

# MASTER OF TECHNOLOGY POSTGRADUATE PROGRAM

## ACADEMIC REGULATIONS-R18

(Batches admitted from the academic year 2018 - 2019)



## MALLA REDDY ENGINEERING COLLEGE FOR WOMEN

**(Autonomous Institution-UGC, Govt. of India)**

Permanently Affiliated to JNTUH, Approved by AICTE, ISO 9001:2015 Certified Institution

Accredited by NBA & NAAC with 'A' Grade UGC, Govt. of India

NIRF Indian Ranking-2018, Accepted by MHRD, Govt. of India

AAA+ Rated by Careers 360 Magazine, National Ranking-Top 100 Rank band by Outlook

Maisammaguda, Dhullapally, Secunderabad, Kompally-500100

**ACADEMIC REGULATIONS R-18 FOR M. Tech. (REGULAR) DEGREE COURSE**

Academic Regulations of R-18 are applicable for the students of M. Tech. (Regular) Course from the Academic Year 2018-19 and onwards. The M.Tech Degree of Malla Reddy Engineering College for Women (MRECW), Secunderabad shall be conferred on candidates who are admitted to the program and who fulfill all the requirements for the award of the Degree.

**1.0 ELIGIBILITY FOR ADMISSIONS**

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

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

**2.0 AWARD OF M. Tech. DEGREE**

- 2.1. A student shall be declared eligible for the award of the M. Tech. Degree, if she pursues a course of study in not less than two and not more than four academic years.
- 2.2. A student, who fails to fulfill all the academic requirements for the award of the degree within four academic years from the year of her admission, shall forfeit her seat in M. Tech. course.
- 2.3. The student shall register for all 90 credits and secure all the 90 credits.
- 2.4. The minimum instruction days in each semester are 90.

**3.0 A. COURSE OF STUDY**

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

1. Computer Science and Engineering
  2. Embedded Systems
- and any other course as approved by the MRECW from time to time.

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

Computer Science and Engineering	Computer Science and Engineering
Electronics & Communication Engineering	Embedded Systems

#### **4.0 ATTENDANCE**

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

- 4.1 A student shall be eligible to write University examinations if she acquires a minimum of 75% of attendance in aggregate of all the subjects.
- 4.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester shall be granted by the College Academic Committee.
- 4.3 Shortage of Attendance below 65% in aggregate shall not be condoned.
- 4.4 Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of that class and their registration shall stand cancelled.
- 4.5 A prescribed fee as determined by the examination branch shall be payable towards condonation of shortage of attendance.
- 4.6 A student shall not be promoted to the next semester unless she satisfies the attendance requirement of the present semester, as applicable. They may seek readmission into that semester when offered next. If any candidate fulfills the attendance requirement in the present semester, she shall not be eligible for readmission into the same class.
- 4.7 In order to qualify for the award of the M. Tech. Degree, the candidate shall complete all the academic requirements of the subjects, as per the course structure.
- 4.8 A student shall not be promoted to the next semester unless she satisfies the minimum academic requirements of the previous semester.

#### **5.0 EVALUATION**

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

For the theory subjects 70 marks shall be awarded based on the performance in the End Semester Examination and 30 marks shall be awarded based on the Internal Examination Evaluation. The internal evaluation consists of two mid-term examinations each covering descriptive paper 25 marks which consists of six questions and answers any five questions, each carrying 5 marks a total duration of 2 hours. Average of the two mid-term examinations shall be taken as the final marks secured by each candidate. Five (5) marks are allocated for Assignments (as specified by the subject teacher concerned). The total marks secured by the student in mid-term examination and assignment are evaluated for 30 marks.

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

- 5.1 The end semesters examination will be conducted for 70 marks with 5 questions consisting of two questions each (a) and (b), out of which the student has to answer either (a) or (b), not both and each question carries 14 marks.

- 5.2** For practical subjects, there shall be a continuous evaluation during a semester for 30 internal marks and 70 end semester examination marks. Out of the 30 marks for internal evaluation, day-to-day work in the laboratory shall be evaluated for 15 marks and internal practical examination shall be evaluated for 15 marks conducted by the laboratory teacher concerned. The end semester examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed from the clusters of colleges which are decided by the Principal of the College
- 5.3** There shall be four (4) Technical seminar presentations during I, II, III and IV semesters respectively. For seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the department in a report form and shall make an oral presentation before the Departmental Academic Committee consisting of Head of the Department, Supervisor and two other senior faculty members of the department. For each Seminar there will be only internal evaluation of 50 marks. A candidate has to secure a minimum of 50% of marks to be declared successful.
- 5.4** A candidate shall be deemed to have secured the minimum academic requirement in a subject if she secures a minimum of 40% of marks in the End semester Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal Examination taken together.
- 5.5** In case the candidate does not secure the minimum academic requirement in any subject (as specified in 5.4) she has to reappear for the End semester Examination in that subject.
- 5.6** A candidate shall be given one chance to re-register for each subject provided the internal marks secured by a candidate are less than 50% and so has failed in the end examination. In such a case, the candidate must re-register for the subject(s) and secure the required minimum attendance. The candidate's attendance in the re-registered subject(s) shall be calculated separately to decide upon her eligibility for writing the end examination in those subject(s). In the event of the student taking another chance, her internal marks and end examination marks obtained in the previous attempt stand cancelled.
- 5.7** In case the candidate secures less than the required attendance in any subject, he shall not be permitted to write the End Examination in that subject. She shall re-register the subject when next offered.
- 6.0** EVALUATION OF PROJECT/DISSERTATION WORK
- Every candidate shall be required to submit a thesis or dissertation on a topic approved by the Project Review Committee.
- 6.1** A Project Review Committee (PRC) shall be constituted with Principal as Chairperson, Heads of all the Departments offering the M. Tech. programs and two other senior faculty members.

- 6.2** Registration of Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the subjects, both theory and practical.
- 6.3** After satisfying 6.2, a candidate has to submit, in consultation with her project supervisor, the title, objective and plan of action of her project work to the Departmental Academic Committee for approval. Only after obtaining the approval of the Departmental Academic Committee, the student can initiate the Project work.
- 6.4** If a candidate wishes to change her supervisor or topic of the project, she can do so with the approval of the Departmental Academic Committee. However, the Departmental Academic Committee shall examine whether or not the change of topic/supervisor leads to a major change of her initial plans of project proposal. If yes, her date of registration for the project work starts from the date of change of Supervisor or topic as the case may be.
- 6.5** A candidate shall submit her status report in a bound-form in two stages at least with a gap of 3 months.
- 6.6** The work on the project shall be initiated at the beginning of the II year and the duration of the project is two semesters. A candidate is permitted to submit Project Thesis only after successful completion of theory and practical course with the approval of PRC not earlier than 40 weeks from the date of registration of the project work. For the approval of PRC the candidate shall submit the draft copy of thesis to the Principal through Head of the Department and make an oral presentation before the PRC.
- 6.7** Three copies of the Project Thesis certified by the supervisor shall be submitted to the College/Institute.
- 6.8** The thesis shall be adjudicated by one examiner selected by the Principal of the College. For this, the Head of the Department of the College shall submit a panel of 5 examiners, eminent in that field, with the help of the guide concerned.
- 6.9** If the report of the examiner is not favorable, the candidate shall revise and resubmit the Thesis, in the time frame as decided by the PRC. If the report of the examiner is unfavorable again, the thesis shall be summarily rejected.
- 6.10** If the report of the examiner is favorable, Viva-Voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the examiner who adjudicated the Thesis. The Board shall jointly report the candidate's work as one of the following:
- A. Excellent
  - B. Good
  - C. Satisfactory
  - D. Unsatisfactory

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

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

## 7.0 AWARD OF DEGREE AND CLASS

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

### 7.1 Letter Grades and Grade Points:

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

Letter Grade	Points	% of Marks secured in a subject or course (Class Intervals)
O (Outstanding)	10	Greater than or equal to 85%
A+(Excellent)	9	75 and less than 85%
A(Very Good)	8	65 and less than 75%
B+(Good)	7	60 and less than 65%
B(Average)	6	55 and less than 60%
C (Pass)	5	50 and less than 55%
F(Fail)	0	Below 50%
AB (Absent)	0	-

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

### 7.2 Computation of SGPA and CGPA

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

**Credit points (CP) = grade point (GP) x credits .... For a course**

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

$$SGPA(S_i) = \left\{ \sum_{i=1}^N C_i G_i \right\} / \left\{ \sum_{i=1}^N C_i \right\}$$

where  $C_i$  is the number of credits of the  $i^{\text{th}}$  course and  $G_i$  is the grade point scored by the student in the  $i^{\text{th}}$  course.

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

$$CGPA = \left\{ \sum_{i=1}^M C_i S_i \right\} / \left\{ \sum_{j=1}^M C_i \right\}$$

where  $S_i$  is the SGPA of the  $i$ th semester and  $C_i$  is the total number of credits in that semester.

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

7.3 A student obtaining 'F' grade in any subject shall be deemed to have 'failed' and is required to reappear as a 'supplementary student' in the semester end examination, as and when offered. In such cases, internal marks in those subjects will remain the same as those obtained earlier.

7.4 A student who has not appeared for examination in any subject 'AB' grade will be allocated in that subject, and student shall be considered 'failed'. Student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered.

