and Relations: Fuzzy numbers, Arithmetic operation on Intervals and Fuzzy sets, Lattice of Fuzzy numbers, Fuzzy equations, Fuzzy relations, Projections and Cylindric extensions, Binary fuzzy relations, Fuzzy equivalence, Compatibility and ordering relations.

Advanced Fuzzy Concepts: Fuzzy Morphisms, Fuzzy Systems, Fuzzy controllers, Defuzzification Methods, Fuzzy Inference Techniques, Applications of fuzzy logic in Pattern Recognition and Image Processing.

TEXT BOOKS

- 1. George Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic", PHI, 1st Edition.
- 2. S. Rajsekharan, VijayalaxmiPai, "Neural Networks, Fuzzy logic and Genetic Algorithms, Synthesis and Applications", PHI, 2003.

[9 Periods]

[10 Periods]

[10 Periods]

[9 Periods]
REFERENCES

- 1. Simon Haykins, "Neural Networks-A Comprehensive Foundation", Pearson, 2nd Edition, 1999.
- 2. B. Yegnanarayana, "Artificial Neural Networks", PHI Learning, 2009.

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- 1. http://www.wearealgerians.com/up/uploads/139955152739491.pdf
- 2. https://books.google.co.in/books?id=bVbj9nhvHd4C&printsec=frontcover&source=gbs_ge_su mmary_r&cad=0#v=onepage&q&f=false
- 3. https://ndl.iitkgp.ac.in/result?q={"t":"search","k":"soft%20computing","s":[],"b":{"filters":[]}}
- 4. https://www.journals.elsevier.com/neural-networks
- 5. https://www.bing.com/videos/search?q=soft+computing+nptel+video&qpvt=softcomputing+np tel+video&FORM=VDRE
- 6. http://nptel.ac.in/courses/108104049/16

Course Outcomes:

- 1. **Identify** soft computing techniques, Genetic algorithms in their roles in building intelligent machines
- 2. Describe Neural Network concepts, architecture and learning methods.
- 3. **Evaluate** and compare solutions, architectures by various soft computing approaches for a given problem to get solutions.
- 4. **Implement** different operations on Fuzzy sets.
- 5. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		M.Tech II Sem			l.Tech I Sem	
Code: 75132	WIRELESS NETWORKS AND MOBILE COMPUTING	L	Τ	P			
Credits: 3	(Open Elective – II)	2	2	-			

Prerequisites: Computer Networks

Course Objectives:

This course provides detailed knowledge to understand the wireless communication and mobile computing, fundamental concepts, environment, Architecture, model, LAN, protocols, Mobile communications, GSM, GPRS, Mobile Network layer, mobile IP, and Mobile Transport layer with Traditional TCP and Transaction oriented TCP and wireless networks.

MODULE I: Wireless Networks

Networks: Wireless Network, Wireless Network Architecture, Wireless Switching Technology, Wireless Communication problem, Wireless Network Reference Model, Wireless Networking Issues and Standards.

Mobile Computing: Mobile communication, Mobile computing, Mobile Computing Architecture, Mobile Devices, Mobile System Networks, Mobility Management.

MODULE II: Wireless LAN and MAC Protocols

Wireless LAN: Infra Red Vs radio transmission, Infrastructure and Ad-hoc Network, IEEE 802.11: System Architecture, Protocol Architecture, Bluetooth: User Scenarios, Architecture.

Protocols: MAC Protocols: Introduction to MAC, Design issues, Contention based MAC protocols.

MODULE III: Mobile Communications

A: Global System for Mobile Communications: Mobile Services, System Architecture, Protocols, Localization & Calling, Handover, Security.

B: GPRS: Architecture, UMTS: UMTS System Architecture, Long Term Evolution.

MODULE IV: Mobile Network Layer

Mobile IP: Goals, Assumptions, Entities and Terminology, IP Packet Delivery, Agent Discovery, Registration.

Protocols: Tunneling and Encapsulation, Optimizations, Dynamic Host Configuration Protocol.

MODULE V: Mobile Transport Layer

TCP-I: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit/Fast Recovery, Transmission/Time-out Freezing, Selective Retransmission,

TCP-II: 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, "Wireless and Mobile Networks: Concepts and Protocols", Wiley, 2010.

