CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
DEPARTMENT OF CSE

ACADEMIC REGULATION R02
FOR CBCS BASED M. TECH. (REGULAR) DEGREE PROGRAMMES

(Applicable for the students of M. Tech. programme admitted into I year from Academic Year 2015-16 and onwards)

1.0 Eligibility for Admissions

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

Admission 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 Government from time to time.

2.0 Award of M. Tech. degree

2.1. A student shall be declared eligible for the award of the M. Tech. Degree, if he pursues a course of study in not less than two and not more than four academic years. However, he is permitted to write the examinations for two more years after four academic years of course work, failing which he shall forfeit his seat in M.Tech programme.

2.2. The M. Tech. degree of Jawaharlal Nehru Technological University Hyderabad shall be conferred on candidates who are admitted to the program and who fulfil all the requirements for the award of the degree.

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

2.4 The medium of instruction and examination shall be English.

3.0 A. Courses of Study

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

1. Embedded Systems
2. Power Electronics
3. Structural Engineering
4. Computer Science & Engineering

and any other course as approved by the College/ University/AICTE from time to time.

B. Departments offering M.Tech. Programmes with specializations mentioned below:

Sl. No.	Department	M.Tech Course
1	ECE	Embedded Systems
2	EEE	Power Electronics
3	Civil	Structural Engineering
4	CSE	Computer Science & Engineering

4.0. Course Registration

4.1. A 'Faculty Advisor or Counselor' shall be assigned to each student, who will advise him about the PG Programme, its Course Structure and Curriculum, Choice/Option for 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 through 'ON-LINE SUBMISSIONS', ensuring 'DATE and TIME Stamping'. The ON-LINE Registration Requests for any 'CURRENT SEMESTER' shall be completed BEFORE the commencement of SEEs (Semester End Examinations) of the 'PRECEDING SEMESTER'.

4.3. A Student can apply for ON-LINE Registration, ONLY AFTER obtaining the 'WRITTEN APPROVAL' from his Faculty Advisor, which should be submitted to the College

Academic Section through the Head of Department (a copy of the same 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 Course(s) under a given/ specified Course Group/ Category as listed in the Course Structure, thereby causing discrepancy, the decision of Head of the Department shall be final.

4.5. Course Options exercised through ON-LINE Registration are final and **cannot** be changed /inter-changed; further, alternate choices will also not be considered. However, if the 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 Course (subject to offering of such a Course), or for another existing Course (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.

5.0. Attendance

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

5.1 The minimum instruction period for each semester shall be 90 clear instruction days.

5.2. A student shall be eligible to write semester end examinations **of a course** if he acquires a minimum of 75% of attendance **in that course.**

5.3. Condonation of shortage of attendance in each Course up to 10% (65% and above and below 75%) in each semester may be granted by the Institute Academic Committee on valid medical reasons.

5.4. Shortage of attendance below 65% shall not be condoned.

5.5. Students whose shortage of attendance is not condoned in any semester **for a course(s)** are not eligible to write their end

semester examination of **those** courses and their registration **for these courses** shall stand cancelled. **They have to register for these courses later when offered.**

5.6. A fee as prescribed by the Institute Academic Committee shall be payable towards condonation of shortage of attendance.

5.7. A candidate shall put in a minimum required attendance, in at least 3 theory Courses in I semester for promoting to II semester.

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

5.9. A student shall not be promoted to the next semester unless he satisfies the attendance requirement of the present semester as applicable. They may re-register for the semester when offered next. If a candidate fulfils the attendance requirement in the present semester, he shall not be eligible for re-registration into the same class.

6. Evaluation

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

6.2. For the theory courses 70 marks shall be awarded based on the performance in the Semester End Examination and 30 marks shall be awarded based on the Internal Evaluation. For internal evaluation there shall be the two internal examinations conducted-one in the middle of the semester and the other immediately after the completion of instruction period. Each internal examination shall be conducted for a total duration of 120 minutes. The final marks secured by the student in 'internal evaluation' for the semester are arrived at by giving a weightage of 70% to the best secured 'internal examination' and 30% weightage to the least secured 'internal examination'. A student who is absent for any internal examination for any reason what so ever shall be deemed to have secured 'zero' marks in the test/ examination and no make-up test/ examination shall be conducted.

6.3. Question paper pattern for evaluation

Internal Examination

Part A (10 Marks)

5 questions of 2 marks each (All questions are compulsory).

Part B (20 Marks)

4 questions to be answered out of 6 questions, each question carries 5 marks.

External Examination

Part A (20 Marks)

5 questions (1 question from each unit) of 4 marks each (Compulsory questions)

Part B (50 Marks)

5 questions (1 question from each unit with internal choice) each question carries 10 marks.

6.4. For practical courses, 70 marks shall be awarded based on the performance in the End Semester Examinations. 30 marks shall be awarded for day to day performance in the practicals as internal marks.

6.5. Laboratory end examination for M. Tech. courses for 70 marks must be conducted with two Examiners, one of them being the Laboratory Course Teacher and the second examiner shall be external examiner. External Examiner shall be appointed by the Controller of Examinations from other institutions or industry.

6.6. There shall be seminar presentation during I semester as well as 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 Head of the Department, Supervisor and two other senior faculty members of the department. For each Seminar there will only be internal evaluation for 50 marks. A candidate has to secure for each seminar a minimum of 50% of maximum marks to be declared successful. If he fails to secure minimum marks, he has to re-

appear during the supplementary examinations.

6.8. There shall be a Comprehensive Viva-Voce in III Semester. The Comprehensive Viva-Voce is intended to assess the student's understanding of various Courses during the M.Tech course of study. The Viva-Voce will be conducted by a Committee consisting of Head of the Department, two Senior Faculty members of the Department. The Comprehensive Viva-Voce is evaluated for 100 marks by the Committee. There are no internal marks for the Comprehensive Viva-Voce. A candidate has to secure a minimum of 50% of marks to be declared successful.

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

6.10. In case the candidate does not secure the minimum academic requirement in any course (as specified in 6.9) he has to reappear for the Semester End Examination in that course.

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

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

7. Examinations and Assessment – The Grading System

7.1 Marks will be awarded to indicate the performance of each student in each Theory Course or Lab/Practical, or Seminar, or Project, et., 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 range of percentage of marks shall be followed:

% of Marks Secured (class intervals)	Letter Grade (UGC Guidelines)	Grade Points
80% and above (≥ 80%, ≤ 100%)	**O (Outstanding)**	**10**
Below 80% but not less than 70% (≥ 70%, <80%)	**A^+ (Excellent)**	**9**
Below 70% but not less than 60% (≥ 60% , <70%)	**A (Very Good)**	**8**
Below 60% but not less than 55% (≥ 55%, <60%)	**B^+ (Good)**	**7**
Below 55% but not less than 50% (≥ 50%, < 55%)	**B (above Average)**	**6**
Below 50% (< 50%)	**F (FAIL)**	**0**
Absent	**AB**	**0**

7.3 A student obtaining 'F' Grade in any Course shall be considered ' failed ' and is required to reappear as 'Supplementary Candidate' in the Semester End Examination (SEE), as and when offered. In such cases, his Internal Marks (CIE Marks) in those Courses will remain the same as those he obtained earlier.

7.4 A student not appeared for examination the 'AB' Grade will be allocated in any Course shall be considered 'failed' and will be required to reappear as 'Supplementary Candidate' in the Semester End Examination (SEE), as and when offered.

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 Course (s) only for the sake of 'Grade Improvement' or 'SGPA/CGPA Improvement'

7.7 A student earns Grade Point (GP) in each Course, on the basis of the Letter Grade obtained by him in that Course. The corresponding 'Credit Points '(CP) are computed by multiplying, the Grade Point with Credits for that particular Courses.

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

7.8 The Student passes the Course only when he **gets GP ≥ 6 (B Grade or above)**

7.9 The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points (∑CP) secured from All Courses registered in a Semester, by the Total Number of Credits registered during that Semester. SGPA is rounded off to TWO Decimal Places, SGPA is thus computed as.

SGPA = $\{ \sum^{N}_{i=1} C_i G_j \} / \{ \sum^{N}_{i=1} C_i \}$ ….For each Semester.

Where 'i' is the Course indicator index (takes into account all Courses in a Semester), 'N' is the no. of Courses '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 i^{th} Course, and G_i represent the Grade Points (GP) corresponding to the Letter Grade awarded for that i^{th} Course.

7.10. The Cumulative Grade Point Average (CGPA) is 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 I Year Second Semester onwards, as the end of each Semester, as per the formula.