7.5 A letter grade does not indicate any specific percentage of marks secured by the student, but it indicates only the range of percentage of marks.

7.6 A student earns grade point (GP) in each subject/ course, on the basis of the letter grade secured in that subject/ course. The corresponding 'credit points' (CP) are computed by multiplying the grade point with credits for that particular subject/ course.

**Credit points (CP) = grade point (GP) x credits .... For a course**

7.7 The student passes the subject/ course only when **GP  $\geq$  5 ('C' grade or above)**

#### Illustration of calculation of SGPA

Course/Subject	Credits	Letter Grade	Grade Points	Credit Points
Course 1	4	A	8	4 x 8 = 32
Course 2	4	O	10	4 x 10 = 40
Course 3	4	C	5	4 x 5 = 20
Course 4	3	B	6	3 x 6 = 18
Course 5	3	A+	9	3 x 9 = 27
Course 6	3	C	5	3 x 5 = 15
	21			152

$$\text{SGPA} = 152/21 = 7.24$$

**Illustration of calculation of CGPA:**

Course/Subject	Credits	Letter Grade	Grade Points	Credit Points
<b>I Year I Semester</b>				
Course 1	4	A	8	4 x 8 = 32
Course 2	4	A+	9	4 x 9 = 36
Course 3	4	B	6	4 x 6 = 24
Course 4	3	O	10	3 x 10 = 30
Course 5	3	B+	7	3 x 7 = 21
Course 6	3	A	8	3 x 8 = 24
<b>I Year II Semester</b>				
Course 7	4	B+	7	4 x 7 = 28
Course 8	4	O	10	4 x 10 = 40
Course 9	4	A	8	4 x 8 = 32
Course 10	3	B	6	3 x 6 = 18
Course 11	3	C	5	3 x 5 = 15
Course 12	3	A+	9	3 x 9 = 27
	Total Credits = 42			Total Credits Points = 327

$$\text{CGPA} = 327/42 = 7.79$$

- 7.8 For merit ranking or comparison purposes or any other listing, **only** the ‘rounded off’ values of the CGPAs will be used.
- 7.9 For calculations listed in regulations 7.2 to 7.7, performance in failed subjects/ courses (securing **F** grade) will also be taken into account, and the credits of such subjects/courses will also be included in the multiplications and summations. After passing the failed subject(s) newly secured letter grades will be taken into account for calculation of SGPA and CGPA.

**8.0 Passing standards**

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



- 8.1 student shall be declared successful or 'passed' in a semester, if student secures a GP  $\geq$  5 ('C' grade or above) in every subject/course in that semester (i.e. when student gets an SGPA  $\geq$  5.00 at the end of that particular semester); and a student shall be declared successful or 'passed' in the entire post graduate programme, only when gets a CGPA  $\geq$  5.00 for the award of the degree as required.
- 8.2 After the completion of each semester, a grade card or grade sheet (or transcript) shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. It will show the details of the courses registered (course code, title, no. of credits, and grade earned etc.), credits earned, SGPA, and CGPA.

A student who registers for all the specified subjects/ courses as listed in the course structure and secures the required number of 90 credits (with CGPA  $\geq$  5.0), within 4 academic years from the date of commencement of the first academic year, shall be declared to have 'qualified' for the award of the M.Tech. degree in the chosen branch of Engineering as selected at the time of admission.

A student who qualifies for the award of the degree as listed above shall be placed in the following classes.

Students with final CGPA (at the end of the post graduate programme)  $\geq$  7.50, shall be placed in 'first class with distinction'.

Students with final CGPA (at the end of the post graduate programme)  $\geq$  6.50 but  $<$  7.50, shall be placed in 'first class'.

Students with final CGPA (at the end of the post graduate programme)  $\geq$  5.50 but  $<$  6.50, shall be placed in 'Second class'.

All other students who qualify for the award of the degree (listed above), with final CGPA (at the end of the post graduate programme)  $\geq$  5.00 but  $<$  5.50, shall be placed in 'pass class'.

A student with final CGPA (at the end of the post graduate programme)  $<$  5.00 will not be eligible for the award of the degree.

Students fulfilling the conditions listed above alone will be eligible for award of 'university rank' and 'gold medal'.

## 9.0 Declaration of results

- 9.1 Computation of SGPA and CGPA are done using the procedure listed in 7.2 to 7.7.
- 9.2 For final percentage of formula marks equivalent to the computed final CGPA, the following formula maybe used.

$$\% \text{ of Marks} = (\text{final CGPA} - 0.5) \times 10$$

## 10.0 WITHHOLDING OF RESULTS

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

**11.0 TRANSITORY REGULATIONS**

11.1 A student who has discontinued for any reason, or has been detained for want of attendance or lack of required credits as specified, or who has failed after having undergone the degree programme, may be considered eligible for readmission to the same subjects/ courses (or equivalent subjects/ courses, as the case may be), and same professional electives/ open electives (or from set/category of electives or equivalents suggested, as the case may be) as and when they are offered (within the time-frame of 8 years from the date of commencement of student's first year first semester).

**12. GENERAL**

- 12.1 The academic regulation should be read as a whole for the purpose of any interpretation.
- 12.2 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council of the College is final.
- 12.3 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 Authorities.

**MALPRACTICES RULES****DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS**

S.No	Nature of Malpractices/Improper conduct	Punishment
	<i>If the candidate:</i>	
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 she 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, she will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance

		of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/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. If the imposter is an outsider, She will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/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.
5.	Using objectionable, abusive or offensive language in the answer paper or in letters to the	Cancellation of the performance in that subject.

	examiners or writes to the examiner requesting him to award pass marks.	
6.	Refuses to obey the orders of the Chief Superintendent/Assistant Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or 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.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/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 firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/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.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/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 subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/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 subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

#### **Malpractices identified by squad or special invigilators**

1. Punishments to the candidates as per the above guidelines.
2. Punishment for institutions: (if the squad reports that the college is also involved in encouraging malpractices)
  - i. A show cause notice shall be issued to the college.
  - ii. Impose a suitable fine on the college.
  - iii. Shifting the examination centre from the college to another college for a specific period of not less than one year.

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# MASTER OF TECHNOLOGY POSTGRADUATE PROGRAM

## COURSE STRUCTURE



### **MALLA REDDY ENGINEERING COLLEGE FOR WOMEN (Autonomous Institution-UGC, Govt. of India)**

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Maisammaguda, Dhullapally, Secunderabad, Kompally-500100**



## MALLA REDDY ENGINEERING COLLEGE FOR WOMEN (UGC AUTONOMOUS)

Permanently Affiliated to JNTUH, Approved by AICTE, ISO 9001: 2015 Certified Institution

Accredited by NBA & NAAC with 'A' Grade

NIRF Indian Ranking 2018, Accepted by MHRD Govt. of India

AAA+ Rated by Careers 360 Magazine, Top Hundred Rank band by Outlook, 7<sup>th</sup> Rank CSR

### COURSE STRUCTURE

#### M. Tech – I Semester (I Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C
1	1858PC01	Advanced Algorithms	4	0	0	4
2	1858PC02	Computer Networking	4	0	0	4
3	1858PC03	Software Engineering	4	0	0	4
4		Professional Elective-1	3	0	0	3
5		Professional Elective-2	3	0	0	3
6		Open Elective-1	3	0	0	3
7	1858PC31	Advanced Algorithms Lab	0	0	3	2
8	1858PR01	Technical Seminar-I	0	0	0	2
<b>TOTAL</b>			<b>21</b>	<b>0</b>	<b>3</b>	<b>25</b>

#### M. Tech– II Semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C
1	1858PC04	Network Programming	4	0	0	4
2	1858PC05	Distributed Systems and Cloud Computing	4	0	0	4
3	1858PC06	Theory of Computation	4	0	0	4
4		Professional Elective -3	3	0	0	3
5		Professional Elective -4	3	0	0	3
6		Open Elective-2	3	0	0	3
7	1858PC32	Internet Technologies and Services Lab	0	0	3	2
8	1858PR02	Technical Seminar –II	0	0	0	2
<b>TOTAL</b>			<b>21</b>	<b>0</b>	<b>3</b>	<b>25</b>

## M. Tech – III Semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C
1	11858PR03	Technical Seminar - III	0	0	0	2
2	1858PC05	Comprehensive Viva-Voce	0	0	0	4
3	1858PC06	Project work Review I	0	0	11	4
4		Project work Review II	0	0	11	4
		<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>22</b>	<b>14</b>

## M. Tech – IV Semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C
1	11858PR03	Technical Seminar -IV	0	0	0	2
2	1858PC05	Project work Review III	0	0	24	8
3	1858PC06	Project Evaluation (Viva-Voce)	0	0	0	16
		<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>24</b>	<b>26</b>

Semester	I	II	III	IV	TOTAL
Credits	25	25	14	26	90

<b>PROFESSIONAL ELECTIVES</b>			
<b>PE-I</b>		<b>PE-II</b>	
1858PE01	Network Security and Cryptography	1858PE05	Game Theory
1858PE02	Mobile Application Development	1858PE06	Parallel and Distributed Algorithms
1858PE03	Graph Theory	1858PE07	Software Architecture and Design Patterns
1858PE04	Internet of Things	1858PE08	Embedded Systems
<b>PE-III</b>		<b>PE-IV</b>	
1858PE09	Data Warehousing and Data Mining	1858PE13	Big Data Analytics
1858PE10	Storage Area Networks	1858PE14	Soft Computing
1858PE11	Semantic Web and Social Networks	1858PE15	Software Process and Project Management
1858PE12	Cyber Security	1858PE16	Machine Learning