REFERENCES

[9 Periods]

[10 Periods]

[10 Periods]

[9 Periods]

[10 Periods]

- 1. Asoke K. Talukder, "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.

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- 1. https://sgar91.files.wordpress.com/2011/10/mobile_communications_schiller_2e.pdf
- 2. http://www.edunotes.in/mobile-computing
- 3. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=7755
- 4. https://www.journals.elsevier.com/pervasive-and-mobile-computing
- 5. http://nptel.ac.in/courses/106105160/1
- 6. http://nptel.ac.in/courses/106106147/

Course Outcomes:

- 1. **Identify** the different wireless network architecture and computing that use communication technologies.
- 2. Classify different types of WLANs, protocols and Explaining GSM.
- 3. **Differentiate** different communication protocols Global System for Mobile Communications and GPRS.
- 4. **Illustrate** different cases of IP packet delivery and protocols.
- 5. **Devise** the mobile transport layer used in Traditional TCP and Transaction oriented TCP, 2.5G/3G Wireless Networks.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M II	M.Tecl II Sem		M.Tecl II Sem		M.Tech II Sem		M.Tech II Sem	
Code: 75133	NATURAL LANGUAGE PROCESSING	L	Τ	P						
Credits: 3	(Open Elective-II)	2	2	-						

Prerequisites: Formal Languages and Automata Theory

Curse Objectives:

This course provides a broad introduction to NLP to determine whether the algorithm answers the goals of its designers, or if the system meets the needs of its users. And to demonstrate NLP with regular expression, Python programming, demonstrate Context Free Grammar, Probability theory to analyze various models of language, implement Naive Bayes, HMM, explore in detail about Probabilistic Context Free Grammars, Models, parsers and classifiers, grammar and techniques.

MODULE I: Introduction and Regular Expressions

Natural Language Processing (NLP): Introduction to NLP, Hands-on demonstrations, Ambiguity and uncertainty in language, Turing test, Chomsky hierarchy, regular languages, and limitations, Finite-state automata, Practical regular expressions for finding and counting language phenomena. Python Programming: Introduction, Variables, Numbers, Strings, Arrays, Dictionaries, Conditionals, Iteration. NLTK, String Edit Distance and Alignment Key Algorithmic Tool: Dynamic programming, String edit operations, Edit distance, Examples: Spelling Correction and Machine Translation.

MODULE II: Context Free Grammars and Probability

CFG: Constituency, CFG definition, use and limitations. Chomsky Normal Form, Top-down and Bottom-up parsing, Non-probabilistic Parsing Efficient CFG parsing with CYK, Dynamic programming algorithms, Early parser, Designing a little grammar, and parsing with test data. Probability: Introduction to probability theory, Joint and conditional probability, marginal, independence, Bayes rule, Combining evidence. Information Theory: "Shannon game", Entropy, cross entropy, information gain, Application to language phenomena.

MODULE III: Language Models

A: Language Modeling and Naive Bayes: Probabilistic Language Modeling and its applications, Markov models, N-grams, Estimating probability of a word and smoothing, Generative models.

B: Part of Speech Tagging and Hidden Markov Models: Viterbi Algorithm for Finding Most Likely HMM Path, Dynamic programming with HMM, Use for part-of-speech tagging, Chinese word segmentation, prosody, Information extraction.

MODULE IV: Probabilistic and Classifiers

Probabilistic Context Free Grammars: Weighted context free grammars, Weighted CYK, Pruning and beam search, Parsing with PCFG, Probabilistic version of CYK, Human parsing, Experiments with Eye-Tracking.

Parsers and Classifiers: 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.

[10 Periods]

[10 Periods]

[9 Periods]

[10 Periods]

MODULE V: Grammar and Techniques

[9 Periods]

Grammar: Maximum Entropy Markov Models & Conditional Random Fields, Part-of-speech tagging, Noun-phrase Segmentation and Information Extraction Models, Finite-state machines.

Models and Techniques: Lexical Semantics Mathematics of Multinomial and Dirichlet distributions, Information Extraction & Reference Resolution, Various methods including HMMs, Models of Anaphora Resolution, Machine Learning Methods for Co-reference.