CGPA = $\{\sum^{M}_{j=1} C_j G_j \} / \{\sum^{M}_{j=1} C_j\} \}$ …. For all S Semester registered

{ it., upto and inclusive of S Semester, S ≥2).

Where 'M' is the TOTAL no. of Subject (as specifically required and listed under the Course Structured of the parent Department)

the Student has 'REGISTERED' from the 1st Semester onwards upto and inclusive of the Semester S (Obviously M > N), 'j ' is the Subject indicator index (takes into account all Courses from 1 to S Semesters),C_j is the no. of Credits allotted to the j^{th} Courses from G_j represent the Grade Points (GP) corresponding to the Letter Grade awarded for the j^{th} Course. After registration and completion of II 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 Courses (securing F Grade) will also be take into account, and the credits of such Courses will also be included in the multiplications and summations.

7.12. For Calculations listed in item 7.6 – 7.10, performance in failed Courses (Securing F Grade) will also be taken into account, and the Credits of such Courses will also be included in the multiplication 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, Project Supervisor and one senior faculty member of the Department offering the M.Tech programme as members.

8.2 Registration of Project Work: A Candidate is permitted to register for the project work after satisfying the attendance requirement of all the courses, both theory and practical of I year.

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 changes of topic/supervisor leads to a major changes 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 3 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.

8.7 After approval from the PRC, the soft copy of the thesis should be submitted to the College for ANTI-PLAGIARISM check and the plagiarism report should be included in the final thesis. If the result of above check is less than 24%, then only thesis will be accepted for submission.

8.8. Three copies of the Project Thesis certified by the supervisor shall be submitted to the College.

8.9 For Project Work Review-I will be conducted in III Semester and carries a maximum internal marks of 50. The evaluation should be done by the PRC for 25 marks and Project Supervisor for 25 marks. The Supervisor and PRC will examine the Literature Survey in the same domain, Problem Definition, Objective, Scope of Work**.** A candidate has to secure a minimum of 50% of marks to be declared successful in Project Work Review I. If he fails to secure minimum required marks he has to reappear during the supplementary examination.

8.10. Project Work Review II in IV Semester carries 50 internal marks. The evaluation should be done by the PRC for 25 marks and the Project Supervisor for 25 marks. The PRC will examine the overall progress of the Project Work and decide the eligibility of the Project for final submission. A candidate has to secure a minimum of 50% of marks to be declared successful in Project Work Review II. If he fails to fulfill minimum marks, he has to reappear for Review-II during the supplementary examination.

8.11 The thesis shall be adjudicated by the committee consisting of one senior faculty selected by the Head of the Department, the guide concerned, Head of the Department and external examiner.

8.12 If the report of the committee is not favourable, the candidate shall revise and resubmit the Thesis. If the report of the committee is unfavourable again, the thesis shall be summarily rejected.

8.13. For Project Work Evaluation (Viva Voice) will be conducted on acceptance of the Thesis in IV Semester. This is an external evaluation for 150 marks and will be evaluated by the committee. The External Examiner for the committee shall be appointed by the Controller of Examinations. The candidate has to secure minimum of 50% marks in Project Evaluation (Viva Voice) examination for its successful completion.

8.14. If he fails to secure minimum marks as specified in 8.13, he will reappear for the Viva Voice examination only after three months. In the reappeared examination also if the candidate fails to secure minimum prescribed marks the registration for the programme stands cancelled and he will not be eligible for the award of the degree.

8.15. The Head of the Department shall coordinate and make arrangements for the conduct of Project Viva Voice examination.

9. Award of Degree and Class

9.1 A Student who registers for all the specified Courses as listed in the Course Structure, satisfies all the Course Requirements, and passes the examinations prescribed in the entire PG Programme (PGP), and secured the required number of **88** Credits (with CGPA $\geq$ 6.0), shall be declared to have 'QUALIFIED' for the award of the M.Tech. Degree in the chosen Branch of Engineering and Technology, with the specialization for which he took admission.

9.2 Award of Class

After a student has satisfied the requirements prescribed for the completion of the programme, becomes 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 and Distinction	**$\geq$ 7.75**
First Class	**6.75 $\leq$ CGPA > 7.75**

Second Class	**6.00 ≤ CGPA < 6.75**

9.3 A student with final CGPA (at the end of the PGP) < 6.00 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 institution 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.

11. General

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

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

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

11.4. The college may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.

MALPRACTICES RULES
DISCIPLINARY ACTION FOR
IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/ Improper conduct	**Punishment**
1.(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other 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/year. The Hall Ticket of the candidate is to be cancelled.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been

		impersonated, shall be cancelled in all the Courses of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the Remaining Courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination	Expulsion from the examination hall and cancellation of performance in that subject and all the other Courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the Courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end semester Examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks	Cancellation of the performance in that subject
6.	Refuses to obey the orders of the Chief Superintendent/Assistant– Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the college or organizes a walk out or	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other Courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the

	instigates others **to** examination hall 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 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.	Courses of that semester/year. The candidates are also debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other Courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the Courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or	Expulsion from the examination hall and

	firearm in the examination hall.	cancellation of the performance in that subject 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/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	If the student belongs to the college, expulsion from the examination hall an cancellation of performance in that subject and all other Courses hall and all other Courses that candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the Courses of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other Courses the candidate has already appeared including practical examinations and project work and shall not be permitted for other remaining examinations of the Courses of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other Courses the candidate has appeared including practical examinations and project work of that semester/year.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the College Academic Committee for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators

Punishments to the candidates as per the above guidelines.

Malpractice identified at Spot center during valuation

The following procedure is to be followed in case of malpractice cases detected during valuation, scrutiny etc. at spot center.

1) Malpractice is detected at the spot valuation. The case is to be referred to the malpractice committee. Malpractice committee will meet and discuss/question the candidate and based on the evidences, the committee will recommend suitable action on the candidate.
2) A notice is to be served to the candidate(s) involved through the Principal to his address and to the candidate(s) permanent address regarding the malpractice and seek explanations.

3) The involvement of staff who are in charge of conducting examinations, invigilators valuing examination papers and preparing / keeping records of documents relating to the examinations in such acts (inclusive of providing incorrect or misleading information) that infringe upon the course of natural justice to one and all concerned at the examinations shall be viewed seriously and recommended for award of appropriate punishment after thorough enquiry.

4) Based on the explanation and recommendation of the committee, action may be initiated.

5) **Malpractice committee:**

i.	Controller of Examinations	Chairman
ii.	Assistant controller of Evaluation	Member
iii.	Chief Examiner of the subject/ subject expert	Member
iv.	Concerned Head of the Department	Member
v.	Concerned Invigilator	Member

DEPARTMENT OF CSE

COURSE STRUCTURE FOR M.TECH
(COMPUTER SCIENCE & ENGINEERING) R-02

EFFECTIVE FROM AC YEAR 2015-16

I Semester			Title	L	P	C
CODE		Group				
1	B2501	CC	Advanced Data Structures and Algorithms	4	--	4
2	B2512	CC	Database Internals	4	--	4
3	B2503	CC	Distributed Systems	4	--	4
4		PE	Professional Elective –I	4	--	4
5		PE	Professional Elective –II	4	--	4
6		OE	Open Elective -I	4	--	4
7	B2531	CC	Advanced Data Structures and Algorithms Lab	--	4	2
8	B2526	PW	Seminar	--	4	2
Total				24	8	**28**

II Semester			Title	L	P	C
CODE		Group				
1	B2513	CC	Advanced Network Programming	4	--	4
2	B2533	CC	Cloud Computing	4	--	4
3	B2515	CC	Web Services and Service Oriented Architecture	4	--	4
4		PE	Professional Elective -III	4	--	4
5		PE	Professional Elective -IV	4	--	4
6		OE	Open Elective -II	4	--	4
7	B2532	CC	Web Services Lab	--	4	2
8	B2527	PW	Seminar	--	4	2
Total				24	8	**28**

II Year

III Semester				L	P	C
1	B2528	PW	Comprehensive Viva-Voce	--	--	4
2	B2530A	PW	Project Work (Review-I)	--	24	12
Total				**--**	**--**	**16**

IV Semester				L	P	C
1	B2530B	PW	Project Work (Review-II)	--	--	4
2	B2530C	PW	Project Work (Viva-Voce)		16	12
Total				**--**	**--**	**16**