**List of Open Electives offered by Various Departments for M.Tech.**

S.No	Name of the Department Offering Open Electives	Open Elective –I (Semester- V)	Open Elective –II (Semester –VI)
1	Electronics & Communication Engineering	<b>1855OE01:</b> Principles of Electronic Communications	<b>1855OE02:</b> Industrial Instrumentation <b>1855OE03:</b> Principles of Wireless Communications and Networks
2	Computer Science & Engineering	<b>1858OE01:</b> Cyber Security	<b>1858OE02:</b> Machine Learning <b>1805OE03:</b> Big Data With R

# MASTER OF TECHNOLOGY POSTGRADUATE PROGRAM

## SYLLABUS



### **MALLA REDDY ENGINEERING COLLEGE FOR WOMEN (Autonomous Institution-UGC, Govt. of India)**

**Permanently Affiliated to JNTUH, Approved by AICTE, ISO 9001:2015 Certified Institution  
Accredited by NBA & NAAC with 'A' Grade UGC, Govt. of India  
NIRF Indian Ranking-2018, Accepted by MHRD, Govt. of India  
AAA+ Rated by Careers 360 Magazine, National Ranking-Top 100 Rank band by Outlook  
Maisammaguda, Dhullapally, Secunderabad, Kompally-500100**

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**1858PC01: ADVANCED ALGORITHMS**

M.Tech I Year I Sem.

L	T	P	C
4	0	0	4

**Course Objectives:**

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

**Unit - I : Introduction** - Role of algorithms in computing, Analyzing algorithms, Designing Algorithms, Growth of Functions, Divide and Conquer- The maximum-sub array problem, Strassen's algorithms for matrix multiplication, The substitution method for solving recurrences, The recurrence-tree method for solving recurrence, The master method for solving recursions, Probabilistic analysis and random analysis.

**Unit - II: Review of Data Structures**- Elementary Data Structures, Hash Tables, Binary Search Trees, Red-Black Trees.

**Unit - III: Dynamic Programming** - Matrix-chain multiplication, Elements of dynamic programming, Longest common subsequence, Greedy Algorithms - Elements of the greedy strategy, Huffman codes, Amortized Analysis -Aggregate analysis, The Accounting method, The potential method, Dynamic tables.

**Unit - IV: Graph Algorithms** - Elementary Graph Algorithms, Minimal spanning trees, Single-Source Shortest Paths, Maximum flow.

**Unit - V: NP-Complete & Approximate Algorithms**-Polynomial time, Polynomial-time verification, NP-completeness and reducibility, NP-complete & approximation problems - Clique problem, Vertex- cover problem, formula satisfiability, 3 CNF Satisfiability, The vertex-cover problem, The traveling- salesman problem, The subset-sum problem.

**TEXT BOOKS:**

1. “Introduction to Algorithms”, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Third *Edition*, PHI Publication.
2. “Data Structures and Algorithms in C++”, M.T. Goodrich, R. Tamassia and D.Mount, Wiley India.

**REFERENCES:**

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Second Edition, Galgotia Publication
2. Data structures with C++, J. Hubbard, Schaum’s outlines, TMH.
3. Data structures and Algorithm Analysis in C++, 3<sup>rd</sup> edition, M. A. Weiss, Pearson. Classic Data Structures, D. Samanta, 2<sup>nd</sup> edition, PHI

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### 1858PC02: COMPUTER NETWORKING

M.Tech I Year I Sem.

L	T	P	C
4	0	0	4

#### UNIT-1

The internet architecture, Access Networks, The network Core, Peer-to-Peer Networks, Content Distribution Networks, Delay Tolerant Networks, Circuit Switching vs. Packet switching, Packet switching Delays and congestion, Client/Server and Peer-to-Peer Architectures, MAC and LLC, Virtual LAN, Asynchronous Transfer Mode (ATM)

#### UNIT-2

Network Address Translator, Internet Control Message Protocol, SNMP, CIDR, IPv6, Routing Protocol Basics in advanced networks, Routing Information Protocol (RIP), Interior Gateway Routing Protocol (IGRP), Switching Services, Spanning Tree Protocol (STP), Standard Network Management Protocol.

#### UNIT-3

TCP and Mobile TCP, TCP Tahoe and TCP Reno, High speed TCP, Coexistence of UDP and TCP flows, HTTP and HTTPS, FTP and SFTP, Domain Name Service, TCP and UDP sockets

#### UNIT-4

Introduction to traffic Engineering, Requirement Definition for Traffic Engineering, Traffic Sizing, Traffic Characteristics, Delay Analysis, Connectivity and Availability, Introduction to Multimedia Services, Explaining Transmission of Multimedia over the Internet .Introduction, Wireless Links and Network Characteristics, CDMA, WiFi: 802.11, Wireless LANs, The Architecture, The 802.11 MAC Protocol, The IEEE 802.11 Frame, Mobility in the Same IP Subnet, Advanced Features in 802.11, Personal Area Networks: Bluetooth and Zigbee, Cellular Internet Access, An Overview of Cellular Network Architecture, 3G Cellular Data Networks: Extending the Internet to Cellular Subscribers, On to 4G: LTE, Mobility Management: Principles, Addressing, Routing to a Mobile Node, Mobile IP ,Managing Mobility in Cellular Networks, Routing Calls to a Mobile User, Handoffs in GSM, Wireless and Mobility: Impact on Higher-Layer Protocols

#### UNIT-5

Explaining IP Multicasting, VOIP, Unified Communication, Virtual Networking, Data center Networking, Introduction to Optical Networking, SONET /SDH Standard, Next generation cellular networks, Secure Socket Layer, IP Sec, TLS, Kerberos, Domain name system Protection.

#### TEXT BOOKS:

1. Computer Networking: A Top-Down Approach, 6/e, James F. Kurose and Keith W. Ross, Pearson Education, 2012.
2. Larry L. Peterson and Bruce S. Davie, Computer Networks: A systems approach,



- Morgan Kaufman, 5th Edition, 2012
3. Data Communications and Networking, *Behrouz A. Forouzan*, Fourth Edition, Tata McGraw Hill
  4. High Speed Networks and Internets – Performance and Quality of Service, *William Stallings*, Second Edition, Pearson Education.
  5. Top-Down Network Design, *Priscilla Oppenheimer*, Second Edition, Pearson Education (CISCO Press)

**REFERENCE BOOKS:**

1. Advance Computer Network, By Dayanand Ambawade, Dr. Deven shah, Prof. Mahendra Mehra, Wiley India
2. CCNA Intro – Study Guide – Todd Lammle, Sybex
3. Computer Networks by Mayank Dave, Cengage.
4. Guide to Networking Essentials, *Greg Tomsho, Ed Tittel, David Johnson*, Fifth Edition, Thomson.
5. Computer Networks, *Andrew S. Tanenbaum*, Fourth Edition, Prentice Hall.
6. An Engineering Approach to Computer Networking, *S. Keshav*, Pearson Education.
7. Campus Network Design Fundamentals, *Diane Teare, Catherine Paquet*, Pearson Education (CISCO Press)
8. Computer Communications Networks, Mir, Pearson Education.
9. Chwan-Hwa (John) Wu, J. David Irwin, Introduction to computer networks and Cyber Security, CRC press, Taylor & Francis Group, 2014
10. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, Pearson, 5<sup>th</sup> Edition, 2014
11. G. Wright and W. Stevens, TCP/IP Illustrated, Volume 1 and Volume 2, Addison-Wesley, 1996

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### 1858PC03: SOFTWARE ENGINEERING

M.Tech I Year I Sem.

L	T	P	C
4	0	0	4

#### Course Objectives:

- The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.
- Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams

#### UNIT-I:

**Introduction to Software Engineering:** The evolving role of software, changing nature of software, software myths. **A Generic view of process:** Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models. **Process models:** The waterfall model, incremental process models, evolutionary process models, the unified process.

#### UNIT-II:

**Software Requirements:** Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document. **Requirements engineering process:** Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management. **System models:** Context models, behavioral models, data models, object models, structured methods.

#### UNIT-III:

**Design Engineering:** Design process and design quality, design concepts, the design model. **Creating an architectural design:** software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

#### UNIT-IV:

**Testing Strategies:** A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging.

**Product metrics:** Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

**UNIT-V:**

**Metrics for Process and Products:** Software measurement, metrics for software quality. **Risk management:** Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan. **Quality Management:** Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

**TEXT BOOKS:**

1. Software Engineering, A practitioner's Approach - Roger S. Pressman, 6<sup>th</sup> edition, Mc Graw Hill International Edition.
2. Software Engineering- Sommerville, 7<sup>th</sup> edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.

**REFERENCES:**

1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiely.
2. Software Engineering principles and practice- Waman S Jawadekar, The Mc Graw-Hill Companies.
3. Fundamentals of object oriented design using UML Meiler page-Jones: Pearson Education.

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### 1858PE01: NETWORK SECURITY AND CRYPTOGRAPHY

M.Tech I Year I Sem.