TEXT BOOKS

- 1. Jurafsky and Martin, "Speech and Language Processing", Prentice Hall
- 2. Manning and Schutze, "Statistical Natural Language Processing", MIT Press

REFERENCES

- 1. Cover, T. M. and J. A. Thomas, "Elements of Information Theory", Wiley.
- 2. James Allen, "Natural Language Understanding", The Benajmins, Cummings Publishing Company

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- 1. https://www.cl.cam.ac.uk/teaching/2002/NatLangProc/revised.pdf
- 2. https://hpi.de/fileadmin/user_upload/fachgebiete/plattner/teaching/NaturalLanguageProcessing/ NLP2016/NLP01_IntroNLP.pdf
- 3. http://www.sciencedirect.com/science/article/pii/S1532046401910299
- 4. http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.34.1r036
- 5. http://nptel.ac.in/courses/106101007/
- 6. http://nptel.ac.in/courses/106105158/

Course Outcomes:

- 1. **Be able** to compose key NLP elements to develop higher level processing chains and Assess Evaluate NLP based systems and apply Python programming concepts in NLP.
- 2. Choose appropriate solutions CFG, probability for solving typical NLP sub problems
- 3. Analyze NLP problems to decompose them in adequate independent components, models, and its applications.
- 4. **Evaluate** language technology component use of probabilistic context free grammars, parsers and classifiers.
- 5. Elaborate the interaction between Grammar, models and techniques used in NLP.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M II	/I.Tech II Sem		M.Tech II Sem	
Code: 75134	DATABASE SYSTEMS	L	Τ	P		
Credits: 3	(Open Elective – II)	2	2	-		

Prerequisites: Database Technologies

Course Objectives:

This course enables to learn and understand Database systems, relational models, SQL, normalization techniques, dependencies. The transaction management and concurrency control, indexing, hashing, and storage management, and distributed databases architecture and applications.

MODULE I: Database and Relational Models

Relational Models: Database System Applications, Purpose of Database Systems, View of Data, Data Abstraction, Instances and Schemas, Data Models, ER Model, Relational Model, Other Models, Database Languages, DDL, DML, Database Access, Transaction management, Data Storage and Querying, Database Architecture, Database Users and Administrators, ER diagrams. SQL: 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.

MODULE II: Introduction to Normalization

Normalization: Problems Caused by Redundancy, Decompositions, Problem related to Decomposition, Functional Dependencies. Normal Forms: First, Second, Third Normal forms, BCNF. Schema Refinement: Properties of Decompositions, Loss less-join Decomposition **Dependencies**: Dependency preserving Decomposition, Schema Refinement in database Design, Multi valued Dependencies, Fourth Normal Form, Join Dependencies, Fifth Normal form.

MODULE III: Transaction Management and Concurrency Control [9 Periods]

A: Transaction Management: ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock Based Concurrency Control, Deadlocks, Performance of Locking, Transaction Support in SOL.

B: Concurrency Control: Serializability, Recoverability, Lock Management, Lock Conversions, Deadlocks, Specialized Locking Techniques, Concurrency Control without Locking. Crash Recovery: Introduction, ARIES, Log, Other Recovery related Structures, Write-Ahead Log Protocol, Check pointing, Recovering from System Crash, Media Recovery.

MODULE IV: Overview of Storage and Indexing

Storage: 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: Memory Hierarchy, Redundant Arrays of Independent Disks.

Hashing and Indexing: Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods, B+ Trees: Dynamic Index Structure, Search, Insert and Delete. Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendable versus Linear Hashing.

[10 Periods]

[9 Periods]

[10 Periods]

MODULE V: Distributed Databases

[10 Periods]

Distributed Databases-I: Introduction, Architectures, Storing Data in Distributed DBMS, Distributed Catalog Management.

Distributed Databases-II: Distributed Applications: Distributed query processing Updating distributed data, Distributed Transactions, Distributed Concurrency Control.

TEXT BOOKS

- 1. Silberschatz, Korth, Sudarshan, "Data base System Concepts", McGraw Hill, 6th Edition, 2006.
- 2. Ramez Elmasri, Shamkant, B.Navathe, "Fundamentals of Database Systems", Pearson Education, 5th edition, 2008.