Electives

S. No	Code	Name of Subject
Professional Elective –I		
1	B2519	Network Security
2	B2523	Android Application Development
3	B2525	Internet of Things
Professional Elective –II		
1	B2524	Machine Learning
2	B2507	Software Architecture Design Patterns
3	B2504	Real Time Operating Systems
Professional Elective –III		
1	B2511	Database security
2	B2517	Advanced Data Mining
3	B2518	Expert Systems
Professional Elective –IV		
1	B2520	Semantic Web and Social Networks
2	B2521	Information Retrieval Systems
3	B2522	Parallel and Distributed Algorithms
Open Elective –I		
1	B2534	"R" Programming
2	B2535	Big Data Analytics
3	B2536	Mobile Computing
4	B2240	Robotics(ECE)
5	B2319	Renewable Energy Systems(EEE)

Open Elective –II		
1	B2321	Neural Networks & Fuzzy Systems(EEE)
2	B2537	Cyber Security
3	B2506	Soft Computing
4	B2250	Micro Controllers & Applications(ECE)
5	B2538	Mobile Application Security

S. No	**Category**
CC	Core Course
PE	Professional Elective
OE	Open Elective
PW	Project Work, Seminar

DETAILED SYLLABUS

(B2501)ADVANCED DATA STRUCTURES AND ALGORITHMS

M.Tech(CSE) I Semester

L	T	P	C
4	0	0	4

Course Objectives

- Introduce the structured representation of data in computer systems and programming languages.
- Analyse the time and size efficiency trade-offs of the various data structures and access algorithms.
- Create structures that maintain complex data relationships in order to access, search through and modify that data in an organized and efficient manner.

Course Outcomes

- Using Java programming language to create data structures
- Organizing data into lists, stacks and queues and developing efficient algorithms to access that data using iteration and recursion to solve complex, real-world problems.
- Familiarity with other complex data structures such as trees and graphs

Unit-I

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

Unit-II

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

Queues in java.util, Iterators in java.util.

Unit-III

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

Unit-IV

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

Unit-V

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

Text Books

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

Reference Books

1. Java for Programmers, Deitel and Deitel, Pearson education.
2. Data structures and Algorithms in Java, R.Lafore, Pearson education.
3. Java: The Complete Reference, 8th editon, Herbert Schildt, TMH.
4. Data structures and Algorithms in Java, M.T.Goodrich, R.Tomassia, 3rd edition, Wiley India Edition.

5. Data structures and the Java Collection Frame work,W.J.Collins, Mc Graw Hill.
6. Classic Data structures in Java, T.Budd, Addison-Wesley (Pearson Education).
7. Data structures with Java, Ford and Topp, Pearson Education.
8. Data structures using Java, D.S.Malik and P.S.Nair, Cengage learning.
9. Data structures with Java, J.R.Hubbard and A.Huray, PHI Pvt. Ltd.
10. Data structures and Software Development in an Object-Oriented Domain, J.P.Tremblay and G.A.Cheston, Java edition, Pearson Education.

(B2512) DATABASE INTERNALS

M.Tech(CSE) I Semester

L	T	P	C
4	0	0	4

Course Objectives

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

Unit-I

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

Unit-II

Introduction to Schema Refinement – Problems Caused by redundancy, Decompositions – Problem
related to decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms – FIRST, SECOND, THIRD Normal forms – BCNF –Properties of Decompositions- Loss less- join Decomposition, Dependency preserving Decomposition, Schema Refinement in Data

base Design – Multi valued Dependencies – FOURTH Normal Form, Join Dependencies, FIFTH Normal form.

Unit-III

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

Concurrency Control: Serializability, and recoverability – Introduction to Lock Management – Lock Conversions, Dealing with Deadlocks, Specialized Locking Techniques – Concurrency Control without Locking.

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

Unit-IV

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing – Clustered Indexes, Primary and Secondary Indexes, Index data Structures – Hash Based Indexing, Tree based Indexing

Storing data: Disks and Files: -The Memory Hierarchy – Redundant Arrays of Independent Disks. Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM) B+ Trees: A Dynamic Index Structure, Search, Insert, and Delete.

Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendable Vs Linear Hashing.

UNIT V

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

Text Books

1. Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, TMH, 3rd Edition, 2003.
2. Data base System Concepts, A.Silberschatz, H.F. Korth, S.Sudarshan, McGraw hill, VI edition, 06
3. Fundamentals of Database Systems 5th edition, Ramez Elmasri,

Shamkant B.Navathe, Pearson Edition 2008.

Reference Books

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

(B2503) DISTRIBUTED SYSTMES

M.Tech(CSE) I Semester

L	T	P	C
4	0	0	4

Course Objectives

- Learn the fundamental architectures and distributed system models
- Understand synchronization problems and Clock mechanisms
- Compare and analyse the differences between conventional and distributed transactions
- Discuss Various security issues in distributed environment

Course Outcomes

- Analyse the problem with clock mechanisms in distributed environment
- Understand the concept of distributed transactions , distributed operating system security issues
- Compare Conventional OS with distributed OS features.
- Knowledge about distributed memory management.

Unit-I

Characterization of Distributed Systems- Introduction, Examples of Distributed systems, Resource sharing and web, challenges, System models- Introduction, Architectural and Fundamental models, Networking and Internetworking, Interprocess Communication. Distributed objects and Remote Invocation- Introduction, Communication between distributed objects, RPC, Events and notifications, Case study-Java RMI.

Unit-II

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 the Domain Name System, Case study of the Global Name Service, Case study of the X.500 Directory Service.

Unit-III

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. 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 - Introduction, Distributed mutual exclusion, Elections, Multicast communication, consensus and related problems.

Unit-IV

Transactions and Concurrency control - Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency controls. Distributed Transactions - Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery, Replication- Introduction, System model and group communication, Fault tolerant services, Transactions with replicated data.

Unit-V

Security - Introduction, Overview of Security techniques, Cryptographic algorithms, Digital signatures, Case studies-Kerberos, TLS, 802.11 WiFi.Distributed shared memory, Design and Implementation issues, Sequential consistency and Ivy case study, Release consistency and Munin case study, Other consistency models, CORBA case study-Introduction, CORBA RMI,CORBA Services.

Text Books

1. Distributed Systems Concepts and Design, G Coulouris, J Dollimore and T Kindberg, Fourth Edition, Pearson Education.
2. Distributed Systems, S.Ghosh, Chapman & Hall/CRC, Taylor & Francis Group,2010.
3. Distributed Systems – Principles and Paradigms, A.S. Tanenbaum and M.V. Steen, Pearson Education.

Reference Books

1. Distributed Computing, S.Mahajan and S.Shah, Oxford University

Press.
2. Distributed Operating Systems Concepts and Design, Pradeep K.Sinha, PHI.
3. Advanced Concepts in Operating Systems, M Singhal, N G Shivarathri, and Tata McGraw- Hill
4. Reliable Distributed Systems, K.P.Birman, Springer.
5. Distributed Operating Systems and Algorithm Analysis, R.Chow, T.Johnson, Pearson.
6. Distributed Operating Systems, A.S.Tanenbaum, and Pearson education.
7. Distributed Computing, Principles, Algorithms and Systems, Ajay D. Kshemakalyani & Mukesh Singhal, Cambridge, rp 2010

(B2519) NETWORK SECURITY

(Professional Elective-I)

M.Tech(CSE) I Semester

L	T	P	C
4	0	0	4

Course Objectives

- Understand the basic categories of threats to computers and networks
- Understand various cryptographic algorithms.
- Describe public-key cryptosystem
- Describe the enhancements made to IPv4 by IPSec
- Understand Intrusions and intrusion detection
- Discuss the fundamental ideas of public-key cryptography.
- Generate and distribute a PGP key pair and use the PGP package to send an encrypted e-mail message
- Discuss Web security and Firewalls

Unit-I

Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security **Cryptography: Concepts and Techniques:** Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

Unit-II

Symmetric key Ciphers: Block Cipher principles & Algorithms(DES, AES, Blowfish), Differential and Linear Cryptanalysis, Block cipher modes of operation, Stream ciphers, RC4,Location and placement of encryption function, Key distribution **Asymmetric key Ciphers:** Principles of public key cryptosystems, Algorithms(RSA, Diffie-Hellman, ECC), Key Distribution

Unit-III

Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions,
Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack

algorithm **Authentication Applications:** Kerberos, X.509 Authentication Service, Public – Key Infrastructure, Biometric Authentication

Unit-IV

Mail Security: Pretty Good Privacy, S/MIME **IP Security:** IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, combining security associations, key management

Unit-V

Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction **Intruders, Virus and Firewalls:** Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls

Case Studies on Cryptography and security: Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability, Virtual Elections.