L	T	P	C
3	0	0	3

#### 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

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

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

#### UNIT – II

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

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

#### UNIT – III

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

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

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

#### UNIT – IV

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

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

**UNIT – V**

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

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

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

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

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### 1858PE02: MOBILE APPLICATION DEVELOPMENT

M.Tech I Year I Sem.

L	T	P	C
3	0	0	3

#### 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

**REFERENCES:**

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

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**1858PE03: GRAPH THEORY**

M.Tech I Year I Sem.

L	T	P	C
3	0	0	3

**Unit - I:**

**Introduction**-Discovery of graphs, Definitions, Sub graphs, Isomorphic graphs, Matrix representations of graphs, Degree of a vertex, Directed walks, paths and cycles, Connectivity in digraphs, Eulerian and Hamilton digraphs, Eulerian digraphs, Hamilton digraphs, Special graphs, Complements, Larger graphs from smaller graphs, Union, Sum, Cartesian Product, Composition, Graphic sequences, Graph theoretic model of the LAN problem, Havel-Hakimi criterion, Realization of a graphic sequence.

**Unit - II:**

**Connected graphs and shortest paths** - Walks, trails, paths, cycles, Connected graphs, Distance, Cut-vertices and cut-edges, Blocks, Connectivity, Weighted graphs and shortest paths, Weighted graphs, Dijkstra's shortest path algorithm, Floyd-Warshall shortest path algorithm.

**Unit III:**

**Trees**- Definitions and characterizations, Number of trees, Cayley's formula, Kircho-matrix-tree theorem, Minimum spanning trees, Kruskal's algorithm, Prim's algorithm, Special classes of graphs, Bipartite Graphs, Line Graphs, Chordal Graphs, Eulerian Graphs, Fleury's algorithm, Chinese Postman problem, Hamilton Graphs, Introduction, Necessary conditions and sufficient conditions.

**Unit IV:**

**Independent sets coverings and matchings** – Introduction, Independent sets and coverings: basic equations, Matchings in bipartite graphs, Hall's Theorem, Kőnig's Theorem, Perfect matchings in graphs, Greedy and approximation algorithms.

**Unit - V:**

**Vertex Colorings**- Basic definitions, Cliques and chromatic number, Mycielski's theorem, Greedy coloring algorithm, Coloring of chordal graphs, Brooks theorem, Edge Colorings, Introduction and Basics, Gupta-Vizing theorem, Class-1 and Class-2 graphs, Edge-coloring of bipartite graphs, Class-2 graphs, Hajos union and Class-2 graphs, A scheduling problem and equitable edge-coloring.

**TEXTBOOKS:**

1. J. A. Bondy and U. S. R. Murty. Graph Theory, volume 244 of Graduate Texts in Mathematics. Springer, 1<sup>st</sup> edition, 2008.
2. J. A. Bondy and U. S. R. Murty. Graph Theory with Applications <https://www.iro.umontreal.ca/~hahn/IFT3545/GTWA.pdf>



**REFERENCES:**

**Lecture Videos:** <http://nptel.ac.in/courses/111106050/13>

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### 1858PE04: INTERNET OF THINGS

M.Tech I Year I Sem.

L	T	P	C
3	0	0	3

#### 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 enabled 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 Madiseti, Universities Press, 2015, ISBN: 9788173719547

2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

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**1858PE05: GAME THEORY**

M.Tech I Year I Sem.

L	T	P	C
3	0	0	3

**UNIT - I:**

**Introduction:** Game Theory, Games and Solutions Game Theory and the Theory of Competitive Equilibrium, Rational Behavior, The Steady State and Deductive Interpretations, Bounded Rationality Terminology and Notation

Nash Equilibrium- Strategic Games, Nash Equilibrium Examples Existence of a Nash Equilibrium, Strictly Competitive Games, Bayesian Games: Strategic Games with Imperfect Information

**UNIT - II:**

Mixed, Correlated, and Evolutionary Equilibrium -Mixed Strategy Nash Equilibrium Interpretations of Mixed Strategy Nash Equilibrium Correlated Equilibrium Evolutionary Equilibrium

Rationalizability and Iterated Elimination of Dominated Actions-Rationalizability Iterated Elimination of Strictly Dominated Actions, Iterated Elimination of Weakly Dominated Actions

**UNIT - III:**

Knowledge and Equilibrium -A Model of Knowledge Common Knowledge, Can People Agree to Disagree? , Knowledge and Solution Concepts, The Electronic Mail Game

**UNIT - IV:**

Extensive Games with Perfect Information -Extensive Games with Perfect Information Subgame Perfect Equilibrium Two Extensions of the Definition of a Game The Interpretation of a Strategy , Two Notable Finite Horizon Games , Iterated Elimination of Weakly Dominated Strategies

Bargaining Games -Bargaining and Game Theory , A Bargaining Game of Alternating Offers Subgame Perfect Equilibrium Variations and Extensions

**UNIT - V:**

Repeated Games - The Basic Idea Infinitely Repeated Games vs.\ Finitely Repeated Games Infinitely Repeated Games: Definitions Strategies as Machines Trigger Strategies: Nash Folk Theorems Punishing for a Limited Length of Time: A Perfect Folk Theorem for the Limit of Means Criterion Punishing the Punisher: A Perfect Folk Theorem for the Overtaking Criterion Rewarding Players Who Punish: A Perfect Folk Theorem for the Discounting Criterion The Structure of Subgame Perfect Equilibria Under the Discounting Criterion Finitely Repeated Game

**TEXT BOOKS:**

1. M. J. Osborne and A. Rubinstein, A course in Game Theory, MIT Press
2. Roger Myerson, Game Theory, Harvard University Press
3. D. Fudenberg and J. Tirole, Game Theory, MIT Press

**REFERENCES:**

1. J. von Neumann and O. Morgenstern, Theory of Games and Economic Behavior, New York: John Wiley and Sons.
2. R.D. Luce and H. Raiffa, Games and Decisions, New York: John Wiley and Sons.,
3. G. Owen, Game Theory, (Second Edition), New York: Academic Press,

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**1858PE06: PARALLEL AND DISTRIBUTED ALGORITHMS**

M.Tech I Year I Sem.

L	T	P	C
3	0	0	3

**Course 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 parallelism 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, 2<sup>nd</sup> Edition.

**REFERENCE BOOK:**

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

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### 1858PE07: SOFTWARE ARCHITECTURE AND DESIGN PATTERNS

M.Tech I Year I Sem.

L	T	P	C
3	0	0	3

#### Course 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.



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### 1858PE08: EMBEDDED SYSTEMS

M.Tech I Year I Sem.

L	T	P	C
3	0	0	3

#### Course Objectives:

- To explain various embedded system applications and design requirements.
- To construct embedded system hardware.
- To develop software programs to control embedded system.
- To generate product specification for embedded system.

#### UNIT - I

**Introduction to Embedded Systems:** Embedded Systems, Processor Embedded into a System, Embedded Hardware Units and Devices in a System, Embedded Software, Complex System Design, Design Process in Embedded System, Formalization of System Design, Classification of Embedded Systems

#### UNIT - II

**8051 and Advanced Processor Architecture:** 8051 Architecture, 8051 Micro controller Hardware, Input/output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/output, Interrupts, Introduction to Advanced Architectures, Real World Interfacing, Processor and Memory organization - **Devices and Communication Buses for Devices Network:** Serial and parallel Devices & ports, Wireless Devices, Timer and Counting Devices, Watchdog Timer, Real Time Clock, Networked Embedded Systems, Internet Enabled Systems, Wireless and Mobile System protocols

#### UNIT - III

**Embedded Programming Concepts:** Software programming in Assembly language and High Level Language, Data types, Structures, Modifiers, Loops and Pointers, Macros and Functions, object oriented Programming, Embedded Programming in C++ & JAVA

#### UNIT IV

**Real – Time Operating Systems:** OS Services, Process and Memory Management, Real – Time Operating Systems, Basic Design Using an RTOS, Task Scheduling Models, Interrupt Latency, Response of Task as Performance Metrics - **RTOS Programming:** Basic functions and Types of RTOSes, RTOS VxWorks, Windows CE

#### UNIT - V

**Embedded Software Development Process and Tools:** Introduction to Embedded Software Development Process and Tools, Host and Target Machines, Linking and Locating Software, Getting Embedded Software into the Target System, Issues in Hardware-Software Design and

Co-Design - **Testing, Simulation and Debugging Techniques and Tools:** Testing on Host Machine, Simulators, Laboratory Tools

**TEXT BOOK:**

1. Embedded Systems, Raj Kamal, Second Edition TMH.

**REFERENCE BOOKS:**

1. Embedded/Real-Time Systems, Dr. K.V.K.K. Prasad, dream Tech press
2. The 8051 Microcontroller and Embedded Systems, Muhammad Ali Mazidi, Pearson.
3. The 8051 Microcontroller, Third Edition, Kenneth J Ayala, Thomson.
4. An Embedded Software Primer, David E. Simon, Pearson Education.
5. Micro Controllers, Ajay V Deshmukhi, TMH.
6. Microcontrollers, Raj kamal, Pearson Education.
7. Introduction to Embedded Systems, Shibu K.V, TMH.

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**1858PC31: ADVANCED ALGORITHMS LAB**

M.Tech I Year I Sem.