REFERENCES

- 1. C. J. Date, "Introduction to Database Systems", Pearson Education.
- 2. P. K. Das Gupta, "Database Management System Oracle SQL and PL/SQL", PHI.

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- 1. https://docs.google.com/file/d/0B9aJA_iV4kHYM2dieHZhMHhyRVE/edit.
- 2. http://grch.com.ar/docs/bdd/libros/Principles%20Of%20Distributed%20Database%20Systems %20%20-0%20M.%20Tamer%20Ozsu,%20Patrick%20Valduriez.pdf
- 3. http://fkee.uthm.edu.my/helmy1299/class/dec2213/concurrency_control.PDF
- 4. http://nptel.ac.in/courses/106106093/

Course Outcomes:

- 1. **Identify** and define the data models needed to design a database and SQL.
- 2. Analyze functional dependencies, normalization for designing a robust database.
- 3. Implement transactions, concurrency control, recovery and Query optimization techniques.
- 4. **Describe** about data storage and compares various indexing and hashing techniques.
- 5. **Understand** processing of data in distributed databases And concurrency control and applications.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M Il	ch m	
Code: 75109		L	Τ	P
Credits: 2	DATA ANALY TICS LAB	-	•	4

Prerequisites: Probability & Statistics and Data Mining

Programs on Data Analytics:

- a) Demonstrate how variables are processed and data is displayed using R.
 b) Using a suitable example show that R is case-sensitive.
- 2. a) Show how scalars and lists are processed in R.
 - b) Show how vectors are processed in R.
- 3. Show how matrices can be added and multiplied in R using an appropriate example.
- 4. Demonstrate using different colors how graphics is processed and displayed using R.
- 5. a) Using appropriate example show how graphs can be displayed using R.
 b) Using appropriate example demonstrate statistical analysis using R (For example, calculation of mean, variance etc).
- 6. Consider any real dataset and demonstrate Linear Regression.
- 7. Consider any real dataset and demonstrate Random Forest.
- 8. Consider any real dataset and demonstrate CART (Classification and Regression Trees).
- 9. Consider any real dataset and demonstrate Support Vector Machines (SVM).
- 10. Consider any real dataset and demonstrate Neural Networks.
- 11. Consider any real dataset and demonstrate Naïve Bayes Classification.
- 12. Consider any real dataset and demonstrate K-means Clustering.

TEXT BOOKS

- 1. Frank J Ohlhorst, "**Big Data Analytics: Turning Big Data into Big Money**", Wiley and SAS Business Series, 2012.
- 2. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", Second Edition, Elsevier, Reprinted 2008.

REFERENCES

- 1. Colleen Mccue, "Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis", Elsevier, 2007.
- 2. Tom M. Mitchell, "Machine Learning", Mc Graw Hill, 1997.

E-RESOURCES

- 1. https://www.r-project.org/.
- 2. https://cran.r-project.org/manuals.html.

Course Outcomes:

- 1. **Understand** the basic concepts of R programming.
- 2. Apply data analytics for a given problem using statistical analysis.
- 3. Classify and predict the data sets using R.
- 4. Compare and apply different clustering techniques on given data sets using R.

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M II	M.Tecl II Sem			M.Tecl II Sem	
Code: 75110	CENTINIA D. II	L	Т	Р			
Credits: 2	SEIVIIINAK-II	-	-	4			

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M II	M.Tecl III Sen		
Code: 75135	Comprehensive Vive Vees	L	Т	Р	
Credits: 6	Comprehensive viva-voce	-	-	-	

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M II	M.Tecl III Sen		
Code: 75136		L	Т	Р	
Credits: 16	Project work Part - 1	-	-	-	

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M IV	M.Tec IV Ser			M.Tech IV Sem	
Code: 75137	Ducient Work Dout II	L	Т	Р			
Credits: 6	Project work Part -11	-	-	-			

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	M IV	M.Tec IV Ser			M.Tech IV Sen	
Code: 75138		L	Т	Р			
Credits: 16	Project viva-voce	-	I	-			