Text Books

1. Cryptography and Network Security : William Stallings, Pearson Education,5th Edition
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 2nd Edition.
3. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

Reference Books

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

6. Principles of Information security by Michael E Whitman and Herbert J.Mattord.

(B2523) ANDROID APPLICATION DEVELOPMENT

(Professional Elective-I)

M.Tech(CSE) I Semester

L	T	P	C
4	0	0	4

Course Objectives

- To demonstrate their understanding of the fundamentals of Android operating systems To demonstrate their skills of using Android software development tools
- To demonstrate their ability to develop software with reasonable complexity on mobile platform
- To demonstrate their ability to deploy software to mobile devices
- To demonstrate their ability to debug programs running on mobile devices

Unit-I

Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Eclipse platform, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

Unit-II

Android User Interface: Measurements – Device and pixel density independent measuring units Layouts –Linear, Relative, Grid and Table Layouts User Interface (UI) Components – Editable and non editable TextViews, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers Event Handling – Handling clicks or changes of various UI components Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

Unit-III

Intents and Broadcasts: Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity Notifications – Creating and Displaying notifications, Displaying Toasts

Unit-IV

Persistent Storage: Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference Database – Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and deleting data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

Unit-V

Advanced Topics: Alarms – Creating and using alarms Using Internet Resources – Connecting to internet resource, using download manager Location Based Services – Finding Current Location and showing location on the Map, updating location

Text Books

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox) , 2012
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013

Reference Books

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013

(B2525) INTERNET OF THINGS

(Professional Elective-I)

M.Tech(CSE) I Semester

L	T	P	C
4	0	0	4

Course Objectives:

- To introduce the terminology, technology and its applications
- To introduce the concept of M2M (machine to machine) with necessary protocols
- To introduce the Python Scripting Language which is used in many IoT devices
- To introduce the Raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of web based services on IoT devices

Unit I

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

Unit II

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

Unit III

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

Unit IV

IoT Physical Devices and Endpoints - Introduction to Raspberry PI-

Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

Unit V

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework
Designing a RESTful web API

Text Books

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

(B2524) MACHINE LEARNING
(Professional Elective-II)

M.Tech(CSE) I Semester

L	T	P	C
4	0	0	4

Objectives:

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

UNIT I

Introduction - Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning

Concept learning and the general to specific ordering – Introduction, A concept learning task, concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias

UNIT II

Decision Tree learning – Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning **Artificial Neural Networks –** Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition Advanced topics in artificial neural networks

Evaluation Hypotheses – Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence

intervals, Difference in error of two hypotheses, Comparing learning algorithms

UNIT III

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm **Computational learning theory –** Introduction, Probability learning an approximately correct hypothesis, Sample complexity for Finite Hypothesis Space, Sample Complexity for infinite Hypothesis Spaces, The mistake bound model of learning –

Instance-Based Learning- Introduction, k -Nearest Neighbour Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning **Genetic Algorithms** – Motivation, Genetic Algorithms, An illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

UNIT IV

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

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

UNIT V

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

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

Text Books

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

Reference Books

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc., 2001
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995

(B2507) SOFTWARE ARCHITECTURE DESIGN PATTERNS
(Professional Elective-II)

M.Tech(CSE) I Semester

L	T	P	C
4	0	0	4

Objectives

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

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

Unit-I

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

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

Unit-II

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

Moving from one system to many Software Product Lines, Building systems from off the shelf components, Software architecture in future.

Unit-III

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

Creational and Structural patterns Abstract factory, builder, factory method, prototype, singleton, adapter, bridge, composite, façade, flyweight.

Unit-IV

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

Unit-V

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

Text Books

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

Reference Books

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

(B2504) REAL TIME OPERATING SYSTEMS
(Professional Elective-II)

M.Tech(CSE) I Semester

L	T	P	C
4	0	0	4

Course Objectives

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

Course Outcomes

- Students explains what a real-time operating system (RTOS) is, how real-time operating systems are useful for measurement and control applications.
- Understand Distributed Operating System Design issues, features and principles of working
- Analyse Functions of Network operating systems
- Understand Kernel Issues and development principles
- Able to implement Protection, privacy, access control and security for real time Applications.

Unit-I

Real-time operating systems: Introduction to Real-Time Operating Systems, Definitions, Role of an OS in Real Time Systems, Important Terminology and Concepts Example Real-Time Applications, How Real-Time OSs Differ from General-Purpose OSs, Design issues, principles and case study.

Unit-II

Distributed operating system: Introduction to Distributed Systems, Definitions, Goals, Advantages of Distributed Systems over Centralized Systems, Advantages of Distributed Systems over Independent PCs, Disadvantages of Distributed Systems Design issues, features and principles of working, case study.

Unit-III

Network operating system: Introduction to Network operating system, Definitions, Different types of network operating systems, Function of Network operating systems, Design issues, working principles and characteristic features, case study.

Unit-IV

Kernel development: Introduction, Overview, Issues and development principles, case study.

Unit-V

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

Text Books

1. A. Silberschatz - Applied Operating System Concepts, Wiley, 2000.
2. Lubemir F Bic and Alan C. Shaw - Operating System Principles, Pearson Education, 2003.
3. Andrew S. Tanenbaum, "Distributed Operating Systems" ,PHI

Reference Books

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

(B2534) " R" PROGRAMMING
(Open Elective-I)

M.Tech(CSE) I Semester

L	T	P	C
4	0	0	4

Course Objectives:

- To Learn the fundamentals of R
- To Understand performing operations on complex data types
- To understanding how to use the four object systems in R
- To Enable the students to use existing functional programming tools
- Explains how to create functions that use non-standard evaluation in a principled way
  - Shows how to use profiling to pinpoint performance bottlenecks and how to convert slow R functions to fast C++ equivalents.

Unit-I

Introduction to R programming, Introduction to Functions, Preview of Important R Data Structures, Vectors ,Recycling, Common Vector Operations, Vectorized Operations, Filtering Matrices and Arrays

Unit – II

Lists, Creating Lists, General List Operations Accessing List Components and Values, Applying Functions to Lists, Recursive Lists, Data Frames, Creating Data Frames, Other Matrix-Like Operations, Merging Data Frames, Applying Functions to Data Frames, Factors and Tables, Factors and Levels, Common Functions Used with Factors, Working with Table, Table-Related Functions

Unit-III

R Programming Structures, Control Statements, Arithmetic and Boolean Operators and Values, Default Values for Arguments, Environment and Scope Issues, Recursion Replacement Functions, Anonymous Functions Data Frames, Creating Data Frames, Other Matrix-Like Operations, Merging Data Frames, Applying Functions to Data Frames, Factors and Tables Factors and Levels, Common Functions Used with Factors, Working with Table, Table-Related Functions, R Programming Structures, Control Statements Arithmetic and Boolean Operators and

Values, Default Values for Arguments, Environment and Scope Issues, Recursion Replacement Functions, Anonymous Functions Corporate Digital Library - Document Library, digital Document types, corporate Data Warehouses.

Unit-IV

Math and Simulations in R, Math Functions, Functions for Statistical Distributions, Sorting, Linear Algebra Operations on Vectors and Matrices, Set Operations, Simulation Programming in R, Object-Oriented Programming, S3 Classes, S4 Classes, S3 Versus S4, Managing Your Objects

Unit-V

Input/ Output, Accessing the Keyboard and Monitor, Reading and Writing Files, Accessing the Internet, String Manipulation, String-Manipulation Functions, Regular Expressions, Use of String Utilities in the edtdbg Debugging Tool, Creating Graphs, Customizing Graphs, Saving Graphs to Files creating three dimensional plots

Text Books

1. Art of R programming by Norman Matloff , safari books online Publisher: No Starch Press

Reference Books

1. Beginning R: The Statistical Programming Language by mark gardener wrox publication
2. Beginning R by lary pace Publishers appress publishing
3. R Programming for Dummies by Andrie De Vries and Joris Meys,Wiley India Private Limited; 1st edition

(B2535) BIG DATA ANALYTICS
(Open Elective-I)

M.Tech(CSE) I Semester

L	T	P	C
4	0	0	4

Course Objectives

- To understand about big data
- To learn the analytics of Big Data
- To Understand the MapReduce fundamentals

Unit I

Big Data Analytics : What is big data, History of Data Management ; Structuring Big Data ; Elements of Big Data ; Big Data Analytics; 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, 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;

Unit- II

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; Introducing Popular Analytical Tools; Comparing Various Analytical Tools.