L	T	P	C
3	0	0	3

**Course Objectives:**

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

**Sample Problems on Data structures:**

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

- c) Quick sort      f) 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, 3<sup>rd</sup> edition, A.Drozdek, Cengage Learning.
2. Data Structures with Java, J.R.Hubbard, 2<sup>nd</sup> edition, Schaum's Outlines, TMH.
3. Data Structures and algorithms in Java, 2<sup>nd</sup> 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, 2<sup>nd</sup> 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, 7<sup>th</sup> edition, 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 , 8<sup>th</sup> 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)**

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### 1858PC04: NETWORK PROGRAMMING

M.Tech I Year II Sem.

L	T	P	C
4	0	0	4

#### Course Objectives:

- To understand to Linux utilities
- To understand file handling, signals
- To understand IPC, network programming in Java
- To understand processes to communicate with each other across a Computer Network.

#### 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)
4. Unix Network Programming ,W.R. Stevens, PHI.(Units II,III,IV)
5. Java Network Programming,3<sup>rd</sup> edition, E.R. Harold, SPD, O'Reilly.(Unit V)

#### **REFERENCE BOOKS:**

1. Linux System Programming, Robert Love, O'Reilly, SPD.
2. Advanced Programming in the UNIX environment, 2<sup>nd</sup> Edition, W.R.Stevens, Pearson Education.
3. UNIX for programmers and users, 3<sup>rd</sup> Edition, Graham Glass, King Ables, Pearson Education.
4. Beginning Linux Programming, 4<sup>th</sup> Edition, N.Matthew, R.Stones, Wrox, Wiley India Edition.
5. Unix Network Programming The Sockets Networking API, Vol.- I,W.R.Stevens, Bill Fenner, A.M.Rudoff, Pearson Education.
6. Unix Internals, U.Vahalia, Pearson Education.
7. Unix shell Programming, S.G.Kochan and P.Wood, 3<sup>rd</sup> edition, Pearson Education.
8. C Programming Language, Kernighan and Ritchie, PHI

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**1858PC05: DISTRIBUTED SYSTEMS AND CLOUDCOMPUTING**

M.Tech II Year I Sem.

L	T	P	C
4	0	0	4

**Course Objectives:**

- To explain the evolving computer model called cloud computing.
- To introduce the various levels of services that can be achieved by cloud.
- To describe the security aspects in cloud.

**Course Outcomes:**

- Ability to understand the virtualization and cloud computing concepts.

**UNIT- I**

**Systems Modeling, Clustering and Virtualization:** Distributed System Models and Enabling Technologies, Computer Clusters for Scalable Parallel Computing, Virtual Machines and Virtualization of Clusters and Data centers.

**UNIT- II**

**Foundations:** Introduction to Cloud Computing, Migrating into a Cloud, Enriching the 'Integration as a Service' Paradigm for the Cloud Era, The Enterprise Cloud Computing Paradigm.

**UNIT- III**

**Infrastructure as a Service (IAAS) & Platform and Software as a Service (PAAS / SAAS):** Virtual machines provisioning and Migration services, On the Management of Virtual machines for Cloud Infrastructures, Enhancing Cloud Computing Environments using a cluster as a Service, Secure Distributed Data Storage in Cloud Computing.

Aneka, Comet Cloud, T-Systems', Workflow Engine for Clouds, Understanding Scientific Applications for Cloud Environments.

**UNIT- IV**

**Monitoring, Management and Applications:** An Architecture for Federated Cloud Computing, SLA Management in Cloud Computing, Performance Prediction for HPC on Clouds, Best Practices in Architecting Cloud Applications in the AWS cloud, Building Content Delivery networks using Clouds, Resource Cloud Mashups.

**UNIT - V**

**Governance and Case Studies:** Organizational Readiness and Change management in the Cloud age, Data Security in the Cloud, Legal Issues in Cloud computing,

Achieving Production Readiness for Cloud Services.

**TEXT BOOKS:**

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C.Fox, Jack J.Dongarra, Elsevier, 2012.

**REFERENCE BOOKS:**

1. Cloud Computing : A Practical Approach, Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, Tata McGraw Hill, rp2011.
2. Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press, 2010.
3. Cloud Computing: Implementation, Management and Security, John W. Rittinghouse, James F.Ransome, CRC Press, rp2012.
4. Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, George Reese, O'Reilly, SPD, rp2011.  
Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp2011



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**1858PC06: THEORY OF COMPUTATION**

M.Tech I Year II Sem.

L	T	P	C
4	0	0	4

**Course Outcomes:**

- Able to understand the concept of abstract machines and their power to recognize the languages.
- Able to employ finite state machines for modeling and solving computing problems.
- Able to design context free grammars for formal languages.
- Able to distinguish between decidability and undecidability.
- Able to gain proficiency with mathematical tools and formal methods.

**UNIT - I:**

**Regular Languages** –Finite Automata, Formal definition of finite automaton, Examples of finite automata, Formal definition of computation, Designing finite automata, The regular operations, Non determinism, formal definition of nondeterministic finite automaton, equivalence of NFAs and DFAs, closure under the regular operations, Regular Expressions, formal definition of a regular expression, equivalence with finite automata, Nonregular languages, The pumping lemma for regular languages.

**UNIT - II :**

**Context-Free languages**, Context-free grammars, formal definition of a Context-free grammar, Examples of context-free grammars, Designing context-free grammars, Ambiguity, Chomsky normal form, Pushdown Automata, Examples of pushdown Automata, Equivalence with context-free grammars, Non-context-free languages, The pumping lemma for context-free languages.

**UNIT - III :**

**The Church-Turing Thesis** - Turing machines, Formal definition of turing machine, Examples of turing machines, Variants of turing machines, Multitape turing machines, Nondeterministic turing machine, Enumerators, Equivalence with other models, The definition of algorithm, Hilbert's problem, Terminology of describing turing machines.

**UNIT - IV:**

**Decidability** – Decidable languages, Decidable problems concerning regular languages, Decidable problems concerning context-free languages, The halting problem, The diagonalization method, The halting method is undecidable, A turing – unrecognizable language, **Reducibility** – Undecidable problems for language theory, Reductions via computations histories, A simple undecidable problem, Mapping reducibility, computable functions, Formal definition of mapping reducibility.

**UNIT - V:****TEXTBOOKS:**

1. Introduction to the theory of computation, Micheal Sipser, Third Edition, Cengage Learning.

**REFERENCES:**

1. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
2. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
3. A Text book on Automata Theory, P. K. Srimani, Nasir S. F. B, Cambridge University Press.
4. Introduction to Formal languages Automata Theory and Computation Kamala Krithivasan, Rama R, Pearson.
5. Theory of Computer Science – Automata languages and computation, Mishra and Chandrashekar, 2nd edition, PHI.

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**1858PE09: DATA WAREHOUSING AND DATA MINING**

M.Tech I Year II Sem.

L	T	P	C
3	0	0	3

**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, roughset approach, fuzzy 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, web 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 Han, 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.

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**1858PE10: STORAGE AREA NETWORKS**

M.Tech I Year II Sem.

L	T	P	C
3	0	0	3

**Course Objectives:**

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

**UNIT - I:**

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

**UNIT - II:**

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

**UNIT - III:**

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

**UNIT - IV:**

**Information Availability & Monitoring & Managing Datacenter** List reasons for

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

**UNIT - V:**

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

**Case Studies**

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

**TEXT BOOK:**

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

**REFERENCE BOOKS:**

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

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### 1858PE11: SEMANTIC WEB AND SOCIAL NETWORKS

M.Tech I Year II Sem.

L	T	P	C
3	0	0	3

#### Course Objectives:

- To learn Web Intelligence
- To learn Knowledge Representation for the Semantic Web
- To learn Ontology Engineering
- To learn Semantic Web Applications, Services and Technology
- To learn Social Network Analysis and semantic web

#### 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.

**REFERENCE BOOKS:**

1. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J. Davies, R. Studer, P. Warren, John Wiley & Sons.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
3. Information Sharing on the semantic Web - Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.
4. Programming the Semantic Web, T. Segaran, C.Evans, J. Taylor, O'Reilly, SPD.



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### 1858PE12: CYBER SECURITY

M.Tech I Year II Sem.

L	T	P	C
3	0	0	3

#### Course Objectives:

- To learn about cyber crimes and how they are planned
- To learn the vulnerabilities of mobile and wireless devices
- To learn about the crimes in mobile and wireless devices

#### 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 and 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 BOOK:**

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 BOOK:**

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

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**1858PE13: BIG DATA ANALYTICS**

M.Tech I Year II Sem.

L	T	P	C
3	0	0	3

**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 MapReduce Fundamentals and HBase : The MapReduce Framework; Techniques to Optimize MapReduce Jobs; Uses of MapReduce; Role of HBase in Big Data Processing; Storing Data in Hadoop : Introduction of HDFS, Architecture, HDLC 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; HDLC (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.

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**1858PE14: SOFT COMPUTING**

M.Tech I Year II Sem.

L	T	P	C
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**Course Objectives:**

To give students knowledge of soft computing theories fundamentals, i.e. Fundamentals of artificial and neural networks, fuzzy sets and fuzzy logic and genetic algorithms.

**UNIT- I**

AI Problems and Search: AI problems, Techniques, Problem Spaces and Search, Heuristic Search Techniques- Generate and Test, Hill Climbing, Best First Search Problem reduction, Constraint Satisfaction and Means End Analysis. Approaches to Knowledge Representation- Using Predicate Logic and Rules.

**UNIT- II**

Artificial Neural Networks: Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Back propagation Network. Associative Memory Networks. Traing Algorithms for pattern association, BAM and Hopfield Networks.

**UNIT- III**

Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks-Introduction to various networks.

**UNIT- IV**

Introduction to Classical Sets ( crisp Sets)and Fuzzy Sets- operations and Fuzzy sets. Classical Relations -and Fuzzy Relations- Cardinality, Operations, Properties and composition. Tolerance and equivalence relations. Membership functions- Features, Fuzzification, membership value assignments, Defuzzification.

**UNIT- V**

Fuzzy Arithmetic and Fuzzy Measures, Fuzzy Rule Base and Approximate Reasoning Fuzzy Decision making  
Fuzzy Logic Control Systems, Genetic Algorithm- Introduction and basic operators and terminology. Applications: Optimization of TSP, Internet Search Technique.

**TEXT BOOKS:**

1. Principles of Soft Computing- S N Sivanandam, S N Deepa, Wiley India, 2007

2. Soft Computing and Intelligent System Design -Fakhreddine O Karray, Clarence D Silva,. Pearson Edition, 2004.

**REFERENCE BOOKS:**

1. Artificial Intelligence and Soft Computing- Behavioural and Cognitive Modeling of the Human Brain- Amit Konar, CRC press, Taylor and Francis Group.
2. Artificial Intelligence – Elaine Rich and Kevin Knight, TMH, 1991, rp2008.
3. Artificial Intelligence – Patric Henry Winston – Third Edition, Pearson Education.
4. A first course in Fuzzy Logic-Hung T Nguyen and Elbert A Walker, CRC. Press Taylor and Francis Group.

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### 1858PE15: SOFTWARE PROCESS AND PROJECT MANAGEMENT

M.Tech I Year II Sem.

L	T	P	C
3	0	0	3

#### Course Objectives:

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

#### UNIT- I

##### Software Process Maturity

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

##### Process Reference Models

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

#### UNIT - II

##### Software Project Management Renaissance

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

##### Life-Cycle Phases and Process artifacts

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

#### UNIT - III

##### Workflows and Checkpoints of process

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

##### Process Planning

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

#### UNIT - IV

##### Project Organizations

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

**Project Control and process instrumentation**

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

**UNIT - V****CCPDS-R Case Study and Future Software Project Management Practices**

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

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

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



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**1858PE16: MACHINE LEARNING**

M.Tech I Year II Sem.

L	T	P	C
3	0	0	3

**Course 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, Gibbs 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.
4. Machine Learning by Peter Flach , Cambridge.

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M.Tech I Year II Sem.

L	T	P	C
3	0	0	3

**Course Objectives:**

- Write syntactically correct HTTP messages and describe the semantics of common HTTP methods and header fields
- Discuss differences between URIs, URNs, and URLs, and demonstrate a detailed understanding of http-scheme URLs, both relative and absolute
- Describe the actions, including those related to the cache, performed by a browser in the process of visiting a Web address
- Install a web server and perform basic administrative procedures, such as tuning communication parameters, denying access to certain domains, and interpreting an access log
- Write a valid standards-conformant HTML document involving a variety of element types, including hyperlinks, images, lists, tables, and forms
- Use CSS to implement a variety of presentation effects in HTML and XML documents, including explicit positioning of elements
- Demonstrate techniques for improving the accessibility of an HTML document

**List of Sample Problems:****i) Internet Technologies**

1. Develop static pages (using Only HTML) of an online Book store. The pages should resemble: [www.amazon.com](http://www.amazon.com) the website should consist the following pages.

Home page, Registration and user

Login User Profile Page, Books

catalog Shopping Cart, Payment By

credit card Order Conformation

2. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.

3. Create and save an XML document at the server, which contains 10 users information. Write a program, which takes User Id as an input and returns the user details by taking the user information from the XML document.

4. Install TOMCAT web server. Convert the static web pages of assignments 2 into

dynamic web pages using Servlets and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.

5. Redo the previous task using JSP by converting the static web pages of assignments 2 into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database. Follow the MVC architecture while doing the website.

6. Implement the “Hello World!” program using JSP Struts Framework.

### ii) Additional Assignment Problems

Write an HTML page including any required Javascript that takes a number from one text field in the range of 0 to 999 and shows it in another text field in words. If the number is out of range, it should show “out of range” and if it is not a number, it should show “not a number” message in the result box.

Write a java swing application that takes a text file name as input and counts the characters, words

and lines in the file. Words are separated with white space characters and lines are separated with new line character.

Write a simple calculator servlet that takes two numbers and an operator (+, -, /, \* and %) from an HTML page and returns the result page with the operation performed on the operands. It should check in a database if the same expression is already computed and if so, just return the value from database. Use MySQL or PostgreSQL.

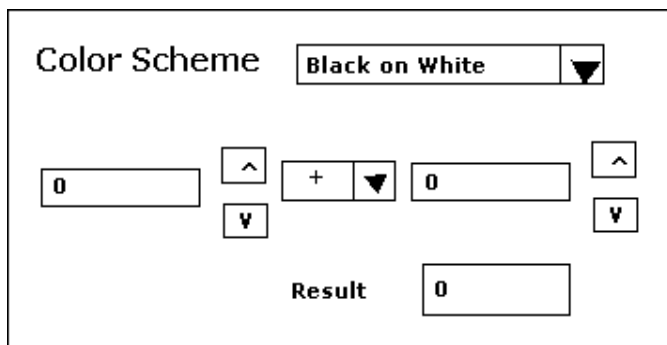
Write an HTML page that contains a list of 5 countries. When the user selects a country, its capital should be printed next to the list. Add CSS to customize the properties of the font of the capital (color, bold and font size).

Write a servlet that takes name and age from an HTML page. If the age is less than 18, it should send a page with “Hello <name>, you are not authorized to visit this site” message, where <name> should be replaced with the entered name. Otherwise it should send “Welcome <name> to this site” message.

Write a calculator program in HTML that performs basic arithmetic operations (+, -, /, \* and %). Use CSS to change the foreground and background color of the values, buttons and result display area separately. Validate the input strings using JavaScript regular expressions. Handle any special cases like division with zero reasonably. The screen may look similar to the following:

Value 1	Operator	Value 2	Operator	Result
<input type="text"/>	<input type="text" value="+"/>	<input type="text"/>	<input "="" type="text" value="="/>	<input type="text"/>

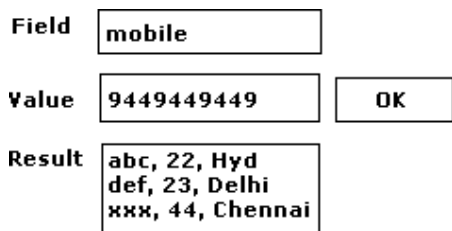
Write a Java program that creates a calculator GUI, as shown in figure. Extra components may be added for convenience:



The Color Scheme may be Black on White or Blue on Yellow (selectable) and accordingly all components colors must be changed. The values can be either entered or increased or decreased by a step of 10. The operators are +, -, / and \* (selectable). Once any change

takes place, the result must be automatically computed by the program.

Write a Java Application that will read an XML file that contains personal information (Name, Mobile Number, age and place. It reads the information using SAX parser. After reading the information, it shows two input Text Fields in a window, one for tag name and the other for value. Once these two values are given, it should list all the records in the XML file that match the value of the given field in a text area (result box). For example, if the two text boxes are entered with “name” and “ABCD” then it should show all the records for which name is “ABCD”? An Illustration is given below that takes a mobile number and lists all the records that have the same mobile number.



Consider the following web application for implementation:

The user is first served a login page which takes user's name and password. After submitting the details the server checks these values against the data from a database and takes the following decisions.

If name and password matches, serves a welcome page with user's full name.  
 If name matches and password doesn't match, then serves “password mismatch” page  
 If name is not found in the database, serves a registration page, where users full name, present user name (used to login) and password are collected. Implement this application in:

1. Pure JSP
2. Pure Servlets
3. Struts Framework

Implement a simple arithmetic calculator with +, -, /, \*, % and = operations using

Struts Framework The number of times the calculator is used should be displayed at the bottom (use session variable).

#### i) Internet Technologies and Services Lab - Additional Problems

Create a web Service in Java that takes two city names from the user and returns the distance between these two from data available from a table in MySQL.

Write a java and a C# client which use the above service

Write a Java program that takes a file as input and encrypts it using DES encryption. The program should

check if the file exists and its size is not zero.

Write a Java program that generates a key pair and encrypts a given file using RSA algorithm.

Write a Java program that finds digest value of a given string.

Consider the following xml file for encryption

```
<?xml version="1.0"> <transaction> <from>12345</from> <to>54321</to>
<amount>10000</amount>
<secretcode>abc123</secretcode> <checksum></checksum> </transaction>
```

Replace <from> and <to> values with the RSA encrypted values represented with base64 encoding assuming that the public key is available in a file in local directory "pubkey.dat".

Encrypt <secretcode> with AES algorithm with a password 'secret'. The checksum of all the field values concatenated with a delimiter character '+' will be

inserted in the checksum and the xml file is written to encrypted.xml file.