Unit III

Understanding Map Reduce Fundamentals and HBase : The Map Reduce Framework; Techniques to Optimize Map Reduce Jobs; Uses of Map Reduce; Role of HBase in Big Data Processing; Storing Data in Hadoop : Introduction of HDFS, Architecture, HDFC Files, File system types, commands, org.apache.hadoop.io package, HDF, HDFS High Availability; Introducing HBase, Architecture, Storing Big Data with HBase , Interacting with the Hadoop Ecosystem; HBase in Operations-Programming with HBase; Installation, Combining HBase and HDFS;

Unit IV

Big Data Technology Landscape and Hadoop : NoSQL, Hadoop; RDBMS versus Hadoop; Distributed Computing Challenges; History of Hadoop; Hadoop Overview; Use Case of Hadoop; Hadoop Distributors; HDFC (Hadoop Distributed File System), HDFC Daemons, read, write, Replica Processing of Data with Hadoop; Managing Resources and Applications with Hadoop YARN.

Unit V

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: Introducing Mobile Analytics; Define Mobile Analytics; Mobile Analytics and Web Analytics; Types of Results from Mobile Analytics; Types of Applications for Mobile Analytics; Introducing Mobile Analytics Tools;

Text Books

1. BIG DATA and ANALYTICS, Seema Acharya, Subhasinin Chellappan, Wiley publications.
2. BIG DATA, Black Book™ , DreamTech Press, 2015 Edition.
3. BUSINESS ANALYTICS 5e , BY Albright |Winston

Reference books:

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

(B2536) MOBILE COMPUTING
(Open Elective-I)

M.Tech(CSE) I Semester

L	T	P	C
4	0	0	4

UNIT-I

Introduction, Mobile Computing Architecture, Mobile Computing through Telephony, Emerging Technologies

UNIT-II

Global System for Mobile Communications (GSM), Short Message Service (SMS), General Packet Radio Services (GPRS), Wireless Application Protocol (WAP), CDMA and 3G.

UNIT-III

Wireless LAN, Intelligent Network and Internetworking, Client Programming, Programming for PalmOS, Wireless Devices with Symbian OS.

UNIT-IV

J2ME Introduction, J2ME Architecture, MIDLET, MidLet Suite , J2ME Profiles, Wireless Devices with WindowsCE, Voice Over Internet Protocol and Convergence, Session Internet Protocol(SIP),other protocols.

UNIT-V

Multimedia, IP Multimedia Subsystems, Security Issues in Mobile Computing, Next Generation Networks.

Textbooks

1. Mobile Computing Technology, Applications and Service Creation by Ashok Talukder , Hasan Ahmed, Roopa R Yavagal.
2. Mobile Computing Principles by Raza B'Far, Cambridge.
3. Mobile Computing by Raj Kamal 2e.
4. Mobile Computing by Jochen schiller

(B2240) ROBOTICS

(Open Elective – I, Offered by ECE Dept)

M.Tech(CSE) I Semester

L	T	P	C
4	0	0	4

Unit - I: Introduction & Basic Definitions

Introduction, Control Programs for Robots, Industry Applications of Robots, Pick and Place, Gantry and Arm type Robots in typical set-ups like Automobile Industry Coordinate Systems: Cartesian, Cylindrical, Polar, and Revolute systems: Robot Positioning: Robot Arms; Axes, their ranges, offset and In-line Wrist: Roll, Pitch and Yaw, their meaning in Robotics

Unit-II: Mechanical Aspects

Kinematics, Inverse Kinematics, Motion planning and Mobile Mechanisms

Unit-Ill: Sensors and Applications

Range and Use of Sensors, Micro switches, Resistance Transducers, Piezo-electric, Infrared and Lasers. Applications of Sensors: Reed Switches, Ultrasonic, Barcode Readers and RFlD

Unit-IV Robot Systems

Hydraulic and Electrical Systems including pumps, valves, solenoids, cylinders, stepper motors, Encoders and *i\C* Motors

Unit- V Programming of Robots

Programming of Robots such as Lego Robots, Programming environment, Example Applications, Safety considerations

Text books:

1. Introduction to Robotics - PJ .Mckerrow, ISBN: 0201182408
2. Introduction to Robotics - S. Nikv, 200 I, Prentice Hall,
3. Mechatronics and Robotics: Design & Applications - A. Mutanbara, I 999, CRC Press.

Reference book:

1. Robotics - K. S. Fu, RC. Gonzalez and C.S.G. Lee, 2008, TMH.

(B2319) RENEWABLE ENERGY SYSTEMS
(Open Elective – I, Offered by EEE Dept)

M. Tech(CSE) – II Semester

L	T	P	C
4	0	0	4

UNIT-I:

Photo voltaic power generation, spectral distribution of energy in solar radiation, solar cell configurations, voltage developed by solar cell, photo current and load current, practical solar cell performance, commercial photo voltaic systems, test specifications for PV systems, applications of super conducting materials in electrical equipment systems.

UNIT-II:

Principles of MHD power generation, ideal MHD generator performance, practical MHD generator, MHD technology.
Wind Energy conversion: Power from wind, properties of air and wind, types of wind Turbines, operating characteristics.

UNIT-III:

Tides and tidal power stations, modes of operation, tidal project examples, turbines and generators for tidal power generation.
Wave energy conversion: properties of waves and power content, vertex motion of Waves, device applications. Types of ocean thermal energy conversion systems Application of OTEC systems examples,

UNIT-IV:

Miscellaneous energy conversion systems: coal gasification and liquefaction, biomass conversion, geothermal energy, thermo electric energy conversion, principles of EMF generation, description of fuel cells, Co-generation and energy storage, combined cycle co-generation, energy storage.
Global energy position and environmental effects: energy units, global energy position.

UNIT-V:

Types of fuel cells, H_2-O_2 Fuel cells, Application of fuel cells – Batteries, Description of batteries, Battery application for large power. Environmental effects of energy conversion systems, pollution from coal and preventive measures steam stations and pollution, pollution free energy systems.

Text Books

1. "Energy conversion systems" by Rakosh das Begamudre, New age International publishers, New Delhi - 2000.
2. "Renewable Energy Resources" by John Twidell and Tony Weir, 2nd Edition, Fspon &Co.

(B2531) ADVANCED DATASTRUCTURES AND ALGORITHMS LAB

M.Tech(CSE) I Semester **L P C**
0 4 2

Course Objectives

- Explain the data structures and their categories.
- Understanding of abstract data types and differentiate linear and non-linear data structures
- Advance understanding of stack, queue and their applications.
- Understanding of Searching and sorting techniques in real-world scenarios and
- Advance knowledge of graphs and tress and their applications.

Course Outcomes

Understanding and applying the Techniques in Software Development Life cycle

- Apply fundamental knowledge of Data Structures in Real time applications.
- Develop a project based on Algorithms and Data Structures.
- Analyze and implement graphs and trees for real time applications.
- Perform text processing operations using pattern matching algorithms.

Sample Problems on Data Structures

1. Write Java programs that use both recursive and non-recursive functions for implementing the following searching methods:
   a) Linear search b) Binary search
2. Write Java programs to implement the following using arrays and linked lists a)List ADT 3.Write Java programs to implement the following using an array. a) Stack ADT b) Queue ADT
4. Write a Java program that reads an infix expression and converts the expression to postfix form. (Use stack ADT).
5. Write a Java program to implement circular queue ADT using an array.
6. Write a Java program that uses both a stack and a queue to test whether the given string is a palindrome or not.
7. Write Java programs to implement the following using a singly linked list.
   a) Stack ADT b) Queue ADT

8. Write Java programs to implement the deque (double ended queue) ADT using
   a) Array b) Singly linked list c) Doubly linked list.
9. Write a Java program to implement priority queue ADT.
10. Write a Java program to perform the following operations:

a) Construct a binary search tree of elements.

b) Search for a key element in the above binary search tree. c) Delete an element from the above binary search tree.

11. Write a Java program to implement all the functions of a dictionary (ADT) using Hashing.
12. Write a Java program to implement Dijkstra's algorithm for Single source shortest path problem.
13. Write Java programs that use recursive and non-recursive functions to traverse the given binary tree in
    a) Preorder b) Inorder c) Postorder
14. Write Java programs for the implementation of bfs and dfs for a given graph.
15. Write Java programs for implementing the following sorting methods:
    a) Bubble sort
    b) Insertion sort
    c) Quick sort
    d) Merge sort
    e) Binary tree sort
    f) Heap sort
    g) Radix sort
16. Write a Java program to perform the following operations:
    a) Insertion into a B-tree
    b) Searching in a B-tree
17. Write a Java program that implements Kruskal's algorithm to generate minimum cost spanning tree.
18. Write a Java program that implements KMP algorithm for pattern matching.

Reference Books

1. Data Structures and Algorithms in java, 3rd edition, A.Drozdek, Cengage Learning.
2. Data Structures with Java, J.R.Hubbard, 2nd edition, Schaum's

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

(B2513) NETWORK PROGRAMMING

M.Tech(CSE) II Semester

L	T	P	C
4	0	0	4

Course Objectives

- Introduce the student to Unix/Linux kernel programming techniques. Teach advanced C systems programming and debugging techniques in a Unix/Linux environment
- Introduce the concepts of files and Directories to manage the Linux Environment through C Programming.
- Provide knowledge in working with the core operating systems Concepts Signals in Linux Environment
- Teach how to manage the Inter process communication by using the IPC techniques
- Introduce the student to socket programming and to manage the connections between client and server.

Course Outcomes

At the end of this course, the student will be able:

- To Understand the Linux Operating system by commands and develop c programs.
- To Analyse the files and directories in Linux environment by developing C Applications
- To implement system programs to control the processes using signals.
- To Develop programs to provide Inter process communication to avoid classical IPC problems.
- To Design a client-server application using sockets and RPI.

Unit-I

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

Unit-II

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

Unit-III

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

Unit-IV

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

Unit-V

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

Text Books

1. Unix System Programming using C++, T.Chan, PHI.(Units II,III,IV)
2. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH.(Unit I)
3. An Introduction to Network Programming with Java, Jan Graba, Springer, rp 2010.(Unit V)

References

1. Unix Network Programming ,W.R. Stevens, PHI.(Units II,III,IV)
2. Java Network Programming,3rd edition, E.R. Harold, SPD, O'Reilly.(Unit V)
3. Linux System Programming, Robert Love, O'Reilly, SPD.
4. Advanced Programming in the UNIX environment, 2nd Edition, W.R.Stevens, Pearson Education
5. UNIX for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education.
6. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones, Wrox, Wiley India Edition.
7. Unix Network Programming The Sockets Networking API, Vol.-I,W.R.Stevens, Bill Fenner, A.M.Rudoff, Pearson Education.
8. Unix Internals, U.Vahalia, Pearson Education.

(B2533) CLOUD COMPUTING

M.Tech(CSE) II Semester

L	T	P	C
4	0	0	4

Course Objectives

- To learn the new computing model, which enables shared resources on demand over the network.
- To learn about the pay-per-use scenarios.
- To learn about the new kind of service models and deployment models.
- To learn about the virtualization technology.
- To learn the python programming or various services and models.
- To develop cloud applications in Python

UNIT-I

Principles of Parallel and Distributed Computing, Introduction to cloud computing, Cloud computing Architecture, cloud concepts and technologies, cloud services and platforms, Cloud models, cloud as a service, cloud solutions, cloud offerings, introduction to Hadoop and Mapreduce.

UNIT –II

Cloud Platforms for Industry, Healthcare and education, Cloud Platforms in the Industry, cloud applications. Virtualization, cloud virtualization technology, deep dive: cloud virtualization, Migrating in to cloud computing, Virtual Machines Provisioning and Virtual Machine Migration Services, On the Management of Virtual Machines for cloud Infrastructure, Comet cloud, T- Systems,

UNIT-III

Cloud computing Applications: Industry, Health, Education, Scientific Applications, Business and Consumer Applications, Understanding Scientific Applications for Cloud Environments, Impact of Cloud computing on the role of corporate IT.

Enterprise cloud computing Paradigm, Federated cloud computing Architecture, SLA Management in Cloud Computing, Developing the cloud: cloud application Design.

UNIT-IV

Python Basics, Python for cloud, cloud application development in python, Cloud Application Development in Python. Programming Google App Engine with Python: A first real cloud Application, Managing Data in the cloud, Google app engine Services for Login Authentication, Optimizing UI and Logic, Making the UI Pretty: Templates and CSS, Getting Interactive. Map Reduce Programming Model and Implementations.

UNIT-V

Cloud management, Organizational Readiness and change management in the cloud age ,Cloud Security ,Data security in the cloud, Legal Issues in the Cloud , Achieving Production Readiness for the cloud Services

Text Books

1. Cloud Computing : Raj Kumar Buyya , James Broberg, andrzej Goscinski, 2013 Wiley
2. Mastering Cloud Computing: Raj Kumar buyya, Christian Vecchiola,selvi-2013.
3. Cloud Computing: Arshdeep Bahga, Vijay Madisetti, 2014, University Press.
4. Cloud computing: Dr Kumar Saurab Wiley India 2011.

Reference Books

1. Code in the Cloud: Mark C.Chu-Carroll 2011, SPD.(Second part of IV UNIT)
2. Essentials of cloud computing : K Chandrasekharan CRC Press.
3. Cloud Computing: John W. Rittinghouse, James Ransome, CRC Press.
4. Virtualization Security: Dave shackleford 2013. SYBEX a wiley Brand.
5. Cloud computing and Software Services: Ahson , Ilyas.2011.
6. Cloud Computing Bible: Sosinsky 2012. Wiley India .
7. Cloud Computing: Dan C. Marinescu-2013, Morgan Kaufmann.

(B2515) WEB SERVICES AND SERVICE ORIENTED ARCHITECTURE

M.Tech(CSE) II Semester

L	T	P	C
4	0	0	4

Course Objectives

- To give the student an understanding of the strengths and weaknesses of a service based architecture, informed by an ability to implement and deploy simple web services using a suitable development platform.
- To define and design applications as combinations of services, and be able to discuss the emergent properties of those compositions;
- To understand the research context and potential future directions for these technologies.

Course Outcomes

On successful completion of this course, the student should be able to:

- Gain a comprehensive understanding of software oriented architectures and web services.
- Analyse and manage a modern medium scale s oftware development project using SOA principles.
- Formulate functional testing, compliance testing and load testing of Web
- Services to Identify bug-finding ideas in testing Web Services.
- Synthesize a service oriented application that meets the business needs.

Unit-I

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

Unit-II

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

Unit-III

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

Unit-IV

Registering and Discovering Services : The role of service registries, Service discovery, Universal Description, Discovery, and Integration, UDDI Architecture, UDDI Data Model, Interfaces, UDDI Implementation, UDDI with WSDL, UDDI specification, Service Addressing and Notification, Referencing and addressing Web Services, Web Services Notification.

Unit-V

SOA and web services security considerations, Network-level security mechanisms, Application- level security topologies, XML security standards, Semantics and Web Services, The semantic interoperability problem, The role of metadata, Service metadata, Overview of .NET and J2EE, SOA and Web Service Management, Managing Distributed System, Enterprise management Framework, Standard distributed management frameworks, Web service management, Richer schema languages, WS- Metadata Exchange.

Text Books

1. Web Services & SOA Principles and Technology, Second Edition, Michael P.Papazoglou.
2. Developing Java Web Services, R. Nagappan, R. Skoczylas, R.P.

Sriganesh, Wiley India.

3. Developing Enterprise Web Services, S. Chatterjee, J. Webber, Pearson Education.

Reference Books

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

(B2511) DATABASE SECURITY

(Professional Elective-III)

M.Tech(CSE) II Semester

L	T	P	C
4	0	0	4

Course Objectives

- Understanding the key issues associated with protecting database assets
- Analyze the levels of protection and response to security incidents
- Synthesis a consistent, reasonable database security system

Course Outcomes

On completion of this course a student should be able to:

- Build a risk analysis model for a large database.
- Implement identification and authentication procedures, fine-grained access control and data encryption techniques.
- Plan Audit accounts and the database system.
- Formulate methods for Back-up and Restore a database.

Unit-I: introduction

Introduction to Databases Security Problems in Databases Security Controls Conclusions

Security Models 1

Introduction Access Matrix Model Take-Grant Model Acten Model PN Model Hartson and Hsiao's Model Fernandez's Model Bussolati and Martella's Model for Distributed databases

Unit-II: Security Model 2

Bell and LaPadula's Model Biba's Model Dion's Model Sea View Model Jajodia and Sandhu's Model The Lattice Model for the Flow Control conclusion.

Security Mechanisms

Introduction User Identification/Authentication Memory Protection Resource Protection Control Flow Mechanisms Isolation Security Functionalities in Some Operating Systems Trusted Computer System Evaluation Criteria

Unit-III: Security Software design

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

Unit-IV Statistical Database Protection & Intrusion Detection Systems

Introduction Statistics Concepts and Definitions Types of Attacks Inference Controls evaluation Criteria for Control Comparison .Introduction IDES System RETISS System ASES System Discovery

Unit-V: Models For The Protection Of New Generation Database Systems -1

Introduction A Model for the Protection of Frame Based Systems A Model for the Protection of Object-Oriented Systems SORION Model for the Protection of Object- Oriented Databases **Models For The Protection of New Generation Database Systems -2**

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

Text Books

1. Database Security and Auditing, Hassan A. Afyouni, India Edition, CENGAGE Learning 09.
2. Database Security, *Castano*, Second edition, Pearson Education.