Assume that a file 'config.xml', which has the following information:

```
<users>
<user> <name>abc</name> <pwd>pwd123</pwd> <role>admin</role> <md5>xxx</md5>
</user>
<user> <name>def</name> <pwd>pwd123</pwd> <role>guest</role> <md5>xxx</md5>
</user>
</users>
```

Replace name and role with DES encrypted values and pwd with RSA encrypted values (represent the values with base64 encoding). The public key is available in "public.key" file in current directory. Replace xxx with respective MD5 values of all the fields for each user. Write the resulting file back to config.xml.

Write an HTML page that gives 3 multiple choice (a,b,c and d) questions from a set of 5 preloaded questions randomly. After each question is answered change the color of the question to either green or blue using CSS. Finally on clicking OK button that is provided, the score should be displayed as a pop-up window. Use Java

Script for dynamic content.

Write an HTML page that has 3 countries on the left side ("USA", "UK" and "INDIA") and on the right side of

each country, there is a pull-down menu that contains the following entries: ("Select Answer", "New Delhi", "Washington" and "London"). The user will match the Countries with their respective capitals by selecting an

item from the menu. The user chooses all the three answers (whether right or wrong). Then colors of the countries should be changed either to green or to red depending on the answer. Use CSS for changing color.

Write an HTML Page that can be used for registering the candidates for an entrance test. The fields are: name, age, qualifying examination (diploma or 10+2), stream in qualifying examination. If qualifying examination is “diploma”, the stream can be “Electrical”, “Mechanical” or “Civil”. If the qualifying examination is 10+2, the stream can be “MPC” or “BPC”. Validate the name to accept only characters and spaces.

Write an HTML page that has two selection menus. The first menu contains the states (“AP”, “TN” and “KN”) and depending on the selection the second menu should show the following items: “Hyderabad”, “Vijayawada”, “Kurnool” for AP, “Chennai”, “Salem”, “Madurai” for TN and “Bangalore”, “Bellary”, “Mysore” for KN.

Write an HTML page that has phone buttons 0 to 9 and a text box that shows the dialed number. If 00 is pressed at the beginning, it should be replaced with a + symbol in the text box. If the number is not a valid international number (+ followed by country code and 10 digit phone number) the color of the display should be red and it should turn to green when the number is valid. Consider only “+91, +1 and +44 as valid country codes. Use CSS for defining colors.

Write an HTML page that has a text box for phone number or Name. If a number is entered in the box the name should be displayed next to the number. If 00 is pressed at the beginning, it should be replaced with a + symbol in the text box. If a name is entered in the text box, it should show the number next to the name. If the corresponding value is not found, show it in red and show it in green otherwise. Use CSS for colors. Store at least 5 names and numbers in the script for testing.

A library consists of 10 titles and each title has a given number of books initially. A student can take or return a

book by entering his/her HTNo as user ID and a given password. If there are at least two books, the book is issued and the balance is modified accordingly.

- Use RDBMS and implement it with JSP.
- Use XML File for data and Implement it with JSP
- Use RDBMS and implement it with Servlets
- Use XML File for data and Implement it with Servlets

A Bus Reservation System contains the details of a bus seat plan for 40 seats in 2x2 per row arrangement,

where the seats are numbered from 1 to 40 from first row to last row. The customer can visit the website and can reserve a ticket of his choice if available by entering his details (Name, Address, Gender and Age). The customer can cancel the ticket by entering the seat number and his name as entered for reservation.

- Use RDBMS and implement it with JSP.
- Use XML File for data and Implement it with JSP
- Use RDBMS and implement it with Servlets
- Use XML File for data and Implement it with Servlets.

Implement a simple messaging system with the following details:

When a student logs in with his/her HTNO and a given password, they should get all the messages posted to him/her giving the ID of sender and the actual message. Each message may be separated with a ruler. There should be a provision for the user to send a message to any number of users by giving the IDs separated with commas in the “To” text box.

- Use RDBMS and implement it with JSP.
- Use XML File for data and Implement it with JSP
- Use RDBMS and implement it with Servlets

(d) Use XML File for data and Implement it with Servlets.

There is an image of 600x100 size which can be logically divided into 12 button areas with labels (0-9, +, =).

Write a javascript calculator program that uses this image as input virtual keyboard and three text areas for two

input numbers and result of sum of these numbers. Add a CSS that can be used to change the colors of text and background of text areas and the page. The input numbers can be up to 4 digits each.

Develop a web application that takes user name and password as input and compares them with those

available in an xml user database. If they match, it should display the welcome page that contains the user's full

name and last used date and time retrieved from a client cookie. On logout it stores new time to the cookie and

displays a goodbye page. If authentication fails, it should store the attempt number to the client cookie and displays an error page. Add necessary CSS that takes care of the font, color of foreground and background.

A web application has the following specifications:

The first page (Login page) should have a login screen where the user gives the login name and password. Both fields must be validated on client side for a minimum length of 4 characters, name should be lower case a- z characters only and password should contain at least one digit. On submitting these values, the server should validate them with a MySQL database and if failed, show the login page along with a message saying "Login Name or Password Mismatch" in Red color below the main heading and above the form. If successful, show a welcome page with the user's full name (taken from database) and a link to Logout. On logout, a good bye page is displayed with the total time of usage (Logout time – login time). Specify the Schema details of table and web.xml file contents.

Implement it using (a) JSP Pages (b) Servlets (c) Struts

Design a struts based web portal for an international conference with following specifications:

The welcome page should give the details of the conference and a link to login. If login fails, direct them back for re-login and also provide a link for registration. On successful registration/login, the user will be directed to a page where s/he can see the status (accepted/rejected) of their already submitted papers followed by a form for submitting a doc file to the conference. Provide a logout button on all pages including the home page, once the user logs in. Implement validation framework to check that the user name is in the form of CCDDCC and password is in the form of (CCSDDD) (C for character, S for special character (one of @, #, \$, %, ^, & and !) and D for digit)., Database should be accessed through Connection Pool for MySql for user information.

Provide scope for internationalization in future. Assume any missing information and mention it first.



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M.Tech I Year I Sem.

L	T	P	C
3	0	0	3

**UNIT - I**

**Introduction:** Need for Modulation, Frequency translation, Electromagnetic spectrum, Gain, Attenuation and decibels.

**UNIT - II**

**Simple description on Modulation:** Analog Modulation-AM, FM, Pulse Modulation-PAM, PWM, PCM, Digital Modulation Techniques-ASK, FSK, PSK, QPSK modulation and demodulation schemes.

**UNIT - III**

**Telecommunication Systems:** Telephones Telephone system, Paging systems, Internet Telephony. **Networking and Local Area Networks:** Network fundamentals, LAN hardware, Ethernet LANs, Token Ring LAN.

**UNIT - IV**

**Satellite Communication:** Satellite Orbits, satellite communication systems, satellite subsystems, Ground Stations Satellite Applications, Global Positioning systems.

**Optical Communication:** Optical Principles, Optical Communication Systems, Fiber – Optic Cables, Optical Transmitters & Receivers, Wavelength Division Multiplexing.

**UNIT - V**

**Cellular and Mobile Communications:** Cellular telephone systems, AMPS, GSM, CDMA, WCDMA. **Wireless Technologies:** Wireless LAN, PANs and Bluetooth, ZigBee and Mesh Wireless networks, Wimax and MANs, Infrared wireless, RFID communication, UWB.

**TEXT BOOKS**

1. Louis E. Frenzel, "Principles of Electronic Communication Systems", 3<sup>rd</sup> Ed., McGraw Hill publications, 2008.
2. Kennady, Davis, "Electronic Communications systems", 4Ed., TMH, 1999

**REFERENCE BOOKS**

1. Tarmo Anttalainen, "Introduction to Telecommunications Network Engineering", Artech House Telecommunications Library.
2. Theodore Rappaport, "Wireless Communications-Principles and practice", Prentice Hall, 2002.
3. Roger L. Freeman, "Fundamentals of Telecommunications", 2 Ed. Wiley publications.
4. Wayne Tomasi, "Introduction to data communications and networking", Pearson Education, 2005.

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(UGC AUTONOMOUS)****Permanently Affiliated to JNTUH, Approved by AICTE, ISO 9001: 2015 Certified Institution****Accredited by NBA & NAAC with 'A' Grade****NIRF Indian Ranking 2018, Accepted by MHRD Govt. of India****AAA+ Rated by Careers 360 Magazine, Top Hundred Rank band by Outlook, 7<sup>th</sup> Rank CSR****1858OE01: FUNDAMENTALS OF CYBER SECURITY****(Open Elective - I)**

M.Tech I Year I Sem.

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**Course Objective:**

This course is aimed to generate interest and awareness in cyber security field, which is important in the world of information security due to the wide variety of computer crimes that take place in cyber space. The course deals with various types of attacks framed by an attacker, and the security which need to be implemented at various levels along with latest trends in cyber security.

**UNIT-I:**

Cyber Security Basics – Sphere, Terminology, Vulnerability in the Cyber Structure and Infrastructure, Cyber threats and Weaponry, Cyber Defense, Cyber Attack Detection and Prevention, Information Security Testing, Cyber Security Investigation/assessment, Cyber-Deterrence.

**UNIT-II:**

Cyber Crimes and Cyber Laws – Introduction, IT laws & Cyber Crimes – Internet, Hacking, Password Cracking, Viruses, Virus Attacks, Pornography, Software Privacy, Intellectual Property, Legal System of Information Technology, Social Engineering, Phishing, Denial of Service attack, Malicious Code, Mail Bombs, Worms, Logic Bombs, Botnet, Trojan, Bug Exploits.