Reference Book

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

(B2517) ADVANCED DATAMINING

(Professional Elective-III)

M.Tech(CSE) II Semester

L	T	P	C
4	0	0	4

Course Objectives

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

Unit-I

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

Unit-II

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

Unit-III

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

Unit-IV

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

Unit-V

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

Text Books

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

Reference Books

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

(B2518) EXPERT SYSTEMS

(Professional Elective-III)

M.Tech(CSE) II Semester

L	T	P	C
4	0	0	4

UNIT I KNOWLEDGE REPRESENTATION AND ISSUES: Notational systems: Trees, graphs, hierarchies, propositional and predicate logics, frames, semantics networks, constraints, conceptual dependencies, database, knowledge discovery in databases (KDD).

UNIT II SEARCH: State-space representations, Depth-first, breadth-first, heuristic search, Planning and game playing, Genetic algorithms.

UNIT III&IV LOGICAL REASONING AND PROBABILISTIC REASONING: Predicate, Calculus resolution, completeness, and strategies, Unification, Prolog, monotonic and non- monotonic reasoning, Probabilistic inference networks, Fuzzy inference rules, Bayesian rules. Dempster Shafer Calculus.

UNIT V&VI LEARNING AND COMMON SENSANE REASONING: Robot actions, strips, triangle tables, case based reasoning, spatial and temporal formalisms. Knowledge acquisition, classification rules, self directed systems.

Text Books

1. Charniak .E,And McDermott .D., "Intoduction to Artificial intelligence", Adiison-Wesley, 1987
2. Giarratano.J.,And Riley G., "Expert Systems principles an Programming" PWS-KENT,1989

(B2520) SEMANTIC WEB AND SOCIAL NETWORKS

(Professional Elective-IV)

M.Tech(CSE) II Semester

L	T	P	C
4	0	0	4

Course Objectives:

- To learn Web Intelligence synthesize Knowledge Representation for the Semantic Web
- To define Ontology engineering and applications pertaining to it.
- To understand the essence of Semantic Web Applications, Services that promotes Semantic Web Technology ,to infer the principles of Social Network
- Analysis and correlate the rules with the semantic web

Course Outcomes:

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

- Evaluate principles of ontology and design inference engines in semantic web development
- Build semantic web applications with social network features
- Evaluate the social media and synthesize semantic web applications that mitigate
- Societal bad impacts and promote connectivity that enhances sharing.

UNIT I: Web Intelligence

Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

UNIT II: Knowledge Representation for the Semantic Web

Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web – Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.

UNIT III: Ontology Engineering

Ontology Engineering, Constructing Ontology, Ontology Development

Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

UNIT IV: Semantic Web Applications, Services and Technology

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

UNIT V: Social Network Analysis and semantic web

What is social Networks analysis, development of the 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.

Text Books

1. Thinking on the Web - Berners Lee, Godel and Turing, Wiley inter science, 2008.
2. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.
3. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J.Davies, R.Studer, P.Warren, John Wiley & Sons

Reference Books

1. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
2. Information Sharing on the semantic Web - Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.
3. Programming the Semantic Web, T.Segaran, C.Evans,J.Taylor, O'Reilly, SPD

(B2521) INFORMATION RETRIEVAL SYSTEMS
(Professional Elective-IV)

M.Tech(CSE) II Semester

L	T	P	C
4	0	0	4

Course Objectives

- To outline basic terminology and components in information storage and retrieval systems
- To outline the structure of queries and documents
- To articulate fundamental functions used in information retrieval such as automatic indexing, abstracting, and clustering
- Learn the important concepts, algorithms, and data/file structures that are necessary to specify, design, and implement Information Retrieval (IR) systems.

Course Outcomes

- Distinguish classical information retrieval models, identifying their principles, document models and measures used for evaluating similarity and retrieval systems.
- Recognize the Boolean Model, Vector Space Model, and Probabilistic Model.
- Clearly separate the indexing and search modules in information retrieval tools
- For a document collection and a retrieval task, create an appropriate document model and specify automatic methods for processing the documents
- Relate textual information retrieval with its extensions to voice and image, identifying the open problems.

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

Text Book

1. Introduction to Information Retrieval , Christopher D. Manning and Prabhakar Raghavan and Hinrich Schütze, Cambridge University Press, 2008.
2. Information Storage and Retrieval Systems: Theory and Implementation, Kowalski, Gerald, Mark T Maybury, Springer.
3. Modern Information Retrieval, Ricardo Baeza-Yates, Pearson Education, 2007.

Reference Books

1. Information Retrieval: Algorithms and Heuristics, David A Grossman and Ophir Frieder, 2nd Edition, Springer, 2004
2. Information Retrieval Data Structures and Algorithms, William B Frakes, Ricardo Baeza-Yates, Pearson Education, 1992.
3. Information Storage & Retieval, Robert Korfhage, John Wiley & Sons

(B2522) PARALLEL AND DISTRIBUED ALGORITHMS

(Professional Elective-IV)

M.Tech(CSE) II Semester

L	T	P	C
4	0	0	4

Objectives

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

UNIT-I

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

UNIT-II

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

UNIT-III

Pipelining- Techniques computing platform, pipeline programs examples

UNIT-IV

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

UNIT-V

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

Text Book

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

Reference Book

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

(B2321) NEURAL NETWORK AND FUZZY SYSTEMS
(Open Elective – II, Offered by EEE Dept)

M. Tech(CSE) – II Semester

L	T	P	C
4	0	0	4

UNIT-I:
Biological neuron Vs artificial neuron, structure and activation functions – Neural network architectures –learning methods, stability and convergence .Single layer networks –Mcculloh–pitts neuron model, Perceptron training and algorithm, delta learning, widrow-Hoff learning rules, limitations, adaline and modification.

UNIT-II:
Multilayer networks, architectures and modeling, BP algorithm, radial basis functions. Unsupervised learning-Winner all learning, out star learning, Counter propagation networks, self organizing networks-Kohonen.

UNIT-III:
Grossberg, Hamming NET, MAXNET, Hopfiled networks, recurrent and associative memory, BAM and ART architectures Fuzzy sets and systems – geometry of fuzzy sets – theorems – fuzzy and neural function estimators – FAM system architectures – Uncertainty and estimation – Types of uncertainty.

UNIT-IV:
Measures of Fuzziness – Classical measures of uncertainty – measures of Dissonance – confession specificity – knowledge base defuzzifictuon.

UNIT-V:
Application to load forecasting, load flow, fault detection-unit commitments, LF control – economic dispatch, Neuro-Fuzzy controllers.

Textbooks
1. Artificial neural networks – B.Yegna Narayana –phi -1st edition 1999.
2. Neural networks – Simon Haykin – prentice hall international inc.1999.

Reference Books
1. Neural networks and fuzzy system – Bart Kosko – 2nd edition, 2001.

2. Neural network fundamentals with graphs, algorithms & applications – N.K.Bose and Liang –McGraw hill, 1996.
3. Fuzzy logic with fuzzy applications – T.J.Rosee-Mcgraw hill 1997

(B2537) CYBER SECURITY

(Open Elective-II)

M.Tech(CSE) II Semester

L	T	P	C
4	0	0	4

UNIT-I

Introduction to Cybercrime:

Introduction, Cybercrime and Information security, who are cybercriminals, Classifications of Cybercrimes, Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes.

Cyber offenses: How criminals Plan Them

Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.

UNIT-II

Cybercrime: Mobile and Wireless Devices

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies an Measures in Mobile Computing Era, Laptops.

UNIT III

Cybercrimes and Cyber security: the Legal Perspectives

Introduction Cyber Crime and Legal Landscape around the world, Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario In India, Digital signatures and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment Cyber law, Technology and Students: Indian Scenario.

UNIT IV

Understanding Computer Forensics

Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics

and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Chain of Custody concept, Network Forensics, Approaching a computer, Forensics Investigation, Challenges in Computer Forensics, Special Tools and Techniques Forensics Auditing

UNIT V

Cyber Security: Organizational Implications

Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.

Text Books

1. **Cyber Security**: *Understanding Cyber Crimes, Computer Forensics and Legal Perspectives*, Nina Godbole and Sunil Belapure, Wiley INDIA.
2. **Introduction to Cyber Security** , Chwan-Hwa(john) Wu,J.David Irwin.CRC Press T&F Group

Reference Books

1. **Cyber Security Essentials**, James Graham, Richard Howard and Ryan Otson, CRC Press.

(B2506) SOFT COMPUTING

(Open Elective-II)

M.Tech(CSE) II Semester

L	T	P	C
4	0	0	4

Course Objectives:

- Learning of the constituent parts of Soft Computing.
- Gain knowledge about the operators, classification & applications of Genetic Algorithms.
- Examine the concepts of neural networks in detail and understand the types of supervised and unsupervised learning networks and their respective functioning.
- Comprehend the purpose and usage of fuzzy sets.
- Study the construction and working of fuzzy inference and neuro-fuzzy systems

Course Outcomes:

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

- Infer the relevance and significance of Soft Computing.
- Propose an optimization model using Genetic Algorithms.
- Differentiate between the various supervised and unsupervised neural networks.
- Analyze and select an appropriate neural network for a specific problem.
- Design fuzzy membership functions and construct fuzzy logic control systems for simple applications

UNIT I

Introduction To Soft Computing And Neural Networks

Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics

UNIT II

Genetic Algorithms

Introduction to Genetic Algorithms (GA) – Applications of GA in Machine Learning - Machine Learning Approach to Knowledge

Acquisition.

UNIT III

Neural Networks

Machine Learning Using Neural Network, Adaptive Networks – Feed forward Networks – Supervised Learning Neural Networks – Radial Basis Function Networks - Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance architectures – Advances in Neural networks.

UNIT IV Fuzzy Logic

Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions- Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems– Fuzzy Decision Making.

UNIT V

Neuro-Fuzzy Modeling

Text Books

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", Prentice-Hall of India, 2003.
2. George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic-Theory and Applications", Prentice Hall, 1995.
3. James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Pearson Edn., 2003.

References

1. Mitchell Melanie, "An Introduction to Genetic Algorithm", Prentice Hall, 1998.
2. David E. Goldberg, "Genetic Algorithms in Search , Optimization and Machine Learning", Addison Wesley, 1997.
3. S. N. Sivanandam, S. Sumathi and S. N. Deepa, " Introduction to Fuzzy Logic using MATLAB", Springer, 2007.
4. S.N.Sivanandam · S.N.Deepa, " Introduction to Genetic Algorithms", Springer, 2007.
5. Jacek M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishers, 1992

(B2250) MICROCONTROLLERS AND APPLICATIONS

(Open Elective-I, Offered by ECE Dept)

M. Tech(CSE) II Semester

L	T	P	C
4	0	0	4

UNIT-I: Overview of Architecture & Microcontroller Resources

Architecture of a microcontroller – Microcontroller resources – Resources in advanced and next generation microcontrollers – 8051 microcontroller – Internal and External memories – Counters and Timers – Synchronous serial-cum asynchronous serial communication - Interrupts.

UNIT-II: 8051- Microcontrollers Instruction Set

Basic assembly language programming – Data transfer instructions – Data and Bit-manipulation instructions – Arithmetic instructions – Instructions for Logical operations on the test among the Registers, Internal RAM, and SFRs – Program flow control instructions – Interrupt control flow.

UNIT-III: Real Time Control Interrupts

Interrupt handling structure of an MCU – Interrupt Latency and Interrupt deadline – Multiple sources of the interrupts – Non-maskable interrupt sources – Enabling or disabling of the sources – Polling to determine the interrupt source and assignment of the priorities among them – Interrupt structure in Intel 8051.

TIMERS: Programmable Timers in the MCU's – Free running counter and real time control – Interrupt interval and density constraints.

UNIT-IV: Systems Design

Digital and Analog Interfacing Methods:

Switch, Keypad and Keyboard interfacings – LED and Array of LEDs – Keyboard-cum-Display controller (8279) – Alphanumeric Devices – Display Systems and its interfaces – Printer interfaces – Programmable instruments interface using IEEE 488 Bus – Interfacing with the Flash Memory – Interfaces – Interfacing to High Power Devices – Analog input interfacing – Analog output interfacing – Optical motor shaft encoders – Industrial control – Industrial process control system – Prototype MCU based Measuring instruments – Robotics and Embedded control – Digital Signal Processing and digital filters.

UNIT-V: Real Time Operating System for Microcontrollers:

Real Time operating system – RTOS of Keil (RTX51) – Use of RTOS in Design – Software development tools for Microcontrollers.

16-BIT Microcontrollers: Hardware – Memory map in Intel 80196 family MCU system – IO ports – Programmable Timers and High-speed outputs and input captures – Interrupts – instructions.
ARM 32 Bit MCUs: Introduction to 16/32 Bit processors – ARM architecture and organization – ARM / Thumb programming model – ARM / Thumb instruction set –Development-tools.

Text Books

1. Raj Kamal," Microcontrollers Architecture, Programming, Interfacing and System Design"– Pearson Education, 2005.
2. Mazidi and Mazidi, "The 8051 Microcontroller and Embedded Systems" – PHI, 2000.

Reference Books

1. A.V. Deshmuk, "Microcontrollers (Theory & Applications)" – WTMH, 2005.
2. John B. Peatman, "Design with PIC Microcontrollers" – Pearson Education, 2005.

(B2538) MOBILE APPLICATION SECURITY
(Open Elective-II)

M. Tech(CSE) II Semester

L	T	P	C
4	0	0	4

Course Objectives:

- To understand the mobile issues and development strategies
- To understand the WAP and mobile security issues
- To understand the Bluetooth security issues.

UNIT I: Top Mobile Issues and Development Strategies: Top Issues Facing Mobile Devices, Physical Security , Secure Data Storage (on Disk), Strong Authentication with Poor Keyboards , Multiple-User Support with Security, Safe Browsing Environment , Secure Operating Systems, Application Isolation, Information Disclosure, Virus, Worms, Trojans, Spyware, and Malware , Difficult Patching/Update Process, Strict Use and Enforcement of SSL, Phishing , Cross-Site Request Forgery (CSRF), Location Privacy/Security, Insecure Device Drivers, Multifactor Authentication, Tips for Secure Mobile Application Development .

UNIT II: WAP and Mobile HTML Security :WAP and Mobile HTML Basics , Authentication on WAP/Mobile HTML Sites , Encryption , Application Attacks on Mobile HTML Sites ,Cross-Site Scripting , SQL Injection , Cross-Site Request Forgery , HTTP Redirects , Phishing , Session Fixation , Non-SSL Login , WAP and Mobile Browser Weaknesses , Lack of HTTPOnly Flag Support , Lack of SECURE Flag Support , Handling Browser Cache , WAP Limitations.

UNIT III: Bluetooth Security: Overview of the Technology , History and Standards , Common Uses , Alternatives , Future , Bluetooth Technical Architecture , Radio Operation and Frequency, Bluetooth Network Topology , Device Identification , Modes of Operation , Bluetooth Stack ,Bluetooth Profiles , Bluetooth Security Features , Pairing , Traditional Security Services in Bluetooth, Security “Non-Features” , Threats to

Bluetooth Devices and Networks, Bluetooth Vulnerabilities , Bluetooth Versions Prior to v1.2, Bluetooth Versions Prior to v2.1.

UNIT IV: SMS Security: Overview of Short Message Service, Overview of Multimedia Messaging Service, Wireless Application Protocol (WAP), Protocol Attacks , Abusing Legitimate Functionality, Attacking Protocol Implementations, Application Attacks , iPhone Safari , Windows Mobile MMS, Motorola RAZR JPG Overflow, Walkthroughs ,Sending PDUs ,Converting XML to WBXML .

UNIT V Enterprise Security on the Mobile OS: Device Security Options , PIN , Remote , 346 Secure Local Storage , Apple iPhone and Keychain , Security Policy Enforcement ,Encryption ,Full Disk Encryption ,E-mail Encryption , File Encryption , Application Sandboxing, Signing, and Permissions , Application Sandboxing , Application Signing , Permissions , Buffer Overflow Protection ,Windows Mobile , iPhone ,Android ,BlackBerry , Security Feature Summary.

Text Book

1. “Mobile Application Security”, Himanshu Dwivedi, Chris Clark, David Thiel, TATA McGRAW-Hill.

References

1. “Mobile and Wireless Network Security and Privacy”, Kami S.Makki,et al, Springer.
2. “Android Security Attacks Defenses”, Abhishek Dubey, CRC Press

(B2532) WEB SERVICES LAB

M.Tech(CSE) II Semester

L	P	C
0	4	2

Objectives

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

List of Programs

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

a) Web based service consumer

b) Windows application based web service consumer