**UNIT-III:**

**End point Security:** Desktop and Laptop Security, Cell Phone and PDA Security, Bluetooth Security, Patch and Vulnerability Management, Password Management, Security for Full Virtualization Technologies, Media Sanitization, Security Radio Frequency Identification (RFID) Systems. **Network Security:** Intrusion Detection & Prevention Systems, Firewalls and Firewall Policy, Computer Security Log Management, Enterprise Tele work and Remote Access Security, Securing WiMAX Wireless Communication. **Web Security:** Server Security, Web authentication, SSL and SET, Securing Public Web Servers, Secure

Deployment of IPv6, Secure Domain name System (DNS) Deployment, SSL VPNs, Unified Threat Management (UTM).;

**UNIT-IV:**

**Application Security:** Active Content and Mobile Code, E-commerce Security, Email Security (PGP, S/MIME), Web Security, Web Application Security, OWASP; **Data Security:** Data Management, Database Security, Data Encryption, Data Leakage Prevention (DLP), Data Destruction; **Software Security:** Software Flaws, Malware, Software based Attacks; Insecurity in Software: SRE, Software Tamper Resistance, DRM, Software Development.

**Operating System Security:** Security Functions, Software Updates and Patches, OS Integrity Checks, Account management, Antivirus Software, Security in Ordinary Operating Systems, Design of Secure OS, OS hardening, Configuring the OS for security, Security kernels, Secure Virtual machine Systems, Trusted Operating System, NGSCB.

**UNIT-V:**

Recent Trends in Cyber Security – Zero – day Malware, Trojan Wars, New Ways to Monetize Non- Financial Data, Fraud-as-a-service, Out-of-band Methods forcing Cybercriminals to Innovate, The Rise of Hactivism, Attacks in mobile devices, social media and cloud computing; Insider threats, Increased regulatory security, Cyber-Terrorism, Cyber –War and Cyber-Peace. Topological Vulnerability Analysis, Cyber Situational Awareness, Secure Composition of Systems, Autonomic Recovery, Secure Data Centers, Cloud Computing Security, Privacy in location-Based Applications

**TEXT BOOKS:**

1. Cyber Security, Edward Amoroso, kindle Edition, 2007
2. Cyber Security ,Understanding Cyber crimes, Computer Forensics and Legal Perspectives, Sunita Belapure and Nina Godbole, Wiley India Pvt Ltd. 2011

**REFERENCES:**

1. Computer Security, Dirter Gollmann, John Wiley & Sons Publication, 2011
2. Cyber Security Essentials, James Graham, Richard Howrad, Ryan Olson, CRC Press, 2011

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**1855OE02: INDUSTRIAL INSTRUMENTATION**

(Open Elective – II)

**UNIT - I**

**METROLOGY, VELOCITY AND ACCELERATION MEASUREMENT:** Measurement of length -

Gauge blocks – Plainness – Area using Simpson's rule, Plain meter – Diameter – Roughness – Angle using Bevel protractor, sine bars and Clinometer – Mechanical, Electrical, Optical and Pneumatic Comparators. Optical Methods for length and distance measurements using Optical flats and Michelson Interferometer.

Relative velocity – Translational and Rotational velocity measurements – Revolution counters and Timers - Magnetic and Photoelectric pulse counting stroboscopic methods. Accelerometers-different types, Gyroscopes-applications.

**UNIT - II**

**FORCE AND PRESSURE MEASUREMENT:** Force measurement – Different methods – Gyroscopic Force Measurement – Vibrating wire Force transducer. Basics of Pressure measurement – Manometer types – Force-Balance and Vibrating Cylinder Transducers – High and Low Pressure measurement – McLeod Gauge, Knudsen Gauge, Momentum Transfer Gauge, Thermal Conductivity Gauge, Ionization Gauge, Dual Gauge Techniques, Deadweight Gauges, Hydrostatic Pressure Measurement

**UNIT - III**

**FLOW MEASUREMENT AND LEVEL MEASUREMENT:** Flow Meters- Head type, Area type (Rota meter), electromagnetic type, Positive displacement type, mass flow meter, ultrasonic type, vortex shedding type, Hotwire anemometer type, Laser Doppler Velocity-meter. Basic Level measurements – Direct, Indirect, Pressure, Buoyancy, Weight, Capacitive Probe methods

**UNIT - IV**

**DENSITY, VISCOSITY AND OTHER MEASUREMENTS:** Density measurements – Strain Gauge load cell method – Buoyancy method - Air pressure balance method – Gamma ray method – Vibrating probe method. Units of Viscosity, specific gravity scales used in Petroleum Industries, Different Methods of measuring consistency and Viscosity – Two float viscorator – Industrial consistency meter. Sound-Level Meters, Microphones, Humidity Measurement

**UNIT - V**

**CALIBRATION AND INTERFACING:** Calibration using Master Sensors, Interfacing of Force, Pressure, Velocity, Acceleration, Flow, Density and Viscosity Sensors, Variable

Frequency Drive

**TEXT BOOKS:**

1. Doebelin E.O., “Measurement Systems – Applications and Design”, 4<sup>th</sup> Edition, McGraw Hill International, 1990.
2. Patranabis D, “Principles of Industrial Instrumentation”, TMH. End edition 1997

**REFERENCES:**

1. Considine D. M., “Process Instruments and Control Handbook”, 4<sup>th</sup> Edition, McGraw Hill International, 1993
2. Jain R.K., “Mechanical and Industrial Measurements”, Khanna Publications.

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**1855OE03: PRINCIPLES OF COMPUTER COMMUNICATIONS AND NETWORKS**

(Open Elective – II)

**Prerequisite:** Nil

**Course Objectives:**

- To understand the concept of computer communication.
- To learn about the networking concept, layered protocols.
- To understand various communications concepts.
- To get the knowledge of various networking equipment.

**Course Outcomes:** The student:

- Can get the knowledge of networking of computers, data transmission between computers.
- Will have the exposure about the various communication concepts.
- Will get awareness about the structure and equipment of computer network structures.

**UNIT - I**

**Overview of Computer Communications and Networking:** Introduction to Computer Communications and Networking, Introduction to Computer Network, Types of Computer Networks, Network Addressing, Routing, Reliability, Interoperability and Security, Network Standards, The Telephone System and Data Communications.

**UNIT - II**

**Essential Terms and Concepts:** Computer Applications and application protocols, Computer Communications and Networking models, Communication Service Methods and data transmission modes, analog and Digital Communications, Speed and capacity of a Communication Channel, Multiplexing and switching, Network architecture and the OSI reference model.

**UNIT - III**

**Analog and Digital Communication Concepts:** Representing data as analog signals, representing data as digital signals, data rate and bandwidth reduction, Digital Carrier Systems.

**UNIT - IV**

**Physical and data link layer Concepts:** The Physical and Electrical Characteristics of wire, Copper media, fiber optic media, wireless Communications. Introduction to data link Layer, the logical link control and medium access control sub-layers.

**UNIT - V**

**Network Hardware Components:** Introduction to Connectors, Transreceivers and media

convertors, repeaters, network interference cards and PC cards, bridges, switches, switches Vs Routers.

**TEXT BOOKS:**

Computer Communications and Networking Technologies, Michel A. Gallo and William H. Hancock, Thomson Brooks / Cole.

**REFERENCE BOOKS:**

Principles of Computer Networks and Communications, M. Barry Dumas, Morris Schwartz, Pearson.



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**1858OE02: MACHINE LEARNING  
(Open Elective - II)****Prerequisites:**

- Data Structures
- Knowledge on statistical methods

**Course Objectives:**

- This course explains machine learning techniques such as decision tree learning, Bayesian learning etc.
- To understand computational learning theory.
- To study the pattern comparison techniques.

**Course Outcomes:**

- Understand the concepts of computational intelligence like machine learning
- Ability to get the skill to apply machine learning techniques to address the real time problems in different areas
- Understand the Neural Networks and its usage in machine learning application.

**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.

**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.

**UNIT - II**

**Artificial Neural Networks** Introduction, Neural Network Representation, Appropriate Problems for Neural Network Learning, Perceptions, Multilayer Networks and the Back propagation Algorithm.

Discussion on the Back Propagation Algorithm, An illustrative Example: Face Recognition

**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, Gibbs Algorithm, Naïve Bayes Classifier, An Example: Learning to Classify Text, Bayesian Belief Networks, EM Algorithm.

**Computational Learning Theory** – Introduction, Probably 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 Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning.

**UNIT - IV**

**Pattern Comparison Techniques**, Temporal patterns, Dynamic Time Warping Methods, Clustering, Codebook Generation, Vector Quantization

**Pattern Classification:** Introduction to HMMS, Training and Testing of Discrete Hidden Markov Models and Continuous Hidden Markov Models, Viterbi Algorithm, Different Case Studies in Speech recognition and Image Processing

**UNIT - V**

**Analytical Learning** – Introduction, Learning with Perfect Domain Theories : PROLOG-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operations.

**Combining Inductive and Analytical Learning** – Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis.

**TEXT BOOKS:**

1. Machine Learning – Tom M. Mitchell,- MGH
2. Fundamentals of Speech Recognition By Lawrence Rabiner and Biing – Hwang Juang.

**REFERENCE BOOK:**

1. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis