

ACADEMIC REGULATIONS (R22) COURSE STRUCTURE AND DETAILED SYLLABUS (CHOICE BASED CREDIT SYSTEM (CBCS))

M.Tech. Computer Science and Engineering (Applicable for the batches admitted from 2022 - 2023)



Department of Computer Science and Engineering CMR INSTITUTE OF TECHNOLOGY

(UGC - Autonomous)

Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NBA and NAAC with A Grade Kandlakoya(V), Medchal District, Hyderabad-501 401, Telangana State Mobile No.: 8008557612 E-mail: principal@cmritonline.ac.in Web: www.cmritonline.ac.in



FOREWORD

CMR Institute of Technology, established in the year 2005, Approved by AICTE, New Delhi, Permanently Affiliated to JNTUH, Accredited by NBA under Tier-I, Achieved UGC Autonomous Status and has been bestowed with NAAC 'A' Grade for its remarkable academic accomplishments accompanied by its unflinching spirit and dedication to impart quality technical education to the deserving aspirants. The institution has commenced functioning independently within the set norms prescribed by UGC and AICTE. The performance of the institution manifests the confidence that the prestigious monitoring body, the UGC has on it, in terms of upholding its spirit and sustenance of the expected standards of functioning on its own consequently facilitating the award of degrees for its students. Thus, an autonomous institution is provided with the necessary freedom to have its own **curriculum, examination system and monitoring mechanism**, independent of the affiliating University but under its observance.

CMR Institute of Technology takes pride for having won the confidence of such distinguished academic bodies meant for monitoring the quality in technology education. Besides, the institution is delighted to sustain the same spirit of discharging the responsibilities that it has been conveying since 2005 to attain the current academic excellence in improvement of the standards and ethics. Institutional Governance enriched by eminent personalities on many of its boards/councils such as the Governing Body, Academic Council, Boards of Studies, IQAC to frame the guidelines for curriculum design and development in the interest of the key-stakeholders.

The autonomous academic regulations, course structure and syllabi have been framed in accordance with the vision and mission of the institution on the valuable suggestions from various stakeholders from the diverse fields of academics, industry, R&D and society with a bird-eye-view to impart quality professional technical education to contribute the society with innovation and creativity.

All the staff members, parents and students are requested to study all the rules and regulations carefully and approach the Principal to seek any clarifications, if needed, without presumptions, to avoid unwanted subsequent embarrassments. The cooperation of all the stakeholders is sought for the successful implementation of the autonomous system in the larger interests of the institution and for brightening the career prospects of engineering and management graduates.

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CMR INSTITUTE OF TECHNOLOGY

Vision: To create world class technocrats for societal needs.

Mission: Achieve global quality technical education by assessing learning environment through

- Innovative Research & Development
- Eco-system for better Industry institute interaction
- Capacity building among stakeholders

Quality Policy: Strive for global professional excellence in pursuit of key-stakeholders.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (CSE)

Vision: Develop competent software professionals, researchers and entrepreneurs to serve global society.

Mission: The department of Computer Science and Engineering is committed to

- create technocrats with proficiency in design and code for software development
- adapt contemporary technologies by lifelong learning and face challenges in IT and ITES sectors
- quench the thirst of knowledge in higher education, employment, R&D and entrepreneurship

M.Tech. - Computer Science and Engineering (CSE)

- I. Programme Educational Objectives (PEOs): Engineering Graduates will
- 1. Pursue successful professional career in diverse fields.
- 2. Pursue lifelong learning and research skills to solve complex engineering problems.
- 3. Exhibit professionalism, ethics, inter-personal skills and leadership.
- **II. Programme Outcomes (POs):** Engineering Graduates will have ability to
- 1. Carry out investigation, research, development and solve complex problems independently.
- 2. Write, present and substantiate a technical report/document.
- 3. Demonstrate mastery in the field of Computer Science and Engineering.

III. Programme Specific Outcomes (PSOs): Engineering Graduates will be able to

- 1. Extend optimized solutions for various computing problems using cutting-edge technologies.
- 2. Design and develop technically-feasible and environmentally-sustainable solutions.

M.Tech. - Academic Regulations - R22 (For batches admitted from the Academic Year 2022 - 23)

PREAMBLE

For pursuing M.Tech. - Regular Two Year Post Graduate Degree Programme offered by CMR Institute of Technology (CMRIT) under Autonomous status will herein be referred to as CMRIT (Autonomous).

All the specified rules are herein approved by the Academic Council. These rules will be in force and are applicable to students admitted from the academic year 2022-23 onwards. Any reference to "**Institute**" or "**College**" in these rules and regulations stand for CMRIT (Autonomous).

All the rules and regulations specified shall hereafter be read as a whole for the purpose of interpretation, as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies, the Principal, CMRIT (Autonomous) shall be The Chairman, Academic Council.

1. POST-GRADUATE DEGREE PROGRAMMES IN ENGINEERING & TECHNOLOGY (PGP IN E&T)

CMR Institute of Technology offers **Two** Years (**Four** Semesters) full-time Master of Technology (M.Tech.) Degree Programmes, under Choice Based Credit System (CBCS) in different branches of Engineering and Technology with different specializations.

2. ELIGIBILITY FOR ADMISSIONS

- 2.1 Admission to the PGPs shall be made subject to eligibility, qualification and specializations prescribed by the JNTUH from time to time, for each specialization under each M.Tech. Programme.
- 2.2 Admission to the post graduate programme shall be made on the basis of either the merit rank or Percentile obtained by the qualified student in there relevant qualifying GATE Examination/the merit rank obtained by the qualified student in an entrance test conducted by Telangana State Government(PGECET) for M.Tech. Programmes /an entrance test conducted by JNTUH/on the basis of any other exams approved by the JNTUH, subject to reservations as laid down by the Govt. from time to time.
- 2.3 The medium of instructions for all PG Programmes will be **English** only.

3. M.Tech. PROGRAMME (PGP in E&T) STRUCTURE

- 3.1 The M.Tech. Programs in E & T of JNTUH are of Semester pattern, with **Four** Semesters consisting of **Two** academic years, each academic year having **Two** Semesters (First/Odd and Second/Even Semesters). Each Semester shall be of 22 weeks duration (inclusive of Examinations), with a minimum of 90 instructional days per Semester.
- 3.2 The two-year M.Tech. Program consists of **68** credits and the student has to register for all **68** credits and earn all **68** credits for the award of M.Tech. degree. There is **NO** exemption of credits in any case.
- 3.3 The student shall not take more than four academic years to fulfill all the academic requirements for the award of M.Tech. degree from the date of commencement of first year first semester, failing which the student shall forfeit the seat in M.Tech. Programme.
- 3.4 **UGC/AICTE** specified definitions/descriptions are adopted appropriately for various terms and abbreviations used in these PG academic regulations, as listed below:

3.4.1 Semester Scheme:

Each Semester shall have 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'. Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) are taken as 'references' for the present set of Regulations. The terms 'SUBJECT'/'COURSE' imply the same meaning here and refer to 'Theory/Lab Course'/ 'Design/Drawing Subject'/'Mini Project with Seminar'/'Dissertation', as the case may be.

3.4.2 Credit Courses:

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

Theory		Practical				
1 Hr. Lecture (L) per week 1 credit		1 Hr. Practical (P) per week 0.5 cm				
1 Hr. Tutorial (T) per week	1 credit	2 Hrs Practical (Lab) per week	1.0 credit			

All Mandatory Courses, Study Tour, Guest Lecture, etc., will not carry any Credits.

Contact Hours: Weekly contact hours – maximum of 30 hours per week (i.e. 1 hour = 60 Minutes) including credit and non-credit courses.

3.4.3 Subject/ Course Classification:

All subjects/courses offered for the Post-Graduate Programme in E & T (M.Tech. Degree Programme) are broadly classified as follows. The JNTUH has followed in general the guidelines issued by AICTE/UGC.

S.	Broad Course	Course					
No.	Classification	Group/Category	Course Description				
		PC- Professional	Includes subjects related to the parent				
		Core	discipline/department/branch of Engineering.				
		Dissertation	M.Tech. Project or PG Project or Major				
1	Core Courses (CoC)		Project.				
		Mini Project	Seminar based on core contents related to				
		with Seminar	Parent Discipline/Department/Branch of				
			Engineering.				
	Elective	PE-	Includes elective subjects related to the parent				
		Professional	discipline/department/branch of Engineering.				
		Electives					
2	Courses(E&C)	OE- Open	Elective subjects which include inter-				
		Electives	disciplinary subjects or subjects in an area				
			outside the parent discipline/department/				
			branch of Engineering.				
3	MC - Mandatory Courses		Non-Credit Audit Courses				

4. COURSE REGISTRATION

- 4.1 A 'Faculty Advisor or Counselor' shall be assigned to each specialization, who will advise on the Post Graduate Programme (PGP), its Course Structure and Curriculum, Choice/Option for Subjects/Courses, based on his competence, progress, pre-requisites and interest.
- 4.2 The Academic Section of the College invites 'Registration Forms' from students within 15 days from the commencement of class work through 'ON-LINESUBMISSIONS', ensuring 'DATE and TIME Stamping'. The ON-LINE Registration Requests for any 'CURRENT SEMESTER' shall be completed BEFORE the commencement of SEEs (Semester End Examinations) of the 'PRECEDING SEMESTER'.

- 4.3 A Student can apply for ON-LINE Registration, ONLY AFTER obtaining the 'WRITTEN APPROVAL' from his Faculty Advisor, which should be submitted to the College Academic Section through the Head of Department (a copy of it be in retained with Head of Department, Faculty Advisor and the Student).
- 4.4 If the student submits ambiguous choices or multiple options or erroneous entries during ON-LINE Registration for the Subject(s)/Course(s) under a given/specified Course Group/Category as listed in the Course Structure, only the first mentioned Subject/Course in that Category will be taken into consideration.
- 4.5 Subject/Course Options exercised through ON-LINE Registration are final and CANNOT be changed, nor can they be inter-changed; further, alternate choices also will not be considered. However, if the Subject/Course that has already been listed by the CMRIT in a semester could not be offered due to unforeseen or unexpected reasons, then the student will be allowed to have alternate choice either for a new subject, if it is offered, or for another existing subject. Such alternate arrangements will be made by the Head of Dept., with due notification and time-framed schedule, with in the FIRST WEEK from the commencement of class-work for that Semester.

5. ATTENDANCE REQUIREMENTS

The programmes are offered based on a unit system with each subject being considered a unit. Attendance is calculated separately for each subject.

- 5.1 Attendance in all courses is compulsory. The minimum required attendance in each theory/lab subject (*also mandatory Audit Courses*) including the attendance of mid-term examination/ Laboratory etc. is 75%. Two periods of attendance for each theory subject shall be considered, if the student appears for the mid-term examination of that subject. A student shall not be permitted to appear for the SEE, if his attendance is less than 75%.
- 5.2 A student's Seminar report and presentation on Mini Project shall be eligible for evaluation, only if he ensures a minimum of 75% of his attendance in Seminar presentation classes on Mini Project during that Semester.
- 5.3 **Condoning of shortage of attendance** (between 65% and 75%) up to a maximum of 10% (considering the days of attendance in sports, games, NCC, NSS activities and Medical grounds) in each subject (Theory/Lab/Mini Project with Seminar) of a semester shall be granted by the College Academic Committee on genuine reasons.
- 5.4 A prescribed fee per subject shall be payable for condoning shortage of attendance after getting the approval of College Academic Committee for the same. The College Academic Committee shall maintain relevant documents along with the request from the student.
- 5.5 Shortage of Attendance below 65% in any subject shall in no case be condoned.
- 5.6 A Student, whose shortage of attendance is not condoned in any Subject(s) (Theory/Lab/Mini Project with Seminar) in any Semester, is considered as 'Detained in that Subject(s), and is not eligible to write SEE of such Subject(s); in case of 'Mini Project with Seminar, without a Report or Presentation are not eligible for evaluation in that semester; and the student have to seek reregistration for those subject(s) in subsequent semesters and attend the same as and when offered.
- 5.7 A student fulfills the attendance requirement in the present semester, shall not be eligible for readmission into the same class.
- 5.8 a) A student shall put in a minimum required attendance in at least three theory subjects (excluding *mandatory* (*non-credit audit*) course) in I semester for promotion to II Semester.
 - b) A student shall put in a minimum required attendance in at least three theory subjects (excluding *mandatory* (*non-credit audit*) course) in II semester for promotion to III Semester.

6. ACADEMIC REQUIREMENTS

The following academic requirements must be satisfied, in addition to the attendance requirements mentioned in itemno.5. The performance of the candidate in each semester shall be evaluated subject-wise, with a maximum of 100 marks per subject/course (theory/practical), based on Continuous Internal Evaluation (CIE) and Semester End Examination (SEE).

- 6.1 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course, if he secures not less than (i) 40% of Marks (24 out of 60 marks) in the Semester End Examination (ii) 40% of Marks in the internal examinations (16out of 40 marks allotted for CIE); and (iii) A minimum of 50% of marks in the sum total of CIE and SEE taken together; in terms of Letter Grades this implies securing **'B'** Grade or above in a subject.
- 6.2 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Mini Project with seminar, if student secures not less than 50% marks (i.e. 50 out of 100 allotted marks). The student would be treated as failed, if student (i) does not submit a seminar report on Mini Project or does not make a presentation of the same before the evaluation committee as per schedule or (ii) secures less than 50% marks in Mini Project with seminar evaluation. The failed student shall reappear for the above evaluation when the notification for supplementary examination is issued.
- 6.3 A student shall register for all subjects for total of **68** credits as specified and listed in the course structure for the chosen specialization, put in the required attendance and fulfill the academic requirements for securing **68** credits obtaining a minimum of 'B' Grade or above in each subject, and all **68** credits securing Semester Grade Point Average (**SGPA**) \geq **6.0** (in each semester) and final Cumulative Grade Point Average (**CGPA**) (i.e., CGPA at the end of PGP) \geq **6.0**, and shall *pass all the mandatory Audit Courses* to complete the PGP successfully.
- Note:(1) The SGPA will be computed and printed on the marks memo only if the candidate passes in all the subjects offered and gets minimum B grade in all the subjects.

(2) CGPA is calculated only when the candidate passes in all subjects in all semesters.

- 6.4 Marks and Letter Grades obtained in all those subjects covering the above specified **68** credits alone shall be considered for the calculation of final CGPA, which will be indicated in the Grade Card/Marks Memo of second year second semester.
- 6.5 If a student registers for extra subject(s) (in the parent department or other departments/ branches of Engineering) other than those listed subjects totaling to **68** credits as specified in the course structure, the performance in extra subject(s) (although evaluated and graded using the same procedure as that of the required **68** credits) will not be considered while calculating the SGPA and CGPA. For such extra subject(s) registered, percentage of marks and Letter Grade alone will be indicated in the Grade Card/Marks Memo, as a performance measure, subject to completion of the attendance and academic requirements as stated in items 5 and 6.1-6.3.
- 6.6 When a student is detained due to shortage of attendance in any subject(s) in any semester, no Grade allotment will be made for such subject(s). However, he is eligible for re-registration of such subject(s) in the subsequent semester(s), as and when next offered, with the academic regulations of the batch into which he is re-registered, by paying the prescribed fees per subject. In all these re-registration cases, the student shall have to secure a fresh set of internal marks and SEE marks for performance evaluation in such subject(s), and SGPA/CGPA calculations.
- 6.7 A student eligible to appear for the Semester End Examination in any subject, but absent from it or failed (failing to secure 'B' Grade or above), may reappear for that subject at the supplementary examination as and when conducted. In such cases, his Internal Marks assessed earlier for that subject will be carried over, and added to the marks secured in the supplementary examination, for the purpose of evaluating his performance in that subject.
- 6.8 A student who fails to earn **68** credits as per the specified course structure, and as indicated above, within **four** academic years from the date of commencement of his first year first semester, shall forfeit his seat in M.Tech. Programme and his admission **shall stand cancelled.**

7. EVALUATION - DISTRIBUTION AND WEIGHTAGE OF MARKS

The performance of a student in each semester shall be evaluated subject-wise (irrespective of credits assigned) for a maximum of 100 marks.

- 7.1 The performance of a student in every subject/course (including practical's and Project) will be evaluated for 100 marks each, with 40 marks allotted for CIE and 60 marks for SEE. The CIE shall be made based on the average of the marks secured in the two Mid-Term Examinations conducted, first Mid-Term examinations in the middle of the Semester and second Mid-Term examinations during the last week of instruction.
- 7.2 Evaluation of Theory Subjects/Courses
 - A) Continuous Internal Evaluation (CIE): In CIE, for theory subjects, during a semester, there shall be Two Mid-Term Examinations. The first Mid-Term Examination shall be conducted for the first 50% of the syllabus, and the Second Mid-Term for the remaining 50% of the syllabus. Each Mid-Term examination consists of two parts (i) Part A for 5 marks, (ii) Part B for 25 marks with a total duration of 2 hours as follows:
 - Part-A consists of one compulsory question with five sub questions carrying one mark each and Part-B consists of 5 essay questions with internal choice carrying five marks each; the student has to answer all 5 questions. The First and Second Mid-Term question papers comprise of 2,2,1 questions from I, II, III(A) Units and 1,2,2 questions from III(B), IV, V Units respectively. The **average of two Mid Term Examinations** shall be taken as final marks for Mid-Term Examination (for 30 marks).
 - The remaining 10 marks of CIE are distributed as follows:
 - (i) Assignment for 5 marks. First assignment should be submitted before the commencement of the first mid-term examinations and the second assignment before the commencement of second mid-term examinations. The assignments shall be specified/given by the concerned subject teacher. The average of two assignments shall be taken as final marks for assignment (for 5 marks).
 - (ii) Subject Viva-Voce/PPT/Poster Presentation/Case Study on a topic in the subject concerned for 5 marks before commencement of II Mid-Term Examination.
 - The Student, in each subject, shall have to earn 40% of marks (i.e. 16 marks out of 40 marks) in CIE, 40% of marks (i.e. 24 marks out of 60) in SEE and Overall 50% of marks (i.e. 50 marks out of 100 marks) both CIE and SEE marks taking together.
 - **B)** Semester End Examinations (SEE): The duration of SEE is 3 hours. The details of the question paper pattern are as follows:
 - The end semester examinations will be conducted for 60 marks consisting of two parts viz. i) **Part-A** for 10 marks, ii) **Part B** for 50 marks.
 - Part-A is compulsory, which consists of ten questions (two from each unit) carrying 1 mark each.
 - Part-B consists of five questions (numbered from 11 to 15) carrying 10 marks each. One question from each unit (may contain sub-questions) with internal choice.
- 7.3 **Evaluation of Practical Subjects/Courses:** For practical subjects there shall be a CIE during the semester for 40 marks and 60 marks for SEE. Out of the 40 marks for CIE:
 - A) Continuous Internal Evaluation (CIE): The distribution of CIE 40 marks for practical subjects is as follows:
 - 1. A write-up on day-to-day experiment(s) in the laboratory shall be evaluated for 15 marks. The breakup of marks would be (i) 3 marks for observation and record (ii) 4 marks for performance of experiment (iii) 3 marks for expected outcome and (iv) 5 marks for Viva-Voce. The average marks of day-to-day experiments shall be the final marks (for 15 marks).

- 2. Internal practical examination conducted by the laboratory teacher concerned shall be evaluated for 15 marks. The breakup of marks are (i) 3 marks for write-up (ii) 4 marks for experiment/program (iii) 3 for evaluation of results and (iv) 5 marks for viva-voce on concerned laboratory course.
- 3. The remaining 10 marks are for Laboratory Project, which consists of the Design (or) Software/Hardware Model Presentation (or) App Development (or) Prototype Presentation submission which shall be evaluated after completion of laboratory course and before Semester End Practical Examination.
- **B)** Semester End Examination (SEE): The Semester End Examination (SEE) for practical subject/course shall be conducted at the end of the semester with duration of 3 hours by one internal and one external examiner appointed by the Head of the Institution as per the recommendation of the concerned Head of the Department for 60 marks. The allocation of marks is as given below:
 - (i) 10 marks for write-up (ii) 15 marks for experiment/program (iii) 15 marks for evaluation of results (iv) 10 marks for presentation on another experiment/program in the same lab course and (v) 10 marks for viva-voce on concerned laboratory course.
- 7.4 Condition for Passing CIE and SEE in Theory and Practical Subject(s)/Course(s): The Student, in each subject, shall have to earn 40% of marks (i.e. 16 marks out of 40 marks) in CIE, 40% of marks (i.e. 24 marks out of 60) in SEE and Overall 50% of marks (i.e. 50 marks out of 100 marks) both CIE and SEE marks put together.
 - The student is eligible to write Semester End Examination of the concerned subject, if the student scores ≥ 40% (16 marks) of 40 Continuous Internal Examination (CIE) marks.
 - In case, the student appears for Semester End Examination (SEE) of the concerned subject but not scored minimum 40% of CIE marks (16 marks out of 40 internal marks), his performance in that subject in SEE shall stand cancelled inspite of appearing the SEE.
- 7.5 For conducting laboratory end examinations of all PG Programmes, one internal examiner and one external examiner are to be appointed by the Principal within two weeks, before commencement of the lab SEE. The external examiner should be selected from outside the college concerned but within the cluster. No external examiner should be appointed from any other college in the same cluster/any other cluster which is run by the same Management.
- 7.6 There shall be Mini Project with Seminar during II semester for internal evaluation of 100 marks. The Departmental Academic Committee (DAC) will review the progress of the mini project during the seminar presentations and evaluate the same for 50 marks. Mini Project Viva Voce will be evaluated by the DAC for another 50 marks before the SEE. Student shall carryout the mini project in consultation with the mini project supervisor which may include critically reviewing the literature, project implementation and submit it to the department in the form of a report and shall make an oral presentation before the DAC consisting of Head of the Department, Mini Project supervisor and two other senior faculty members of the department. The student has to secure a minimum of 50% of marks in i) seminar presentation and ii) mini project viva voce, to be declared successful. If he fails to obtain the minimum marks, he has to reappear for the same as and when scheduled.
- 7.7 Every candidate shall be required to submit a dissertation on a topic approved by the Dissertation Review Committee.
- 7.8 A DRC shall be constituted with the Head of the Department as Chairperson, Dissertation Supervisor and one senior faculty member of the Department offering the M.Tech. Programme.
- 7.9 Registration of Dissertation Work: A candidate is permitted to register for the Dissertation Work after satisfying the attendance requirement in all the subjects, both theory and laboratory.
- 7.10 After satisfying 7.9, a candidate must present in **Dissertation Work Review-I**, in consultation with his Dissertation Supervisor, the title, objective and plan of action of his Dissertation work to the DRC for approval **within four weeks** from the commencement of **III Semester**. Only after obtaining the approval of the DRC can the student initiate the Dissertation work.

- 7.11 If any candidate wishes to change their supervisor or topic of the dissertation, they can do so with the approval of the DRC. However, the DRC shall examine whether or not the change of topic/supervisor leads to a major change in initial plans of dissertation proposal and the date of registration for the project work starts from the date of change of supervisor or topic.
- 7.12 A candidate shall submit his Dissertation progress report in two stages at least with a gap of **three** Months between them.
- 7.13 The work on the dissertation shall be initiated at the beginning of the III semester and the duration of the Dissertation is two semesters. A candidate is permitted to submit Dissertation Thesis only after successful completion of all theory and practical courses with the approval of DRC **not earlier than 40 weeks** from the date of approval of the Dissertation work. For the approval of DRC, the candidate shall submit the draft copy of thesis to the Head of the Department and make an oral presentation before the DRC.
- 7.14 **The Dissertation Work Review-II** in III Semester carries 100 internal marks. Evaluation should be done by the DRC for 50 marks and the Supervisor will evaluate the work for the other 50 marks. The Supervisor and DRC will examine the Problem Definition, Objectives, Scope of Work, Literature Survey in the same domain and progress of the Dissertation Work. A candidate has to secure a minimum of 50% of marks to be declared successful in Dissertation Work Review II. If he fails to obtain the minimum required marks, he has to reappear for Dissertation Work Review-II as and when conducted.
- 7.15 **The Dissertation Work Review-III** in IV Sem. Carries 100 internal marks. Evaluation should be done by the DRC for 50 marks and the Supervisor will evaluate it for the other 50 marks. The DRC will examine the overall progress of the Dissertation Work and decide whether or not the Dissertation is eligible for final submission. A candidate has to secure a minimum of 50% of marks to be declared successful in Dissertation Work Review III. If he fails to obtain the required minimum marks, he has to reappear for Dissertation Work Review III as and when conducted. For Dissertation Evaluation (Viva Voce) in IV Semester there are external marks of 100 and it is evaluated by the external examiner. The candidate has to secure a minimum of 50% marks in Dissertation Evaluation (Viva-Voce) examination.
- 7.16 Dissertation Work Reviews-II and III shall be conducted in phase I (Regular) and Phase II (Supplementary). Phase II will be conducted only for unsuccessful students in Phase I. The unsuccessful students in Dissertation Work Review II (Phase II) shall reappear for it at the time of Dissertation Work Review-III (Phase I). These students shall reappear for Dissertation Work Review III in the next academic year at the time of Dissertation Work Review II only after completion of Dissertation Work Review II, and then Dissertation Work Review III follows. The unsuccessful students in Dissertation Work Review III (Phase II) shall reappear for Dissertation Work Review III (Phase II) shall reappear for Dissertation Work Review III (Phase II) shall reappear for Dissertation Work Review III (Phase II) shall reappear for Dissertation Work Review III (Phase II) shall reappear for Dissertation Work Review III (Phase II) shall reappear for Dissertation Work Review III in the next academic year only at the time of Dissertation Work Review III in the next academic year only at the time of Dissertation Work Review III (Phase I).
- 7.17 After approval from the DRC, a soft copy of the thesis should be submitted for <u>ANTI-PLAGIARISM</u> check and the plagiarism report should be submitted to the HOD and be included in the final thesis.

The Thesis will be accepted for submission, if the similarity index is less than **30%**. If the similarity index has more than the required percentage, the student is advised to modify accordingly and re-submit the soft copy of the thesis after one month. The maximum number of re-submissions of thesis after plagiarism check is limited to **TWO**. The candidate has to register for the Dissertation work and work for two semesters. After three attempts, the admission is liable to be cancelled. The college authorities are advised to make plagiarism check of every soft copy of theses before submissions.

- 7.18 Three copies of the Dissertation Thesis certified by the supervisor shall be submitted to the College/School/Institute, after submission of a research paper related to the Dissertation work in a UGC approved journal. A copy of the submitted research paper shall be attached to thesis.
- 7.19 The thesis shall be adjudicated by an external examiner appointed by the Principal. For this, the COE shall submit a panel of **three** examiners from among the list of experts in the relevant specialization as submitted by the Head of the Department.

- 7.20 If the report of the external examiner is unsatisfactory, the candidate shall revise and resubmit the Thesis. If the report of the examiner is unsatisfactory again, the thesis shall be summarily rejected. Subsequent actions for such dissertations may be considered, only on the specific recommendations of the external examiner and /or DRC. No further correspondence in this matter will be entertained, if there is no specific recommendation for resubmission.
- 7.21 If the report of the examiner is satisfactory, the Head of the Department shall coordinate and make arrangements for the conduct of Dissertation Viva-Voce examination. The Dissertation Viva-Voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the external examiner who adjudicated the Thesis. The candidate has to secure a minimum of 50% of marks in Dissertation Evaluation (Viva-Voce) examination.
- 7.22 If he fails to fulfill the requirements as specified in 7.21, he will reappear for the Dissertation Viva-Voce examination **only after three months**. In the reappeared examination also, if he fails to fulfill the requirements, he will not be eligible for the award of the degree, unless he is asked to revise and resubmit his Dissertation Work by the board within a specified time period (within **four** years from the date of commencement of his first year first semester).
- 7.23 The Dissertation Viva-Voce External examination marks must be submitted to the COE on the day of the examination.
- 7.24 For mandatory non-credit Audit courses, a student has to secure 40 marks out of 100 marks (i.e.40% of the marks allotted) in the CIE for passing the subject/course. These marks should also be uploaded along with the CIE marks of other subjects.
- 7.25 No marks or letter grades shall be allotted for mandatory non-credit Audit Courses. Only Pass/Fail shall be indicated in Grade Card.

8. **RE-ADMISSION/RE-REGISTRATION**

8.1 **Re-Admission for Discontinued Student**

A student, who has discontinued the M.Tech. degree programme due to any reason whatsoever, may be considered for '**readmission'** into the same degree programme (with the same specialization) with the academic regulations of the batch into which he gets readmitted, with prior permission from the authorities concerned, subject to item 6.6.

- 8.2 If a student is detained in a subject (s) due to shortage of attendance in any semester, he may be permitted to **re-register** for the same subject(s) in the same category (core or elective group) or equivalent subject, if the same subject is not available, as suggested by the Board of Studies of that department, as and when offered in the subsequent semester(s), with the academic regulations of the batch into which he seeks re-registration, with prior permission from the authorities concerned, subject to item 3.2
- 8.3 A candidate shall be given one chance to re-register and attend the classes for a maximum of two subjects in a semester, if the internal marks secured by a candidate are less than 40% and failed in those subjects but fulfilled the attendance requirement. A candidate must re-register for failed subjects within four weeks of commencement of the class work and secure the required minimum attendance. In the event of the student taking this chance, his Continuous Internal Evaluation (internal) marks and Semester End Examination marks obtained in the previous attempt stand cancelled.

9. EXAMINATIONS AND ASSESSMENT GRADING SYSTEM

- 9.1 Grades will be awarded to indicate the performance of the student in each Theory Subject/Lab/ Mini Project with Seminar/Dissertation, based on the percentage of marks obtained (CIE + SEE) as specified in Item 7 above, and a corresponding Letter Grade shall be given.
- 9.2 As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades (UGC Guidelines) and corresponding percentage of marks shall be followed:

% of Marks Secured (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points
90% and above ($\geq 90\%$, $\leq 100\%$)	O (Outstanding)	10
Below 90% but not less than $80\% (\ge 80\%, < 90\%)$	A^+ (Excellent)	9
Below 80% but not less than 70% (\geq 70%, < 80%)	A (Very Good)	8
Below 70% but not less than $60\% (\ge 60\%, < 70\%)$	B^+ (Good)	7
Below 60% but not less than 50% (\geq 50%, < 60%)	B (Average)	6
Below 50% (< 50%)	F (Fail)	0
Absent	Ab	0

- 9.3 A student obtaining **'F'** Grade in any Subject is deemed to have 'failed' and is required to reappear as 'Supplementary Candidate' for the Semester End Examination (SEE), as and when conducted. In such cases, his Internal Marks (CIE Marks) in those subjects will remain as obtained earlier.
- 9.4 If a student has not appeared for the examinations, '**Ab**' Grade will be allocated to him for any subject and shall be considered 'failed' and will be required to reappear as 'Supplementary Candidate' for the Semester End Examination (SEE), as and when conducted.
- 9.5 A Letter Grade does not imply any specific marks percentage; it is only the range of percentage of marks.
- 9.6 In general, a student shall not be permitted to repeat any Subject/Course(s) only for the sake of 'Grade Improvement' or 'SGPA/CGPA Improvement'.
- 9.7 A student earns Grade Point (GP) in each Subject/Course, on the basis of the Letter Grade obtained by him in that Subject/Course. The corresponding 'Credit Points' (CP) are computed by multiplying the Grade Point with Credits for that particular Subject/Course.

Credit Points (CP) = Grade Point (GP) x Credits

- 9.8 The student passes the Subject/Course only when he gets GP≥6 (B Grade or above).
- 9.9 The SGPA is calculated by dividing the Sum of Credit Points secured from ALL Subjects/ Courses registered in a Semester, by the Total Number of Credits registered during that Semester. SGPA is rounded off to TWO Decimal Places. SGPA is thus computed as

SGPA (S_i) = \sum (C_i X G_i) / \sum C_i

Where C_i is the no. of credits of the ith course and G_i is the GP scored in the ith course.

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

$CGPA = \sum (C_i X S_i) / \sum C_i$

where S_i is the SGPA of the ith semester and C_i is the total no. of credits in that semester.

Illu	Illustration of calculation of SGPA					Illustration of calculation of CGPA			
Course /Subject	Credits	Letter Grade	Grade Points	Credit Points	Sem. Credits S		SGPA	Credits x SGPA	
Course 1	3	А	8	3 x 8 = 24	Sem I	18	7	18 x 7= 126	
Course 2	3	0	10	$3 \ge 10 = 30$	Sem II	18	6	18 x 6= 108	
Course 3	3	В	6	$3 \times 6 = 18$	Sem III	12	8	12 x 8 = 96	
Course 4	3	В	6	$3 \ge 6 = 18$	Sem IV	20	8	20 x 8 = 160	
Course 5	2	A^+	9	$2 \ge 9 = 18$					
Course 6	2	В	6	2 x 6 = 12					
Course 7	2	В	6	2 x 6 = 12					
Total	18			132	Total	68		490	
SGPA = 132/18 = 7.33				(CGPA =	490/68 =	7.20		

10 AWARD OF DEGREE AND CLASS

- 10.1 If a student who registers for all the specified Subjects/ Courses as listed in the Course Structure, satisfies all the Course Requirements, and passes the examinations prescribed in the entire PG Programme (PGP), and secures the required number of **68** Credits (with CGPA>6.0), shall be declared to have 'QUALIFIED' for the award of the M.Tech. degree in the chosen Branch of Engineering and Technology with the specialization that he was admitted into.
- 10.2 After a student has earned the requirements prescribed for the completion of the programme and is eligible for the award of M.Tech. Degree, he shall be placed in one of the following three classes based on the CGPA:

Class Awarded	CGPA
First Class with Distinction	≥ 7.75
First Class	6.75≤CGPA<7.75
Second Class	6.00≤CGPA<6.75

A student with final CGPA (at the end of the **PGP**) < 6.00 shall not be eligible for the Award of Degree.

11 WITH HOLDING OF RESULTS

If the student has not paid the dues, if any, to the Institute or if any case of indiscipline is pending against him, the results and degree of the student will be with held and he will not be allowed into the next semester.

12 GENERAL

- 12.1 **Credit**: A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work per week.
- 12.2 Credit Point: It is the product of grade point and number of credits for a course.
- 12.3 Wherever the words "he", "him", "his", occur in the regulations, they shall include "she", "her".
- 12.4 The academic regulation should be read as a whole for the purpose of any interpretation.
- 12.5 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Institution is final.
- 12.6 The Institution 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 Institute.

13 MALPRACTICE

- 13.1 **Malpractice Prevention Committee:** The committee shall examine the student's malpractice and indiscipline cases occurred, while conducting the examinations and recommend appropriate punishment to the Academic Council after taking explanation from the student and concerned invigilator as per the malpractice rules mentioned below. The committee consists of
 - a) Controller of Examinations Chairman
 - b) Addl. Controller of Examinations.- Convener
 - c) Subject Expert Member
 - d) Head of the Department of which the student belongs to Member
 - e) The Invigilator concerned Member

S. No.	Nature of Malpractices / Improper Conduct	Punishment
1(a)	Possesses or keeps accessible in examination hall, any paper, notebook, 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 the student is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
1(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, the student will be handed over to the police and a case is registered against them.
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 Principal.
3	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from the 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 practical's 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 classwork and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4	Smuggles in the Answer book or additional sheet or takes out or arranges to cond out the question	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the condidate has
	paper during the examination or	already appeared including practical
	during or after the examination.	be permitted for the remaining examinations

13.2	Malpractice	Rules:	Disciplinary	Action for	Improper	Conduct in	Examinations
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5	Uses objectionable, abusive or	of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. Cancellation of the performance in that
	offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	subject.
6	Refuses to obey the orders of the Addl. Controller of examinations / 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 addl. Controller of examinations or any person on duty in or outside the examination hall of any injury to his person or to any of their relations whether by words, either spoken or written or by signs or by visible representation, assaults the addl. Controller of examinations, or any person on duty in or outside the examination hall or any of their 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 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 a 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 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 be reported to the principal for further	not covered in the above clauses 1 to 11 shall action to award suitable punishment.

COURSE STRUCTURE

<u>M.Tech. (Computer Science & Engineering) – R22 Course Structure</u> (Applicable from the batch admitted during 2022-23 and onwards)

	I – Semester								
S.	Course	Course Subject	POs	Os	Hours Per Week			dits	
No.	Code	Subject	105	Sd	L	Т	Р	Cre	
1	22CSPC11	Mathematical Foundations of Computer Science	1,2,3	1,2	3	-	-	3	
2	22CSPC12	Advanced Data Structures	1,2,3	1,2	3	-	-	3	
3	Professional	Elective – I			3	-	-	3	
	22CSPE11	Database Programming with PL/SQL	1,2,3	1,2					
	22CSPE12	Deep Learning	1,2,3	1,2					
	22CSPE13	Natural Language Processing	1,2,3	1,2					
4	Professional	Elective – II			3	-	-	3	
	22CSPE14	Applied Cryptography	1,2,3	1,2					
	22CSPE15	Software Quality Engineering	1,2,3	1,2					
	22CSPE16	Mining Massive Datasets	1,2,3	1,2					
5	22CSPC13	Advanced Data Structures Lab	1,2,3	1,2	-	-	4	2	
6	Professional 1	Elective – I Lab			-	-	4	2	
	22CSPE17	Database Programming with PL/SQL Lab	1,2,3	1,2					
	22CSPE18	Deep Learning Lab	1,2,3	1,2					
	22CSPE19	Natural Language Processing Lab	1,2,3	1,2					
7	22MC11	Research Methodology & IPR	1,2,3	1,2	2	-	-	2	
8	Audit Cours	se -I				-	-	0	
	22AC11	English for Research Paper Writing	1,2,3						
	22AC12	Disaster Management	1,2,3						
	22AC13	Sanskrit for Technical Knowledge	1,2,3						
	22AC14	Value Education	1,2,3						
	TOTAL 16 00 08 18								

		II – Semester						
S.	Course	Subject	POs	Os	He	ours I Week	Per	dits
No.	Code	Subject	105	Sd	L	Т	Р	Cre
1	22CSPC21	Advanced Algorithms	1,2,3	1,2	3	-	-	3
2	22CSPC22	Advanced Computer Architecture	1,2,3	1,2	3	-	I	3
3	Professional	Elective – III			3	-	-	3
	22CSPE21	Enterprise Cloud Concepts	1,2,3	1,2				
	22CSPE22	Advanced Computer Networks	1,2,3	1,2				
	22CSPE23	Edge Analytics	1,2,3	1,2				
4	Professional	Elective – IV			3	-	-	3
	22CSPE24	Bio Informatics	1,2,3	1,2				
	22CSPE25	Nature Inspired Computing	1,2,3	1,2				
	22CSPE26	Robotic Process Automation	1,2,3	1,2				
5	22CSPC23	Advanced Algorithms Lab	1,2,3	1,2	-	-	4	2
6	Professiona	l Elective-III Lab			-	-	4	2
	22CSPE27	Enterprise Cloud Concepts Lab	1,2,3	1,2				
	22CSPE28	Advanced Computer Networks Lab	1,2,3	1,2				
	22CSPE29	Edge Analytics Lab	1,2,3	1,2				
7	22CSPR21	Mini Project with Seminar	1,2,3	1,2	-	-	4	2
8	Audit Cours	se -II			2	-	-	0
	22AC21	Constitution of India	1,2,3					
	22AC22	Pedagogy Studies	1,2,3					
	22AC23	Stress Management by Yoga	1,2,3					
	22AC24	Personality Development Through Life	1,2,3					
		Enlightenment Skills						
TOTAL						00	12	20

	III – Semester							
S.	Course	Subject	POs		Ho	ours I Week	Per	dits
No.	Code	Subject	105	Sd	L	Т	Р	Cre
1	Professional	Elective – V			3	-	-	3
	22CSPE31	Digital Forensics	1,2,3	1,2				
	22CSPC32	High Performance Computing	1,2,3	1,2				
	22CSPC33	Quantum Computing	1,2,3	1,2				
2	Open Electiv	ve			3	-	-	3
	220E31	Business Analytics	1,2,3					
	220E32	Industrial Safety	1,2,3					
	220E33	Operations Research	1,2,3					
	220E34	Cost Management of Engineering projects	1,2,3					
	220E35	Composite Materials	1,2,3					
3	22CSPR31	Dissertation Work Review-II	1,2,3		-	-	12	6
	TOTAL				06	00	12	12

		IV – Semester						
S.	Course	Subject	DOg	Os	Ho	ours I Week	Per K	dits
No.	Code	le Subject POs	Subject POS	PS	L	Т	Р	Cre
1	22CSPR41	Dissertation Work Review-III	1,2,3	1,2	-	-	12	6
2	22CSPR42	Dissertation Viva-Voce	1,2,3	1,2	I	-	28	14
	TOTAL					00	40	20

I-SEMESTER SYLLABUS

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Course	M.TechI-Sem.	L	Т	Р	С
Subject Code	22CSPC11	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	construct precise propositional logic	3	3	3	3	3
CO2	use set theory to formulate precise statements	3	3	3	3	3
CO3	illustrate various recursive algorithms	3	3	3	3	3
CO4	adapt various probabilistic reasoning approaches	3	3	3	3	3
CO5	apply graph theory in solving computing problems	3	3	3	3	3

Unit	Title/Topics	Hours				
Ι		9				
The Fo Propos Introdu	The Foundations Logic and Proofs: Propositional Logic, Applications of Propositional Logic Propositional Equivalence, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference Introduction to Proofs, Proof Methods and Strategy.					
II		11				
Basic Sequer Proper Equiva	Structures, Sets, Functions, Sequences, Sums, Matrices and Relations: Sets, nces & Summations, Cardinality of Sets and Matrices Relations, Relations ties, n-ary Relations and Their Applications, Representing Relations, Closures of alence Relations, Partial Orderings.	Functions, and Their Relations,				
III		4+6=10				
Part A of Algo	: Algorithms, Induction and Recursion: Algorithms, The Growth of Functions, Corithms.	Complexity				
Part B Recurs	B: Induction and Recursion: Mathematical Induction, Strong Induction and Well ive Definitions and Structural Induction, Recursive Algorithms, Program Correctment	-Ordering, less.				
IV		9				
Probab Techni Algorit Inclusi	ility Theory, Bayes' Theorem, Expected Value and Variance. Advanced ques: Recurrence Relations, Solving Linear Recurrence Relations, Divide-an thms and Recurrence Relations, Generating Functions, Inclusion-Exclusion, Applon-Exclusion.	Counting d-Conquer lications of				
V		9				
Graph Repres Path P Trees: Spann	s: Graphs and Graph Models, Graph Terminology and Special Types of senting Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths roblems, Planar Graphs, Graph Coloring. Introduction to Trees, Applications of Trees, Tree Traversal, Spanning Trees, ing Trees.	of Graphs, s, Shortest- Minimum				
Textbo	ooks					
1. Dis R.N	1. Discrete Mathematical Structures with Applications to Computer Science: J.P. Tremblay, R.Manohar, McGraw-Hill,1 st ed.					
2. Dis Teo	crete Mathematics for Computer Scientists & Mathematicians: Joel. Mott, Abraha odore P. Baker, Prentis Hall of India,2 nd ed.	ım Kandel,				
Refere	nces					
1. Dis edu 2. Dis	crete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald cation, 5 th edition. crete Mathematical Structures: Thomas Kosy, Tata Mc Graw Hill publishing co.	, Pearson				

ADVANCED DATA STRUCTURES

Course	M.TechI-Sem.	L	Т	Р	С
Subject Code	22CSPC12	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	analyze various heap data structures	3	3	3	3	3
CO2	illustrate various hashing and collision techniques	3	3	3	3	3
CO3	adapt various tree data structures	3	3	3	3	3
CO4	perceive digital search structures	3	3	3	3	3
CO5	apply various pattern matching algorithms	3	3	3	3	3

Syllabus

Unit	Title/Topics	Hours			
Ι	Heap Structures	9			
Introduction, Min-Max Heaps, Leftist trees, Binomial Heaps, Fibonacci heaps.					
II	Hashing and Collisions	11			
Introd	action, Hash Tables, Hash Functions, different Hash Functions: Division	1 Method,			
Multip	lication Method, Mid-Square Method, Folding Method, Collisions				
III	Search Structures and Multi way Search Trees	4+6=10			
Part A	: OBST, AVL trees, Red-Black trees, Splay trees				
Part B	: B-trees, 2-3 tree				
IV	Digital Search Structures	9			
Digita	l Search trees, Binary tries and Patricia, Multiway Tries, Suffix trees, Stand	lard Tries,			
Comp	ressed Tries				
V	Pattern matching	9			
Introdu	iction, Brute force, the Boyer -Moore algorithm, Knuth-Morris-Pratt algorith	hm, Naïve			
String,	Harspool, Rabin Karp				
Textbo	ooks				
1. Fui	ndamentals of data structures in C++ Sahni, Horowitz, Mehatha, Universities Press	5.			
2. Intr	2. Introduction to Algorithms, TH Cormen, PHI				
Refere	nces				
1. Des	sign methods and analysis of Algorithms, SK Basu, PHI.				
2. Da	a Structures & Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education				
3. Fu	ndamentals of Computer Algorithms, 2 nd Edition, Ellis Horowitz, Sartaj Sahni, San	Iguthevar			

Rajasekaran, Universities Press.

DATABASE PROGRAMMING WITH PL/SQL (Professional Elective-I)

Course	M.TechI-Sem.	L	Τ	P	С
Subject Code	22CSPE11	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	illustrate the basic building blocks of PL/SQL	3	3	3	3	3
CO2	use different control structures	3	3	3	3	3
CO3	demonstrate functions and procedures with arguments	3	3	3	3	3
CO4	interpret packages to reuse the functionality	3	3	3	3	3
CO5	make use of triggers and data manipulations	3	3	3	3	3

Unit	Title/Topics	Hours
Ι	PL/SQL Basics	9
Block	Structure, Behavior of Variables in Blocks, Basic Scalar and Composite Data Typ	es, Control
Struct	ares, Exceptions, Bulk Operations, Functions, Procedures, and Packages, Transact	ion Scope.
II	Language Fundamentals & Control Structures	9
Lexica	l Units, Variables and Data Types, Conditional Statements, Iterative Statemer	nts, Cursor
Structu	ares, Bulk Statements, Introduction to Collections, Object Types: V array	and Table
Collec	tions, Associative Arrays, Oracle Collection API.	
III	Functions and Procedures	6+4=10
Part A	: Function and Procedure Architecture, Transaction Scope, Calling Subroutines,	Positional
Notatio	on, Named Notation, Mixed Notation, Exclusionary Notation, SQL Call Notation,	Functions,
Function	on Model Choices, Creation Options, Pass-by-Value Functions, Pass-by-	Reference
Function	ons	<u> </u>
Part 1	3: Procedures, Pass-by-Value Procedures, Pass-by-Reference Procedures, Su	ipporting
Scripts		•
IV	Packages	9
Packag	ge Architecture, Package Specification, Prototype Features, Serially Reusable P	recompiler
Direct	ive, variables, Types, Components: Functions and Procedures, Package Body,	Prototype
Featur	es, Variables, Types, Components: Functions and Procedures, Definer vs. Invo	Rer Rights
Dockov	nics, Managing Fackages in the Database Catalog, Finding, Vandating, and	Describing
r ackag	Triggors	
V Introdu	111ggels	9 From Example
Attribu	to Functions, Building DDL Triggers, Data Manipulation Language Triggers	Statemont
Loval	Triggers, Dow Level Triggers, Compound Triggers, INSTEAD OF Triggers,	Statement-
Databa	a Event Triggers, Trigger Postrictions, Maximum Trigger Size, SOL Stateman	te LONG
and I (NG RAW Data Types	its, LONG
	no RAw Data Types.	
1 Or	ocle Database 12c PI /SOL Programming Michael McLaughlin, Mc Graw Hill Edu	Ication
Refere	nees	cution
1 Ber	nieu niamin Rosenzweig, Elena Silvestrova Rakhimov, Oracle PL/SOL by example Fift	th Edition
2. Dr	P. S. Deshnande, SOL & PL/SOL for Oracle 11g Black Book	
<i>2</i> , <i>D</i> 1,	······································	

DEEP LEARNING (Professional Elective-I)

Course	M.TechI-Sem.	L	Т	Р	С
Subject Code	22CSPE12	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	adapt back propagation algorithms	3	3	3	3	3
CO2	outline convolutional neural networks for encoders	3	3	3	3	3
CO3	apply deep learning in computer vision and NLP	3	3	3	3	3
CO4	make use of deep learning in NLP	3	3	3	3	3
CO5	illustrate Analogy reasoning	3	3	3	3	3

Unit	Title/Topics	Hours				
Ι	Introduction	9				
Feed	forward Neural networks, Gradient descent and the back propagation algorithm	ithm, Unit				
satura	tion, the vanishing gradient problem, and ways to mitigate it. RelU Heuristics for	or avoiding				
bad 1	ocal minima, Heuristics for faster training, Nestors accelerated gradient	t descent,				
Regula	arization, Dropout					
II	Convolutional Neural Networks	9				
Archit	ectures, convolution/pooling layers, Recurrent Neural Networks: LSTM, GRU	, Encoder				
Decod	ler architectures. Deep Unsupervised Learning: Auto encoders, Variational Auto	-encoders,				
Adver	sarial Generative Networks, Auto-encoder and DBM Attention and memor	y models,				
Dynar	nic Memory Models					
III	Applications of Deep Learning to Computer Vision	6+4=10				
Part A	: Image segmentation, object detection, automatic image captioning					
Part 2	B: Image generation with Generative adversarial networks, video to text with	ı LSTM				
model	s, Attention Models for computer vision tasks					
IV	Applications of Deep Learning to NLP	9				
Introd	uction to NLP and Vector Space Model of Semantics, Word Vector Repre	sentations:				
Contin	nuous Skip-Gram Model, Continuous Bag-of-Words model (CBOW), Glove, E	valuations				
and A	pplications in word similarity					
V	Analogy reasoning	9				
Nameo	l Entity Recognition, Opinion Mining using Recurrent Neural Networks: Pa	arsing and				
Sentim	ent Analysis using Recursive Neural Networks: Sentence Classification using Cor	volutional				
Neural	Networks, Dialogue Generation with LSTMs					
Textb	ooks					
1. De	ep Learning by Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press.					
2. Th	e Elements of Statistical Learning by T. Hastie, R. Tibshirani, and J. Friedman, Spi	ringer.				
3. Pro	babilistic Graphical Models. Koller, and N. Friedman, MIT Press.					
Refere	ences					
1. Bis	hop, C, M., Pattern Recognition and Machine Learning, Springer, 2006.					
2. Ye	gnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.					
3. Go	lub, G.,H., and Van Loan, C.,F., Matrix Computations, JHU Press, 2013.					
4. Sat	4. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.					

NATURAL LANGUAGE PROCESSING (Professional Elective-I)

Course	M.TechI-Sem.	L	Τ	Р	С
Subject Code	22CSPE13	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	explain fundamentals of NLP and morphology	3	3	3	3	3
CO2	demonstrate word level statements and syntactic analysis	3	3	3	3	3
CO3	make use of context free grammar and parsing techniques	3	3	3	3	3
CO4	apply semantic analysis techniques to solve various problems	3	3	3	3	3
CO5	illustrate language generation and discourse analysis	3	3	3	3	3

Unit	Title/Topics	Hours			
Ι	Overview and Morphology	9			
Introd	uction: Models and Algorithms - Regular Expressions - Basic Regular Expression	n Patterns -			
Finite	State Automata.				
Morpl	nology: Inflectional Morphology - Derivational Morphology - Finite-State Mor	phological			
Parsing	g -Porter Stemmer.				
II	Word Level and Syntactic Analysis	10			
N-grar	ns Models of Syntax - Counting Words - Unsmoothed N- grams, Smoothing	g- Backoff			
Delete	d Interpolation - Entropy - English Word Classes - Tagsets for English, Part	of Speech			
Taggir	g-Rule Based Part of Speech Tagging - Stochastic Part of Speech Tagging - Trans	formation-			
Based	Tagging.				
III	Context Free Grammars and Parsing	5+4=9			
PART	-A: Context Free Grammars for English Syntax- Context- Free Rules and Trees -	- Sentence-			
Level	Constructions– Agreement – Sub Categorization.				
PART	-B: Parsing – Top-down – Earley Parsing - feature Structures – Probabilistic Co	ontext-Free			
Gramm	nars.				
IV	Semantic Analysis	10			
Repres	enting Meaning - Meaning Structure of Language - First Order Predicate	Calculus;			
Repres	enting Linguistically Relevant Concepts -Syntax- Driven Semantic Analysis -	· Semantic			
Attach	ments -Syntax- Driven Analyzer; Robust Analysis - Lexemes and Their Senses	- Internal			
Structu	re - Word Sense Disambiguation -Information Retrieval				
V	Language Generation and Discourse Analysis	10			
Discou	rse -Reference Resolution - Text Coherence - Discourse Structure - Coherence; 1	Dialog and			
Conve	rsational Agents - Dialog Acts - Interpretation -Conversational Agents -	Language			
Genera	tion – Architecture - Surface Realizations - Discourse Planning; Machine Tra	anslation -			
Transf	Transfer Metaphor–Interlingua – Statistical Approaches.				
Textbe	ooks				
1. Sp	eech and Language Processing, Daniel Jurafsky and James H. Martin, Prentice	e Hall; 2 nd			
Ed	ition, 2008.				
2. Fo	undations of Statistical Natural Language Processing, Christopher D. Manning an	nd Hinrich			
Sc	huetze, MIT Press, 1999.				
Refere	ences				
1. Jai	nes Allen, Natural Language Understanding, Addison Wesley; 2 nd Edition, 1994.				

APPLIED CRYPTOGRAPHY (Professional Elective-II)

Course	M.TechI-Sem.	L	Т	Р	С
Subject Code	22CSPE14	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	illustrate various protocols of cryptography	3	3	3	3	3
CO2	adapt various cryptographic techniques	3	3	3	3	3
CO3	elaborate public key algorithms and digital signatures	3	3	3	3	3
CO4	demonstrate digital signatures	3	3	3	3	3
CO5	analyze various real world approaches of cryptography	3	3	3	3	3

Unit Title/Topics	Hours			
Ι	9			
Foundations: Terminology, Steganography, Substitution Ciphers and Transposition	Ciphers,			
Simple XOR, One-Time Pads, Computer Algorithms, Large Numbers,				
Cryptographic Protocols: Protocol Building Blocks: Introduction to Protocols, Communication	nications			
Using Symmetric Cryptography, One-Way Functions, One-Way Hash Functions, Commu	nications			
Using Public-Key Cryptography, Digital Signatures, Digital Signatures with Encryption,	Random			
and Pseudo-Random-Sequence Generation				
II	9			
Cryptographic Techniques: Key length: Symmetric Key length, Public key length, co symmetric and public key length.	omparing			
Algorithm types and modes: Electronic Codebook Mode, Block Replay, Cipher Block	Chaining			
Mode, Stream Cipher, Self-Synchronizing Stream Ciphers, Cipher-Feedback Mode, Sync	chronous			
Stream Ciphers, Output-Feedback Mod, Counter Mode, Other Block-Cipher Modes.				
III	6+4=10			
Part A: Public-Key Algorithms: Background, Knapsack Algorithms, RSA, Pohlig-J	Hellman,			
Rabin, ElGamal, McEliece, Elliptic Curve Cryptosystems, LUC, Finite Automaton Pu	ıblic-Key			
Cryptosystems	-			
Part B: Public-Key Digital Signature Algorithms: Digital Signature Algorithm (DSA	A), DSA			
Variants, Gost Digital Signature Algorithm, Discrete Logarithm Signature Schemes, Ong-	-Schnorr-			
Shamir, ESIGN				
IV	9			
Special Algorithms for Protocols: Multiple-Key Public-Key Cryptography, Secret	t-Sharing			
Algorithms, Subliminal Channel, Undeniable Digital Signatures, Designated Confirmer Sig	gnatures,			
Computing with Encrypted Data, Fair Coin Flips, One-Way Accumulators, All-or	-Nothing			
Disclosure of Secrets, Fair and Failsafe Cryptosystems, Zero-Knowledge Proofs of Knowledge Proofs of Knowl	owledge,			
Blind Signatures, Oblivious Transfer, Secure Multiparty Computation, Probabilistic En	cryption,			
Quantum Cryptography.				
	9			
Real World Approaches: IBM Secret key management protocol, ISDN, Kerberos, KryptoKnight,				
Privacy enhanced mail (PEM), Message security protocol (MSP), PGP, Public-Key Cryp	otography			
Standards (PKCS), Universal Electronic Payment System (UEPS).				
Textbooks	1.0			
1. Bruce Schneier, Applied Cryptography, Second Edition: Protocols, Algorithms, and	d Source			
Code in C (cloth)				

SOFTWARE QUALITY ENGINEERING (Professional Elective-II)

Course	M.TechI-Sem.	L	Т	Р	C
Subject Code	22CSPE15	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	demonstrate quality frameworks	3	3	3	3	3
CO2	elaborate various defect prevention and reduction techniques	3	3	3	3	3
CO3	analyze quality planning aspects as quality engineering process	3	3	3	3	3
CO4	adapt software quality through testing and automations processes	3	3	3	3	3
CO5	find coverage and usage testing through checklists and partitions	3	3	3	3	3

Unit Title/Topics	Hours			
I Software Quality	9			
Quality: perspectives and expectations, Quality frameworks and ISO-9126, correctness and defects:				
Definitions, properties and Measurements, A historical perspective of quality, software	e quality.			
II Quality Assurance	9			
Classification: QA as dealing with defects, Defect prevention- Education and train	ning, Formal			
method, Other defect prevention techniques, Defect Reduction - Inspection: Direct f	ault detection			
and removal, Testing: Failure observation and fault removal, other techniqu	es and risk			
identification, Defect Containment- software fault tolerance, safety assurance	and failure			
containment				
III Quality Engineering	6+4=10			
Part A: Activities and process, Quality planning: Goal setting and Strategy formation				
Part B: Quality assessment and Improvement, Quality engineering in software process				
IV Test Activities, Management and Automation	9			
Test planning and preparation, Test execution, Result checking and measurement,	Analysis and			
follow- up, Activities People and Management, Test Automation.				
V Coverage and usage testing based on checklist and partitions	9			
Checklist based testing and its limitations, Testing for partition Coverage, Usage bas	ed Statistical			
testing with Musa's operational profiles, Constructing operational profiles.				
Case Study: OP for the cartridge Support Software				
Textbooks				
1. Jeff Tia'n, Software Quality Engineering, Testing, Quality Assurance, and	Quantifiable			
improvement				
References				
1. Richard N. Taylor, Software Architecture: Foundations, Theory, and Practice				

MINING MASSIVE DATASETS (Professional Elective-II)

Course	M.TechI-Sem.	L	Т	Р	С
Subject Code	22CSPE16	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	explain massive data using mapreduce	3	3	3	3	3
CO2	implement algorithms for data streaming	3	3	3	3	3
CO3	adapt link analysis to clustering	3	3	3	3	3
CO4	develop recommendation systems	3	3	3	3	3
CO5	make use of social networks in data mining	3	3	3	3	3

Unit	Title/Topics	Hours
Ι		9
Data M Map I Using	Ining -Introduction-Definition of Data Mining-Statistical Limits on Data Mining, Reduce and the New Software Stack-Distributed File Systems, Map Reduce, Map Reduce	Algorithms
II		9
Simila Docum Stream Filterin	rity Search: Finding Similar Items-Applications of Near-Neighbor Search, Slents, Similarity-Preserving Summaries of Sets, Distance Measures. ning Data: Mining Data Streams-The Stream Data Model, Sampling Data in ag Streams.	ningling of a Stream,
III		6+4=10
Part A Freque Counti	: Link Analysis -Page Rank, Efficient Computation of Page Rank, Link Spam ent Item sets-Handling Larger Datasets in Main Memory, Limited-Pass Ang Frequent Items in a Stream.	Algorithms,
Part B Stream	: Clustering-The CURE Algorithm, Clustering in Non-Euclidean Spaces, Cluster s and Parallelism.	ing for
IV		9
Adver Proble Recon	tising on the Web- Issues in On-Line Advertising, On-Line Algorithms, The m, The Ad words Problem, Ad words Implementation.	Matching
Recom	mendations, Collaborative Filtering, Dimensionality Reduction, The Netflix Chall	lenge.
V		9
Minin Graphs	g Social-Network Graphs- Social Networks as Graphs, Clustering of Socials, Partitioning of Graphs, Simrank, Counting Triangles	al-Network
Textbe	ooks	
1. Jure	Leskovec, Anand Rajaraman, Jeff Ullman, Mining of Massive Datasets, 3 rd Edition	on.
Refere	nces	
1. Jia Els 2. Ma	wei Han & Micheline Kamber, Data Mining – Concepts and Techniques 3 evier. rgaret H Dunham, Data Mining Introductory and Advanced topics, PEA.	rd Edition
3. Ian Mo	H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and T rgan Kaufmann	'echniques,

ADVANCED DATA STRUCTURES LAB

Course	M.TechI-Sem.	L	Т	Р	С
Subject Code	22CSPC13	0	0	4	2

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	illustrate various search techniques	3	3	3	3	3
CO2	adapt various sorting techniques	3	3	3	3	3
CO3	implement various tree structures	3	3	3	3	3
CO4	demonstrate the kinds of heaps	3	3	3	3	3
CO5	solve pattern matching algorithms	3	3	3	3	3

Week	Title/Experiment
1	Write a program to perform the following operations:
	a) Insert an element into a binary search tree.
	b) Delete an element from a binary search tree.
	c) Search for a key element in a binary search tree.
2	Write a program for implementing the following sorting methods:
	a) Merge sort b) Heap sort c) Quick sort
3	Write a program to perform the following operations:
	a) Insert an element into a B- tree.
	b) Delete an element from a B- tree.
	c) Search for a key element in a B- tree.
4	Write a program to perform the following operations:
	a) Insert an element into a Min-Max heap
	b) Delete an element from a Min-Max heap
	c) Search for a key element in a Min-Max heap
5	Write a program to perform the following operations:
	a) Insert an element into a Lefiist tree
	b) Delete an element from a Leftist tree
	c) Search for a key element in a Leftist tree
6	Write a program to perform the following operations:
	a) Insert an element into a binomial heap
	b) Delete an element from a binomial heap.
	c) Search for a key element in a binomial heap
7	Write a program to perform the following operations:
	a) Insert an element into a AVL tree.
	b) Delete an element from a AVL search tree
	c) Search for a key element in a AVL search tree.
8	Write a program to perform the following operations:
	a) Insert an element into a Red-Black tree.
	b) Delete an element from a Red-Black tree.
	c) Search for a key element in a Red-Black tree.
9	Write a program to implement all the functions of a dictionary using hashing.
10	Write a program for implementing Knuth-Morris-Pratt pattern matching algorithm.
11	Write a program for implementing Brute Force pattern matching algorithm.
12	Write a program for implementing Boyer pattern matching algorithm
Referen	ce
1. Adva	anced Data Structures Lab Manual, Department of CSE, CMRIT, Hyd.

DATABASE PROGRAMMING WITH PL/SQL LAB (Professional Elective Lab-I)

Course	M.TechI-Sem.	L	Τ	P	С
Subject Code	22CSPE17	0	0	4	2

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	implement loops and control statements	3	3	3	3	3
CO2	demonstrate cursors	3	3	3	3	3
CO3	adapt various functions	3	3	3	3	3
CO4	implement of exception handling, packages	3	3	3	3	3
CO5	solve problems by using triggers and procedures	3	3	3	3	3

Week	Title/Experiment
1	Write a Pl/SQL program using FOR loop to insert ten rows into a database table
2	Given the table EMPLOYEE (EmpNo, Name, Salary, Designation, DeptID), write a
	cursor to select the five highest paid employees from the table.
3	Illustrate how you can embed PL/SQL in a high-level host language such as C/Java And
	demonstrates how a banking debit transaction might be done
4	Given an integer i, write a PL/SQL procedure to insert the tuple (i, 'xxx') into a given
	relation.
5	Write a PL/SQL program to demonstrate Exceptions
6	Write a PL/SQL program to demonstrate Cursors.
7	Write a PL/SQL program to demonstrate Functions.
8	Write a PL/SQL program to demonstrate Packages.
9	Write PL/SQL queries to create Procedures.
10	Write PL/SQL queries to create Triggers
Referen	ce
1. Dat	abase programming with PL/SQL Lab Manual, Department of CSE, CMRIT, Hyd.

DEEP LEARNING LAB (Professional Elective Lab-I)

Course	M.TechI-Sem.	L	Τ	P	С
Subject Code	22CSPE18	0	0	4	2

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	model Spyder IDE environment	3	3	3	3	3
CO2	use keras, tensorflow and pytorch libraries	3	3	3	3	3
CO3	apply CNN and deep learning models	3	3	3	3	3
CO4	adapt sentiment analysis model and auto encoder algorithms	3	3	3	3	3
CO5	design generative adversarial networks	3	3	3	3	3

Week	Title/Experiment			
1	Setting up the Spyder IDE Environment and Executing a Python Program			
2	Installing Keras, Tensorflow and Pytorch libraries and making use of them			
3	Applying the Convolution Neural Network on computer vision problems			
4	Image classification on MNIST dataset (CNN model with Fully connected layer)			
5	Applying the Deep Learning Models in the field of Natural Language Processing			
6	Train a sentiment analysis model on IMDB dataset, use RNN layers with LSTM/GRU			
	notes			
7	Applying the Auto encoder algorithms for encoding the real-world data			
8	Applying Generative Adversarial Networks for image generation and unsupervised tasks.			
Reference				
1. De	ep Learning Lab Manual, Department of CSE, CMRIT, Hyd.			

NATURAL LANGUAGE PROCESSING LAB (Professional Elective Lab-I)

Course	M.TechI-Sem.	L	Т	P	С
Subject Code	22CSPE19	0	0	4	2

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	examine word in NLP	3	3	3	3	3
CO2	test N-Grams in NLP	3	3	3	3	3
CO3	execute skip gram model using NLP	3	3	3	3	3
CO4	implement Hidden Markov Model	3	3	3	3	3
CO5	apply chunking in unstructured text	3	3	3	3	3

Week	Title/Experiment		
1	Perform word analysis in NLP.		
2	Perform word generation in NLP.		
3	Perform morphology in NLP.		
4	Perform N-Grams analysis in NLP.		
5	Perform N-Grams smoothing in NLP.		
6	Write a program to construct a skip gram model using NLP.		
7	POS Tagging: Hidden Markov Model.		
8	POS Tagging: Viterbi Decoding.		
9	Building POS Tagger.		
10	Chunking.		
11	Building Chunker.		
Reference			
1. Natural Language Processing Lab Manual, Department of CSE, CMRIT, Hyd.			
RESEARCH METHODOLOGY AND IPR (Mandatory Course)

Course	M.TechI-Sem.	L	Τ	P	С
Subject Code	22MC11	2	0	0	2

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	formulate research problem	3	3	3	3	3
CO2	analyze research related information	3	3	3	3	3
CO3	follow research ethics	3	3	3	3	3
CO4	perceive nature of IPR and its development	3	3	3	3	3
CO5	outline the patent right	3	3	3	3	3

ENGLISH FOR RESEARCH PAPER WRITING (Audit Course-I)

Course	M.TechI-Sem.	L	Т	Р	С
Subject Code	22AC11	2	0	0	0

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3
CO1	write a technical report without any ambiguity & redundancy	3	3	3
CO2	illustrate how to criticize/highlight-findings avoid plagiarism	3	3	3
CO3	apply various techniques of research to discuss results	3	3	3
CO4	exhibit technical communication skills in documentation	3	3	3
CO5	demonstrate research/technical paper publication skills	3	3	3

Syllabus

Unit	Title/Topics	Hours				
Ι		9				
Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and						
Senten	Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness					
II		11				
Clarify	ing Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraph	nrasing and				
Plagiar	ism, Sections of a Paper, Abstracts. Introduction					
III		6+4=10				
Part A	Review of the Literature, Methods, Results					
Part B	Discussion, Conclusions, The Final Check					
IV		9				
key sk	ills are needed when writing a Title, key skills are needed when writing an Ab	stract, key				
skills	are needed when writing an Introduction, skills needed when writing a Revi	iew of the				
Literat	ure					
V		9				
skills a	are needed when writing the Methods, skills needed when writing the Results,	, skills are				
needed	when writing the Discussion, skills are needed when writing the Conclusions					
Textbo	ooks					
1. Go	ldbort R (2006) Writing for Science, Yale University Press (available on Google B	Books)				
Refere	ences					
1. Day 2. Hig Hig 3. Ad	y R (2006) How to Write and Publish a Scientific Paper, Cambridge University Proghman N (1998), Handbook of Writing for the Mathematical Science ghman'sbook. rian Wallwork, English for Writing Research Papers, Springer New York	ess es, SIAM. Dordrecht				

Heidelberg London, 2011

DISASTER MANAGEMENT (Audit Course-I)

Course	M.TechI-Sem.	L	Т	P	С
Subject Code	22AC12	2	0	0	0

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3
CO1	analyze impact of disasters	3	3	3
CO2	choose suitable disaster management mechanism	3	3	3
CO3	make use of appropriate measures for capacity building to reduce risks	3	3	3
CO4	develop strategies to cope up with disasters	3	3	3
CO5	build disaster management plan	3	3	3

Unit	Title/Topics	Hours				
Ι		9				
Under	standing Disaster: Concept of Disaster - Different approaches- Concept of Risk	- Levels of				
Disasters - Disaster Phenomena and Events (Global, national and regional)						
Hazar	Hazards and Vulnerabilities: Natural and man-made hazards; response time, frequency and					
forewa	rning levels of different hazards - Characteristics and damage potential or naturation	al hazards;				
hazard	assessment - Dimensions of vulnerability factors; vulnerability assessment - Vu	ılnerability				
and di	saster risk - Vulnerabilities to flood and earthquake hazards					
II		11				
Disast	er Management Mechanism: Concepts of risk management and crisis mana	igements -				
Disast	er Management Cycle - Response and Recovery - Development, Prevention, Miti	gation and				
Prepar	edness - Planning for Relief					
III		6+4=10				
Part A	: Capacity Building: Capacity Building: Concept - Structural and Nonstructural M	leasures				
Capac	ty Assessment	• .•••				
Part E	: Strengthening Capacity for Reducing Risk - Counter-Disaster Resources and the	er utility				
1n Disa	aster Management - Legislative Support at the state and national levels	<u> </u>				
IV		9				
Copin	g with Disaster: Coping Strategies; alternative adjustment processes – Changing	g Concepts				
of disa	ster management - Industrial Safety Plan; Safety norms and survival kits - Mass	media and				
disaste	r management.	0				
V	for the standard for the standard sta	y Stans fan				
Flann	ing for disaster management: Strategies for disaster management planning -	Steps for				
Organ	ating a disaster fisk reduction plan - Disaster management Act and Policy	y in india				
Digast	zational structure for disaster management in mula - Preparation of state at	la district,				
Toyth						
1 M	JUKS anual on Disaster Management, National Disaster Management, Agency Covit of Iv	adia				
	anual on Disaster Management, National Disaster Management, Agency Govt of In	lula.				
2. Di	saster Science and Management by T. Bhattacharya, TMH, 2015					
D. D.	saster Serence and Management by 1. Dhattacharya, 1111, 2015					
1 1	Farth and Atmospheric Disasters Management N Pandharinath CK Rajan RSP 3	2009				
1.1. 2 Ng	itional Disaster Management Plan Ministry of Home affairs Government of India					
2. 190 (h	tn://www.ndma.gov.in/images/nolicynlan/dmnlan/draftndmn.pdf)					
(II						

SANSKRIT FOR TECHNICAL KNOWLEDGE (Audit Course-I)

Course	M.TechI-Sem.	L	Τ	P	С
Subject Code	22AC13	2	0	0	0

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3
CO1	identify the alphabets	3	3	3
CO2	categorize past/present/future tenses	3	3	3
CO3	determine the roots of the language	3	3	3
CO4	relate the technical information about sanskrit language	3	3	3
CO5	articulate technical concepts of engineering	3	3	3

Syllabus

Unit	Title/Topics	Hours
Ι		9
Alphat	pets in Sanskrit	
II		11
Past/Pi	resent/Future Tense, Simple Sentences	
III		6+4=10
Part A	: Order	
Part B	: Introduction of roots	
IV		9
Techni	cal information about Sanskrit Literature	
V		9
Techni	cal concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics	
Textbe	ooks	
1. "Ab	hyaspustakam" – Dr. Vishwas, Samskrita-Bharti Publication, New Delhi	
2. "Tea	ach Yourself Sanskrit" Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sans	skrit
sans	sthanam, New Delhi Publication	

3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

VALUE EDUCATION (Audit Course-I)

Course	M.TechI-Sem.	L	Τ	P	С
Subject Code	22AC14	2	0	0	0

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3
CO1	interpret moral values, ethics, code of conduct and culture	3	3	3
CO2	illustrate humanity, honesty, devotion, confidence and patriotism	3	3	3
CO3	develop positive thinking, integrity and group cohesiveness	3	3	3
CO4	exhibit friendship, love for truth, and eco-friendly to environment	3	3	3
CO5	identify need for reincarnation, self-control and gender Equity	3	3	3

Unit	Title/Topics	Hours
Ι		9
Values	and self-development -Social values and individual attitudes. Work ethics, India	n vision of
humani	sm. Moral and non- moral valuation. Standards and principles. Value judgements	
II		11
Importa	nce of cultivation of values. Sense of duty. Devotion, Self-reliance. C	Confidence,
Concen	tration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, Natio	onal Unity.
Patrioti	sm. Love for nature, Discipline	
III		6+4=10
Part A:	Personality and Behavior Development - Soul and Scientific attitude. Positive Th	ninking.
Integrit	y and discipline. Punctuality, Love and Kindness	
Part B	: Avoid fault Thinking. Free from anger, Dignity of labour. Universal brothe	erhood and
religiou	s tolerance	
IV		9
True fi	riendship. Happiness Vs suffering, love for truth. Aware of self-destruction	ive habits.
Associa	tion and Cooperation. Doing best for saving nature	
V		9
Charact	er and Competence -Holy books vs Blind faith. Self-management and Good heal	th. Science
of rein	carnation. Equality, Nonviolence, Humility, Role of Women. All religions	and same
messag	e. Mind your Mind, Self-control. Honesty, Studying effectively	
Textbo	oks	
1. Cha	kroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford	1
Uni	versity Press, New Delhi	

II-SEMESTER SYLLABUS

ADVANCED ALGORITHMS

Course	M.TechII-Sem.	L	Τ	P	С
Subject Code	22CSPC21	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	illustrate sorting and searching algorithms	3	3	3	3	3
CO2	apply matriods in graph matching	3	3	3	3	3
CO3	elaborate flow networks and matrix computations	3	3	3	3	3
CO4	perceive dynamic programming though discrete fourier transforms	3	3	3	3	3
CO5	explain problem solving paradigms	3	3	3	3	3

Unit Title/Topics Ho	urs
I)
Sorting: Review of various sorting algorithms, topological sorting	
Graph: Definitions and Elementary Algorithms: Shortest path by BFS, shortest path in e	dge-
weighted case (Dijkstra's), depth-first search and computation of strongly connected compor	ents,
emphasis on correctness proof of the algorithm and time/space analysis, example of amor	tized
analysis	
II)
Matroids: Introduction to greedy paradigm, algorithm to compute a maximum weight may	imal
independent set. Application to MST.	
Graph Matching: Algorithm to compute maximum matching. Characterization of maxi	mum
matching by augmenting paths, Edmond's Blossom algorithm to compute augmenting path.	
III 6+4	=10
Part A: Flow-Networks: Max flow- mincut theorem, Ford-Fulkerson Method to con	ipute
maximum flow, Edmond-Karp maximum-flow algorithm	
Part B: Matrix Computations: Strassen's algorithm and introduction to divide and con	quer
paradigm, inverse of a triangular matrix, relation between the time complexities of basic m	atrix
operations, LUP- decomposition.	
)
Shortest Path in Graphs: Floyd-Warshall algorithm and introduction to dynamic program paradigm. More examples of dynamic programming.	mino
	iiiiig
Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Conve	rsion
Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Converse between base-representation and modulo-representation. Extension to polynomials. Application	rsion tion:
Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Converse between base-representation and modulo-representation. Extension to polynomials. Application Interpolation problem.	rsion tion:
 Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Converse between base-representation and modulo-representation. Extension to polynomials. Applica Interpolation problem. Discrete Fourier Transform (DFT): In complex field, DFT in modulo ring. Fast Fourier Complex field, DFT in modulo ring. Fast Fourier Complex field, DFT in modulo ring. 	rsion tion: urier
 Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Converse between base-representation and modulo-representation. Extension to polynomials. Applica Interpolation problem. Discrete Fourier Transform (DFT): In complex field, DFT in modulo ring. Fast For Transform algorithm. Schonhage-Strassen Integer Multiplication algorithm. 	rsion tion: urier
Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Conve between base-representation and modulo-representation. Extension to polynomials. Applica Interpolation problem.Discrete Fourier Transform (DFT): In complex field, DFT in modulo ring. Fast Fo Transform algorithm. Schonhage-Strassen Integer Multiplication algorithm.V	rsion tion: urier
Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Converse between base-representation and modulo-representation. Extension to polynomials. Applica Interpolation problem. Discrete Fourier Transform (DFT): In complex field, DFT in modulo ring. Fast For Transform algorithm. Schonhage-Strassen Integer Multiplication algorithm. V 9 Linear Programming: Geometry of the feasibility region and Simplex algorithm	rsion tion: urier
Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Converse between base-representation and modulo-representation. Extension to polynomials. Application problem. Discrete Fourier Transform (DFT): In complex field, DFT in modulo ring. Fast For Transform algorithm. Schonhage-Strassen Integer Multiplication algorithm. V Q Linear Programming: Geometry of the feasibility region and Simplex algorithm NP-completeness: Examples, proof of NP-hardness and NP-completeness.	rsion tion: urier
Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Converse between base-representation and modulo-representation. Extension to polynomials. Application problem. Discrete Fourier Transform (DFT): In complex field, DFT in modulo ring. Fast For Transform algorithm. Schonhage-Strassen Integer Multiplication algorithm. V Image: Second representation and Simplex algorithm NP-completeness: Examples, proof of NP-hardness and NP-completeness. Recent Trends in problem solving paradigms using recent searching and sorting techniques by	rsion tion: urier
Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Converse between base-representation and modulo-representation. Extension to polynomials. Applica Interpolation problem. Discrete Fourier Transform (DFT): In complex field, DFT in modulo ring. Fast For Transform algorithm. Schonhage-Strassen Integer Multiplication algorithm. V V Linear Programming: Geometry of the feasibility region and Simplex algorithm NP-completeness: Examples, proof of NP-hardness and NP-completeness. Recent Trends in problem solving paradigms using recent searching and sorting techniques by applying recently proposed data structures.	rsion tion: urier
Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Converse between base-representation and modulo-representation. Extension to polynomials. Applica Interpolation problem. Discrete Fourier Transform (DFT): In complex field, DFT in modulo ring. Fast For Transform algorithm. Schonhage-Strassen Integer Multiplication algorithm. V Image: Schonhage Complex field, DFT in modulo ring. Fast For Transform algorithm. Schonhage-Strassen Integer Multiplication algorithm. V Image: Schonhage Complex field, DFT in modulo ring. Fast For Transform algorithm. V Image: Schonhage Complex field, DFT in modulo ring. Fast For Transform algorithm. V Image: Schonhage Complex field, DFT in modulo ring. Fast For Transform algorithm. V Image: Schonhage Complex field, DFT in modulo ring. Fast For Transform algorithm. V Image: Schonhage Complex field, DFT in modulo ring. Fast For Transform algorithm. P-completeness: Examples, proof of NP-hardness and NP-completeness. Recent Trends in problem solving paradigms using recent searching and sorting techniques by applying recently proposed data structures. Textbooks	rsion tion: ourier
Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Converse between base-representation and modulo-representation. Extension to polynomials. Application problem. Discrete Fourier Transform (DFT): In complex field, DFT in modulo ring. Fast For Transform algorithm. Schonhage-Strassen Integer Multiplication algorithm. V V Linear Programming: Geometry of the feasibility region and Simplex algorithm NP-completeness: Examples, proof of NP-hardness and NP-completeness. Recent Trends in problem solving paradigms using recent searching and sorting techniques by applying recently proposed data structures. Textbooks 1. Cormen, Leiserson, Rivest, Stein, "Introduction to Algorithms".	rsion tion: ourier
Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Converse between base-representation and modulo-representation. Extension to polynomials. Applicating Interpolation problem. Discrete Fourier Transform (DFT): In complex field, DFT in modulo ring. Fast For Transform algorithm. Schonhage-Strassen Integer Multiplication algorithm. V Image: Completeness: Examples, proof of NP-hardness and NP-completeness. Recent Trends in problem solving paradigms using recent searching and sorting techniques by applying recently proposed data structures. Textbooks I. Cormen, Leiserson, Rivest, Stein, "Introduction to Algorithms". Algorithms".	rsion tion: urier
Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Converse between base-representation and modulo-representation. Extension to polynomials. Applica Interpolation problem. Discrete Fourier Transform (DFT): In complex field, DFT in modulo ring. Fast For Transform algorithm. Schonhage-Strassen Integer Multiplication algorithm. V 9 Linear Programming: Geometry of the feasibility region and Simplex algorithm NP-completeness: Examples, proof of NP-hardness and NP-completeness. Recent Trends in problem solving paradigms using recent searching and sorting techniques by applying recently proposed data structures. Textbooks 1. Cormen, Leiserson, Rivest, Stein, "Introduction to Algorithms". 2. Aho, Hopcroft, Ullman "The Design and Analysis of Computer Algorithms". References	rsion tion: urier

ADVANCED COMPUTER ARCHITECTURE

Course	M.TechII-Sem.	L	Т	Р	С
Subject Code	22CSPC22	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	outline parallelism in various architectures	3	3	3	3	3
CO2	analyze metrics and measures of processor performance	3	3	3	3	3
CO3	illustrate pipeline processor designs	3	3	3	3	3
CO4	elaborate various generations of multicomputer	3	3	3	3	3
CO5	explain multi vector multi processors	3	3	3	3	3

Syllabus

Unit Title/Topics Ho	urs
I)
Theory of Parallelism, Parallel computer models, The State of Computing, Multiprocessors	and
Multicomputers, Multivector and SIMD Computers, PRAM and VLSI models, Architec	ctural
development tracks, Program and network properties, Conditions of parallelism, Program	gram
partitioning and Scheduling, Program flow Mechanisms, System interconnect Architectures.	
II 1	1
Principles of Scalable performance, Performance metrics and measures, Parallel Proces	ssing
applications, Speed up performance laws, Scalability Analysis and Approaches, Hard	ware
Technologies, Processes and Memory Hierarchy, Advanced Processor Technology, Supers	calar
and Vector Processors	4.0
	=10
Part A: Shared-Memory Organizations, Sequential and weak consistency models, Pipelining	g and
superscalar techniques	
Part B: Linear Pipeline Processors, Non-Linear Pipeline Processors, Instruction Pipeline de	sıgn,
Arithmetic pipeline design, superscalar pipeline design	
)
Parallel and Scalable Architectures, Multiprocessors and Multicomputers, Multiprocessor sy	stem
interconnects, cache coherence and synchronization mechanism, Three Generations	s of
Multicomputers, Message-passing Mechanisms, Multivetor and SIMD computers.	n
) D/D
Vector Processing Principles, Multivector Multiprocessors, Compound Vector processing, S	IMD
Transfer organizations, The connection machine CM-5.	
1 Advanged Computer Architecture, Kei Uwang 2 nd Edition, Teta McCrow Hill Dublishers	
1. Advanced Computer Architecture, Kai Hwang, 2 Edition, Tata McGraw Hill Publishers	
1. Computer Architecture, J.L. Hennessy and D.A. Patterson, 4 th Edition, ELSEVIER.	.:.
2. Advanced Computer Architectures, S.G.Sniva, Special Indian edition, CRC, Taylor & France	218.
3. Introduction to right Performance Computing for Scientists and Engineers, G. Hager and G. Wolloin, CPC Pross, Taylor & Francis Group	•
Wentern, CRC FIESS, Taylor & Francis Oroup.	

5. Computer Architecture, B. Parhami, Oxford Univ. Press

ENTERPRISE CLOUD CONCEPTS (Professional Elective – III)

Course	M.TechII-Sem.	L	Τ	Р	С
Subject Code	22CSPE21	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	explain cloud deployment models	3	3	3	3	3
CO2	illustrate cloud computing mechanisms	3	3	3	3	3
CO3	analyze cloud management mechanisms and architectures	3	3	3	3	3
CO4	apply cloud enabled smart enterprises	3	3	3	3	3
CO5	perceive cloud-instigated IT transformations	3	3	3	3	3

Unit	Title/Topics	Hours				
Ι		9				
Under	standing Cloud Computing: Origins and influences, Basic Concepts and Ten	rminology,				
Goals a	and Benefits, Risks and Challenges.					
Funda	mental Concepts and Models: Roles and Boundaries, Cloud Characteristi	ics, Cloud				
Delive	ry Models, Cloud Deployment Models.					
II		11				
Cloud	Enabling Technology: Broadband Networks and Internet Architecture, Da	ata Center				
Techno	Technology, Virtualization Technology.					
Cloud Computing Mechanisms: Cloud Infrastructure Mechanisms: Logical Network						
Perime	ter, Virtual Server, Cloud Storage Device, Cloud Usage Monitor, Resource Replic	ation.				
III		4+6=10				
Part	A: Cloud Management Mechanisms: Remote Administration System,	Resource				
Manag	ement System, SLA Management System, Billing Management System, C	ase Study				
Examp						
Part B	: Cloud Computing Architecture					
Funda	mental Cloud Architectures: Workload Distribution Architecture, Resource	e Pooling				
Arcmu	ecture, Dynamic Scalability Architecture, Elastic Resource Capacity Architecture	e, Service				
Load E	anancing Architecture, Cloud Bursting Architecture, Elastic Disk Provisioning Ar	chitecture,				
Kedulle TV	lant Storage Architecture, Case Study Example	0				
	Enabled Smart Enterprises: Introduction Devisiting the Enterprise Journey	9 V Sorvico				
Orient	ad Enterprises Cloud Enterprises Smart Enterprises The Enabling Mechanism	s of Smart				
Entern	rises Cloud-Inspired Enterprises, Smart Enterprises, The Endoling Mechanism	Scheme for				
Enterp	rise Success Elucidating the Evolving Cloud Idea Implications of the Cloud on	Enterprise				
Strateg	v Establishing a Cloud-Incorporated Business Strategy	Lineipiise				
V	j, Establishing a cloud meorporated Basiness Stategy	9				
Transi	tioning to Cloud-Centric Enterprises: The Tuning Methodology, Contract Man	agement in				
the Clo	oud					
Cloud	Instigated IT Transformations: Introduction, Explaining Cloud Infrastructures,	A Briefing				
on Nez	xt-Generation Services, Service Infrastructures, Cloud Infrastructures, Cloud Inf	rastructure				
Solutio	ns, Clouds for Business Continuity, The Relevance of Private Clouds, The Em	ergence of				
Enterp	rise Clouds	C				
Textbo	ooks					
1. Erl	Thomas, Puttini Ricardo, Mahmood Zaigham, Cloud Computing: Concepts, Tech	inology				
& /	Architecture 1st Edition,					
2. Pet	huru Raj, Cloud Enterprise Architecture, CRC Press					
Refere	nces					
1. Jan	nes Bond, The Enterprise Cloud, O'Reilly Media, Inc					

ADVANCED COMPUTER NETWORKS (Professional Elective – III)

Course	M.TechII-Sem.	L	Τ	P	С
Subject Code	22CSPE22	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	demonstrate data link layer protocols	3	3	3	3	3
CO2	explain transport and application layer protocols	3	3	3	3	3
CO3	apply socket programming for web server	3	3	3	3	3
CO4	illustrate wireless mobile networks	3	3	3	3	3
CO5	elaborate multimedia networking	3	3	3	3	3

Unit	Title/Topics	Hours			
Ι		9			
Data-li	nk protocols: Ethernet, Token Ring and Wireless (802.11). Wireless Networks a	and Mobile			
IP: Int	frastructure of Wireless Networks, Wireless LAN Technologies, IEEE 802.1	1 Wireless			
Standa	rd, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs), Multi	ple access			
schem	es Routing and Internetworking: Network-Layer Routing, Least-Cost-Path algorithm	thms, Non-			
Least-	Cost-Path algorithms, Intra-domain Routing Protocols, Inter-domain Routing	Protocols,			
Conge	stion Control at Network Layer.				
II		11			
Transp	ort and Application Layer Protocols: Client-Server and Peer-To-Peer Ap	plication			
Comm	unication, Protocols on the transport layer, reliable communication. Routing	packets			
throug	h a LAN and WAN. Transport Layer, Transmission Control Protocol (TC	P), User			
Datagr	am Protocol (UDP), Mobile Transport Protocols, TCP Congestion Control. Prin	ciples of			
Netwo	rk Applications.				
III		4+6=10			
Part A	: The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Don	nain Name			
Systen	n (DNS), P2P File Sharing, Socket Programming with TCP and UDP				
Part B	: Building a Simple Web Server Creating simulated networks and passing packets	through			
them u	sing different routing techniques. Installing and using network monitoring tools.				
IV		9			
Wirele	ess and Mobile Networks: Introduction, Wireless links and Network Character	eristics -			
CDMA	A, Wifi: 802.11 Wireless LANS, Cellular internet access, Mobility management: P	rinciples			
V		9			
Multin	nedia networking: Multimedia networking applications, streaming stored video	, Voice-			
over-II	P, Protocols for real-time conversational applications.				
Textb	ooks				
1. Co	mputer Networking: A Top-Down Approach, James F. Kuros and Keith W. Ross,	Pearson,			
6th Edition, 2012.					
2. Co	mputer Networks and Internets, Duglas E. Comer, 6th Edition, Pearson				
Refere	ences	D			
1. AI	ractical Guide to Advanced Networking, Jeffrey S. Beasley and PiyasatNilkaew, J	Pearson,			
	Euliioii, 2012 mouter Naturerka Andrew & Tenenhoum David I. Wetherell, Dreatice Hell				
2. Co	mputer Networks, Andrew S. Tanenbaum, David J. Wetherall, Prentice Hall				

EDGE ANALYTICS (Professional Elective – III)

Course	M.TechII-Sem.	L	Τ	P	С
Subject Code	22CSPE23	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	explain the concepts of edge analytics	3	3	3	3	3
CO2	analyze the communication protocols in edge analytics	3	3	3	3	3
CO3	deploy different cloud services	3	3	3	3	3
CO4	make use of micropython on edge analytics applications	3	3	3	3	3
CO5	illustrate types of attacks in edge analytics	3	3	3	3	3

Unit	Title/Topics	Hours					
Ι		9					
Introdu	Introduction to Edge Analytics: What is edge analytics, Applying and comparing architectures,						
Key benefits of edge analytics, Edge analytics architectures, Using edge analytics in the real world							
II		11					
Basic	edge analytics components, Connecting a sensor to the ESP-12F microcontrol	ler, KOM-					
MICS	smart factory platform, Communications protocols used in edge analytic	ics, Wi-Fi					
comm	inication for edge analytics, Bluetooth for edge analytics communication	ı, Cellular					
techno	logies for edge analytics communication, Long-distance communication using	LoRa and					
Signfo	x for edge analytics						
III		4+6=10					
Part A	Working with Microsoft Azure IoT Hub, Cloud Service providers, Micros	oft Azure,					
Explor	ing the Azure portal, Azure ioT Hub						
Part B	: Using the Raspberry Pi with Azure IoT edge, Connecting our Raspberry Pi edge	device,					
adding	a simulated temperature sensor to our edge device						
IV		9					
Using	Micropython for Edge Analytics, Understanding Micropython, Exploring the har	dware that					
runs M	licroPython, Using MicroPython for an edge analytics application, Using edge is	ntelligence					
with m	icrocontrollers, Azure Machine Learning designer, Azure IoT edge custom vision.						
V		9					
Design	ing a Smart Doorbell with Visual Recognition setting up the environment, Writin	g the edge					
code, c	reating the Node-RED dashboard, Types of attacks against our edge analytics ap	oplications,					
Protecting our edge analytics applications							
Textbooks							
1. Ha	1. Hands-On Edge Analytics with Azure IoT: Design and develop IoT applications with edge						
analytical solutions including Azure IoT Edge by Colin Dow							
Refere	References						
1. Lea	rn Edge Analytics - Fundamentals of Edge Analytics: Automated analytics at so	ource using					
Mi	crosoft Azure by Ashish Mahajan						

BIO INFORMATICS (Professional Elective – IV)

Course	M.TechII-Sem.	L	Τ	Р	С
Subject Code	22CSPE24	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	illustrate xml (bio xml) for bioinformatics	3	3	3	3	3
CO2	make use of perl (bioperl) for bioinformatics	3	3	3	3	3
CO3	perceive object-oriented databases	3	3	3	3	3
CO4	demonstrate sequence alignment algorithms	3	3	3	3	3
CO5	explain phylogenetic analysis	3	3	3	3	3

Unit	Title/Topics	Hours					
Ι		9					
The C	entral Dogma & XML (Bio XML) for Bioinformatics: Watson's definition, in	nformation					
flow,	from data to knowledge, Convergence, the organization of DNA, the organ	ization of					
Proteir	s, Introduction, Differences between HTML and XML, fundamentals	of XML,					
fundan	nentals of XML namespaces. Introduction to DTDs, Document type Declarations,	Declaring					
elemer	ts, declaring attributes, working with entities XML Schemas, Essential Concept	s, working					
with si	mple types, working with complex types, Basic namespaces issues						
II		11					
Perl (Bioperl) for Bioinformatics: Representing sequence data, program to store	a DNA					
sequen	ce, concatenating DNA fragments, Transcription, Calculating the reverse comple	ement in					
Perl, F	roteins, files, reading proteins in files, Arrays, Flow control, finding motifs,	counting					
Nucleo	tides, exploding strings into arrays, operating on strings, writing to files, subrout	ines and					
bugs		4 < 40					
		4+6=10					
Part .	A: Databases: Flat file, Relational, object-oriented databases, object Relational	tional and					
Hypert	ext, Data life cycle						
Interfe	B: Database Technology, Database Architecture, Database Management Sy	stems and					
INTELLA		0					
Seque	nce Alignment Algorithms: Biological motivations of sequence analysis, the	models for					
sequen	ce analysis and their biological motivation global alignment local alignment	End free-					
space a	lignment and gap penalty. Sequence Analysis tools and techniques	Life fiet-					
V	ing intent and gup penalty, bequence r marybis tools and teeninques	9					
Phylog	renetic Analysis: Introduction, methods of Phylogenetic analysis, distance me	ethods, the					
neighb	or- Joining (NJ) method, The Fitch/ Margoli ash method, character-based meth	ods, Other					
metho	ls, Tree evaluation and problems in phylogenetic analysis, Clustering, Protein	n structure					
visuali	zation and Protein structure prediction						
Textbo	ooks						
1. S.C	2. Rastogi, N. Mendiratta, "Bioinformatics Methods and Applications", CBS pu	ublications,					
200	04						
2. Jan	nes D. Tisdall, "Beginning Perl for Bioinformatics" O'Reilly media, 1st Edition, 2	001					
Refere	nces						
1. D.I	R. Westhead, J.H. Parish, "Bioinformatics" Viva books private limited, New Delhi	(2003)					
2. Att	Wood, "Bioinformatics" Pearson Education, 2004						
3. Bry	3. Bryan Bergeron, M.D, "Bioinformatics Computing" Pearson Education, 2003						

NATURE INSPIRED COMPUTING (Professional Elective – IV)

Course	M.TechII-Sem.	L	Τ	P	С
Subject Code	22CSPE25	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	explain the fundamentals of Nature Inspired Computing	3	3	3	3	3
CO2	develop programs using the concepts of Genetic Algorithms	3	3	3	3	3
CO3	make use of Swarm Intelligence and immunocomputing	3	3	3	3	3
CO4	show self-tuning algorithms	3	3	3	3	3
CO5	describe nature inspired computing for artificial life	3	3	3	3	3

Unit	Title/Topics	Hours				
Ι	Introduction	8				
Natura	l Computing, From nature to natural computing, sample idea, Philosophy	of natural				
compu	ting, Natural computing approaches, Conceptualization - general concept, Proble	em solving				
as a se	arch track, Hill climbing, Simulated annealing.					
II	Evolutionary Computing	7				
Evolut	ionary computing: Evolutionary biology, Evolutionary computing – standard ev	olutionary				
algorithm; Genetic algorithm, evolutionary strategies, Evolutionary programming.						
III	Swarm Intelligence and Immunocomputing	9+9=18				
Part-A	: Swarm Intelligence: Swarm intelligence-biological motivation, from natural t	o artificial,				
standa	d algorithm of Ant colony optimization, Ant clustering algorithm, Partic	ele swarm				
optimi	zation.					
Part-B	: Immunocomputing: The Immune System, Artificial Immune Systems, Bor	ne Marrow				
Model	s, Negative Selection Algorithms, Clonal Selection and Affinity Maturation,	Artificial				
Immur	e Networks, From Natural to Artificial Immune Systems, Scope of Artificia	il Immune				
System						
IV	Biological Motivation	8				
Biolog	ical motivation, from natural to artificial, standard algorithm of cuckoo s	earch, bat				
algorit	hm, flower pollination, firefly algorithm, framework for self-tuning algorithms -	case study				
of fire	ly algorithm.	-				
V	Artificial Life	7				
The es	sence of life, Examples of ALife projects- flocks, herds and schools, comput	er viruses,				
synthe	sizing emotional behavior, AIBO robot, Turtles, termites, and traffic jams, framsti	cks, Scope				
of arti	icial life, Current trends and open problems.					
Textbo	N 1 C 4 (F 1 4 1 C N 4 1 C A)					
1. L.	1. L. N. de Castro, "Fundamentals of Natural Computing: Basic Concepts, Algorithms, and					
Ap	Applications, 2000, UKU Press, ISBN-15: 978-1584880455.					
2. D.	2. D. Floreano and C. Mattiussi, "Bio-Inspired Artificial Intelligence: Theories, Methods, and					
Deferre	Ciliologies , 2006, WHT Press, ISDN-15: 976-0202002718.					
	nces n Janes (Editor) "Die Ingnined Commuting Desent Inneventiens and Applications	" Clammer				
1. Sal	in Jones (Editor), Bio Inspired Computing-Recent Innovations and Applications	, Clanrye				
Int	emanonai, 2 Europii (2 January 2013), ISDN-10: 1052400812.					

ROBOTIC PROCESS AUTOMATION (Professional Elective – IV)

Course	M.TechII-Sem.	L	Τ	Р	С
Subject Code	22CSPE26	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	outline the basics of RPA	3	3	3	3	3
CO2	implement RPA	3	3	3	3	3
CO3	demonstrate RPA tools and automation techniques	3	3	3	3	3
CO4	adapt RPA BOT Models	3	3	3	3	3
CO5	execute Orchestrator	3	3	3	3	3

Unit	Title/Topics	Hours		
Ι	Introduction to Automation & Robotic Process Automation	9		
Autom	ation and History - RPA vs Automation - Business Processes & Use Cases-	Scope &		
Limita	Limitations of RPA with Real world Industry use cases-Various Types of RPA Implementation			
Metho	dologies - RPA Centre of Excellence - Standardization of processes - Autom	ation Life		
Cycle	- Difference from SDLC - Robotic control flow architecture.			
II	RPA Initiation & Implementation	10		
Initiati	on of RPA- Limitations & factors affecting in Implementing the RPA at the enterp	rise level -		
Enviro	nments setup for RPA Implementation- Infra types to implement the RPA - A	utomation		
Life C	Cycle in detail- RPA Feasibility Analysis- Process Design Document/Solution	on Design		
Docum	nent - Industriesbest suited for RPA Implementation - Risks & Challenges with R	PA - RPA		
and an	emerging ecosystem- Leaders in RPA - Future of RPA.			
III	RPA Tools and Automation	5+5=10		
Part-A	: Introduction to RPA Tool Uipath & Basics The User Interface - Variables -	Managing		
Variab	les - Selectors- Type of Selectors- Customizing the Selectors-RPA Project Main	ntenance –		
Argum	ents-Managing Arguments - Control Flow Activities & Importance - Data Man	nipulation-		
Data N	Annipulation Introduction - Scalar variables, collections and Tables - Data Man	ipulation -		
Gather	ing and Assembling Data.			
Part-B	8: Advanced Automation concepts & Techniques: Recorders in Uipath - Ing	put/Output		
Metho	d- Debugging - RPA Challenge - Image, Text & Advanced Citrix Automation - In	troduction		
to Ima	age & Text Automation - Keyboard based automation -Advanced Citrix A	utomation		
challer	nges –PDF Automation- App Integration & Excel Automation- Email Auto	mation &		
Databa	se Automation.			
IV	RPA BOT Models -Exception Handling	9		
RPA	BOT Models: Attended Vs Unattended Bots- Monitor Events Triggers for	Attended		
Autom	ation. Exception Handling: Debugging and Exception Handling - Debugging To	ols & best		
practic	es.			
Deploy	ying and Maintaining the BOT: Publishing the Automation solution using publi	sh utility -		
creatin	g a provision robot from the server - connecting a robot to server - deploy th	e robot to		
server.	1			
V	Orchestrator	10		
UiPath	Orchestrator Introduction-Robots Configuration and Management-Connecting	Robots to		
Orches	trator- Environment Configuration & Management -Managing Packages-	-Managing		
Proces	ses-Managing Assets in Orchestrator and Studio -Managing Schedules & triggers -	-Managing		
Logs in	n Orchestrator- Practical use case scenarios.			
Textbe	ooks			
1. Ro	botic Process Automation: Guide To Building Software Robots, Automate Repeti	tive Tasks		
&	Become An RPA Consultant - Tom Taulli.			
2. Be	coming Strategic with Robotic Process Automation, L.P. Willcocks, J.Hindle, M.C	Lacity.		

ADVANCED ALGORITHMS LAB

Course	M.TechII-Sem.	L	Τ	P	С
Subject Code	22CSPC23	0	0	4	2

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	illustrate assignment problem using dynamic programming	3	3	3	3	3
CO2	solve knapsack problem using the Greedy method	3	3	3	3	3
CO3	implement LU decomposition	3	3	3	3	3
CO4	adapt KMP algorithm	3	3	3	3	3
CO5	design programs based on max – flow problem	3	3	3	3	3

Week	Title/Experiment			
1	Implement assignment problem using Brute Force method			
2	Perform multiplication of long integers using divide and conquer method.			
3	Implement a solution for the knapsack problem using the Greedy method.			
4	Implement Gaussian elimination method.			
5	Implement LU decomposition			
6	Implement Warshall algorithm			
7	Implement the Rabin Karp algorithm.			
8	Implement the KMP algorithm.			
9	Implement Harspool algorithm			
10	Implement max-flow problem			
Referen	Reference			
1. /	Advanced Algorithms Lab Manual, Department of CSE, CMRIT, Hyd.			

ENTERPRISE CLOUD CONCEPTS LAB (Professional Elective Lab-III)

Course	M.TechII-Sem.	L	Τ	P	С
Subject Code	22CSPE27	0	0	4	2

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	install Virtualbox/VMware with linux or windows OS	3	3	3	3	3
CO2	execute programs with C compiler in any virtual machine	3	3	3	3	3
CO3	illustrate process of create hello-world and google engine apps	3	3	3	3	3
CO4	explain the file-transfer process from one VM to another	3	3	3	3	3
CO5	find the process for launch VM using trystack and Hadoop	3	3	3	3	3

Week	Title/Experiment
1	Install Virtual box/VMware Workstation with different flavors of linux or windows OS
	on top of windows7 or 8.
2	Install a C compiler in the virtual machine created using virtual box and execute Simple
	Programs
3	Install Google App Engine. Create a hello world app and other simple web applications
	using python/java
4	Find a procedure to transfer the files from one virtual machine to another virtual machine
5	Find a procedure to launch virtual machine using trystack (Online Openstack Demo
	Version)
6	Install Hadoop single node cluster and run simple applications like word count
Referen	ce
1. 1	Enterprise Cloud Concepts Lab Manual, Department of CSE, CMRIT, Hyd.

ADVANCED COMPUTER NETWORKS LAB (Professional Elective Lab-III)

Course	M.TechII-Sem.	L	Τ	P	С
Subject Code	22CSPE28	0	0	4	2

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	identify the IP fragmentation and reassemblyalgorithm.	3	3	3	3	3
CO2	write IP forwarding algorithm and sliding window protocol	3	3	3	3	3
CO3	use switch/configure procedure to connect private IPs	3	3	3	3	3
CO4	install telnet in two systems and use wireshark application	3	3	3	3	3
CO5	explain Start packet capture in wireshark application	3	3	3	3	3

Week	Title/Experiment			
1	Implement the IP fragmentation and reassembly algorithm.			
2	Implement the IP forwarding algorithm.			
3	Implement the simplest sliding window protocol of TCP.			
4	Connect two systems using a switch and configure private IP addresses to the systems			
	and ping them from each other. Using Wireshark, capture packets and analyze all the			
	header information in the packets captured			
5	Install Telnet on one of the systems connected by a switch and telnet to it from the other			
	system. Using Wireshark, capture the packets and analyze the TCP 3-way Handshake for			
	connection establishment and tear down			
6	Start packet capture in wireshark application and then open your web browser and type			
	in an URL of the website of your choice. How long did it take from when the HTTP			
	GET message was sent until the HTTP OK reply was received for the web page you			
	visited in your web browser			
Referen	Reference			
1. /	Advanced Computer Networks Lab Manual, Department of CSE, CMRIT, Hyd.			

EDGE ANALYTICS LAB (Professional Elective Lab-III)

Course	M.TechII-Sem.	L	Τ	P	С
Subject Code	22CSPE29	0	0	4	2

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	identify the benefits of edge computing	3	3	3	3	3
CO2	develop the micro services in iofog	3	3	3	3	3
CO3	develop user defined services in the edge	3	3	3	3	3
CO4	create use cases in IoT with edge computing	3	3	3	3	3
CO5	develop services in MEC	3	3	3	3	3

Week	Title/Experiment				
1	Set up the Arduino IDE for ESP8266-12 module and program it to blink a LED light				
2	Installation tools to create and manage ECN's				
3	Deploy micro services and writing your own microservices				
4	Setup the Communication Parameters				
5	Implement any two Communications protocols				
6	Deploy modules to a Windows IoT Edge device				
7	Create an IoT hub.				
8	Register an IoT Edge device to your IoT hub.				
9	Install and start the IoT Edge for Linux on Windows runtime on your device.				
10	Remotely deploy a module to an IoT Edge device and send telemetry.				
11	Python based basic programs using Raspberry Pi.				
12	Deploy a module Manage your Azure IoT Edge device from the cloud to deploy a				
	module that sends telemetry data to IoT Hub.				
13	Publishing Data using HTTP				
14	Sensor Interfacing and Logging using MQTT.				
15	File IO Example - # Example code to demonstrate writing and reading data to/from files				
16	write code to turn on one of the LEDs on the board (Breadboard)				
	Additional Exercises on IOT Edge Analytics Application				
17	Temperature Logger				
18	Home Automatio				
Reference					
1. I	Edge Analytics Lab Manual, Department of CSE, CMRIT, Hyd.				

MINI PROJECT WITH SEMINAR

Course	M.TechII-Sem.	L	Τ	P	С
Subject Code	22CSPR21	0	0	4	2

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	identify the problem, assess the scope and develop a prototype	3	3	3	3	3
CO2	execute the project using modern tools	3	3	3	3	3
CO3	develop project report along with its scalability	3	3	3	3	3
CO4	exhibit project management skills	3	3	3	3	3
CO5	make use of engineering knowledge for societal sustenance	3	3	3	3	3

Guidelines

S.No			Title			
The ob	jective of the M	ini Proje	ect with Seminar is to imb	oibe stud	ents with technical, analyt	ical and
innova	tive ideas to faci	litate wi	th theoretical and practica	al learnin	g pertaining to relevant do	main of
interest	t. An individual	student v	work under the guidance /	mentors	ship of a departmental facu	lty with
the ain	the aim of addressing solution to real world / societal problems using various R & D techniques.					
1	Students shou	ld start	the Mini project with	seminar	r under approved interna	l guide
	immediately af	ter M.To	ech. I Semester SEE and	complete	e before M.Tech. II Semes	ter SEE
	in any reputed	organiza	tion without effecting reg	ular clas	sswork.	
2	The students h	ave to o	btain NOC from both H	OD and	submit the same to the g	uide for
	commencemen	t of Min	i project with seminar.			
3	Survey and stu	dy of pu	blished literature on the a	pproved	/ assigned topic.	
4	Perform Analy	sis/Mode	eling/Simulation/Experim	ent/Desi	gn/Feasibility/study test-fa	cility.
5	The guide period	odically	monitors the performance	e of the s	tudent.	
6	A candidate is	permitte	ed to register for the Min	i project	t with Seminar after satisf	ying the
	attendance requ	uirement	in all the subjects, both the	heory an	d laboratory in I semester.	
7	There shall be	Mini Pro	pject with Seminar during	II semes	ster for CIE of 100 marks.	
8	Mini Project w	ith Semi	nar Viva Voce will be ev	aluated l	by the supervisor for 50 ma	arks and
	DRC for anoth	er 50 ma	urks.			
9	Student shall of	carryout	the mini project in cons	sultation	with the mini project su	pervisor
	which may inc	lude crit	ically reviewing the litera	ture, pro	pject implementation and s	ubmit it
	to the departme	ent in the	e form of a report and shall	ll make a	a presentation before the D	RC.
10	The student ha	s to secu	ure a minimum of 50% of	of marks	in i) seminar presentation	and ii)
	mini project vi	va voce,	to be declared successful	l. If he f	ails to obtain the minimum	1 marks,
	he has to reapp	ear for the	he same as and when sche	eduled.		
			Evaluation Proce	dure		
CIE	Supervisor: 50	Marks	CIE DRC: 50 Mar	·ks	Total CIE: 100 Ma	rks
	Item	Marks	Item	Marks	Item	Marks
Abstra	ct & Scope	05	Abstract & Scope	05	Abstract & Scope	10
Research Design		05	Research Design	05	Research Design	10
Tools Used		05	Tools Used	05	Tools Used	10
Algori	thm/Code	10	Algorithm/Code	10	Algorithm/Code	20
Execution & Test Run		10	Execution & Test Run	10	Execution & Test Run	20
Report		10	Report	10	Report	20
Q & A		05	Q & A	05	Q & A	10
	Total	50	Total	50	Total	100

CONSTITUTION OF INDIA (Audit Course-II)

Course	M.Tech II-Sem.	L	Τ	P	С
Subject Code	22AC21	2	0	0	0

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3
CO1	illustrate origin, history and philosophy behind Indian constitution	3	3	3
CO2	explain various constitutional rights and duties	3	3	3
CO3	summaries the governance and legal administrative procedures	3	3	3
CO4	recognize the need for local self government and administration	3	3	3
CO5	identify importance of ECI and election of public representatives	3	3	3

Unit	Title/Topics	Hours			
Ι		9			
History	History of Making of the Indian Constitution: History Drafting Committee, (Composition &				
Worki	Working) Philosophy of the Indian Constitution: Preamble Salient Features				
II		11			
Contou	rs of Constitutional Rights & Duties: Fundamental Rights Right to Equality	y Right to			
Freedo	m Right against Exploitation Right to Freedom of Religion Cultural and Education	onal Rights			
Right t	o Constitutional Remedies Directive Principles of State Policy Fundamental Dutie	S.			
III		6+4=10			
Part A	: Organs of Governance: Parliament Composition Qualifications and Disqualificat	tions			
Powers	and Functions Executive President Governor Council of Ministers Judiciary				
Part B	: Appointment and Transfer of Judges, Qualifications Powers and Functions				
IV		9			
Local	Administration: District's Administration head: Role and Importance, Mun	nicipalities:			
Introdu	ction, Mayor and role of Elected Representative, CEO of Municipal Corporation.	. Pachayati			
raj: Int	roduction, PRI: ZilaPachayat. Elected officials and their roles, CEO ZilaPachaya	at: Position			
and ro	le. Block level: Organizational Hierarchy (Different departments), Village leve	el: Role of			
Elected	and Appointed officials, Importance of grass root democracy				
V		9			
Electio	n Commission: Election Commission: Role and Functioning. Chief Election Cor	nmissioner			
and El	ection Commissioners. State Election Commission: Role and Functioning. Inst	stitute and			
Bodies	for the welfare of SC/ST/OBC and women.				
Textbo	ooks				
1. T	he Constitution of India, 1950 (Bare Act), Government Publication				
Refere	nces				
1. Dr	S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015	5.			
2. M	P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.				
3. D	.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015				

PEDAGOGY STUDIES (Audit Course-II)

Course	M.Tech II -Sem.	L	Т	P	С
Subject Code	22AC22	2	0	0	0

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3
CO1	identify need right pedagogy in light of OBE	3	3	3
CO2	illustrate various modern pedagogical techniques in practice	3	3	3
CO3	interpret various techniques for evaluation and assessment	3	3	3
CO4	analyze the process of learning among stakeholder ecosystems	3	3	3
CO5	implement R&D for use of modern pedagogy with use of ICT	3	3	3

Unit	Title/Topics	Hours				
Ι		9				
Introd	uction and Methodology: Aims and rationale, Policy background, Conceptual	framework				
and te	rminology Theories of learning, Curriculum, Teacher education. Conceptual	framework,				
Resear	ch questions. Overview of methodology and Searching.					
II		11				
Thema	atic overview: Pedagogical practices are being used by teachers in formal and info	ormal				
classro	oms in developing countries. Curriculum, Teacher education.					
III		6+4=10				
Part A	: Evidence on the effectiveness of pedagogical practices, Methodology for the inc	lepth stage:				
quality	assessment of included studies. How can teacher education (curriculum and pract	icum) and				
the sch	ool curriculum and guidance materials best support effective pedagogy? Theory o	f change.				
Part B	: Strength and nature of the body of evidence for effective pedagogical practices.	Pedagogic				
theory	and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strateg	gies.				
IV		9				
Profes	sional development: alignment with classroom practices and follow-up sup	pport, Peer				
suppor	t, Support from the head teacher and the community. Curriculum and assessment,	Barriers to				
learnin	g: limited resources and large class sizes	1				
V		9				
Resear	ch gaps and future directions: Research design, Contexts, Pedagogy, Teacher e	ducation,				
Curric	ulum and assessment, Dissemination and research impact.					
Textb	ooks					
1. Ack 245	ers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compa- 261.	are, 31 (2):				
2. Agr	awal M (2004) Curricular reform in schools: The importance of evaluation. Journa	ıl of				
Cur	riculum Studies, 36 (3): 361-379.					
3. Aky	eampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher e	ducation				
resea	rch project (MUSTER) country report 1. London: DFID.					
4. Akveampong K. Lussier K. Prvor J. Westbrook J (2013) Improving teaching and learning of						
basic maths and reading in Africa: Does teacher preparation count? International Journal						
Edu	Educational Development, 33 (3): 272–282.					
5. Alex	5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education.					
Oxf	Oxford and Boston: Blackwell.					
6. Cha	van M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.					
7. www	v.pratham.org/images/resource%20working%20paper%202.pdf.					

STRESS MANAGEMENT BY YOGA (Audit Course-II)

Course	M.Tech II -Sem.	L	Т	Р	С
Subject Code	22AC23	2	0	0	0

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3
CO1	explain need for yoga to control stress	3	3	3
CO2	distinguish yam and niyam applications in real life	3	3	3
CO3	demonstrate methods of lifestyle and work balance	3	3	3
CO4	identify need for physical and mental fitness through yoga	3	3	3
CO5	apply principles and methods of yoga for a complete professional	3	3	3

Unit	Title/Topics	Hours			
Ι		9			
Definit	ions of Eight parts of yoga. (Ashtanga)				
II		11			
Yam a	nd Niyam.				
III		6+4=10			
Part A	: Do's and Don't's in life.				
i) Ahir	sa, satya, astheya, bramhacharya and aparigraha				
Part B	: ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan				
IV		9			
Asan a	nd Pranayam				
V		9			
i) Vari	ous yoga poses and their benefits for mind & body				
ii) Reg	ularization of breathing techniques and its effects-Types of pranayam				
Textbo	ooks				
1. 'Yog	1. 'Yogic Asanas for Group Tarining-Part-I": Janardan Swami Yogabhyasi Mandal, Nagpur				
2. "Raj	ayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashran	ma			
(Pul	blication Department), Kolkata				

PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTMENT SKILLS (Audit Course-II)

Course	M.TechII -Sem.	L	Τ	P	С
Subject Code	22AC24	2	0	0	0

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3
CO1	interpret holistic development by neetisatakam sukthis	3	3	3
CO2	explain holistic development and its impact on personality	3	3	3
CO3	illustrate the importance of duties and responsibilities	3	3	3
CO4	explain the term, knowledge, mastery and role model behavior	3	3	3
CO5	exhibit glimpses of bhagavadgita in real life	3	3	3

Unit	Title/Topics	Hours			
Ι		9			
Neetisa	atakam-Holistic development of personality				
•	Verses- 19,20,21,22 (wisdom)				
•	Verses- 29,31,32 (pride & heroism)				
•	Verses- 26,28,63,65 (virtue)				
II		11			
Neetisa	atakam-Holistic development of personality				
•	Verses- 52,53,59 (dont's)				
•	Verses- 71,73,75,78 (do's)				
III		6+4=10			
Part A	: Approach to day to day work and duties.				
•	Shrimad Bhagwad Geeta: Chapter 2-Verses 41, 47,48,				
Part B	:				
•	Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5, 13, 17, 23, 35,				
•	Chapter 18-Verses 45, 46, 48.				
IV		9			
Statem	ents of basic knowledge.				
•	Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68				
•	Chapter 12 - Verses 13, 14, 15, 16, 17, 18				
•	Personality of Role model. Shrimad Bhagwad Geeta:				
V		9			
•	Chapter2-Verses 17, Chapter 3-Verses 36,37,42,				
•	Chapter 4-Verses 18, 38,39				
•	Chapter18 – Verses 37,38,63				
Textbooks					
1. "Srimad Bhagavad Gita" by Swami Swarupananda Advaita Ashram (Publication Department),					
Kol	Kolkata.				
2. Bha	rtrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit	,			
San	sthanam, New Delhi.				

III-SEMESTER SYLLABUS

DIGITAL FORENSICS (Professional Elective – V)

Course	M.TechIII-Sem.	L	Τ	Р	С
Subject Code	22CSPE31	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	understand relevant legislation and codes of ethics.	3	3	3	3	3
CO2	illustrate the process of cyber crime scene analysis	3	3	3	3	3
CO3	outline the process of evidence management and presentation	3	3	3	3	3
CO4	investigate crime through computer and network forensics	3	3	3	3	3
CO5	illustrate the mobile forensics techniques and tools	3	3	3	3	3

Unit	Title/Topics	Hours			
Ι		9			
Digita	Forensics Science : Forensics science, computer forensics, and digital forensics.				
Comp	uter Crime: Criminalistics as it relates to the investigative process, analysis	s of cyber			
crimin	alistics area, holistic approach to cyber-forensics				
II		11			
Cyber	Crime Scene Analysis: Discuss the various court orders etc., methods to search a	and seizure			
electro	electronic evidence, retrieved and un-retrieved communications, Discuss the importance of				
unders	tanding what court documents would be required for a criminal investigation.				
III		4+6=10			
Part A	: Evidence Management & Presentation: Create and manage shared fold	ders using			
operati	ng system, importance of the forensic mindset, define the workload of law enforce	ement			
Part B	Explain what the normal case would look like, Define who should be notified of	of a crime,			
parts o	f gathering evidence, Define and apply probable cause.	-			
IV		9			
Comp	uter Forensics: Prepare a case, Begin an investigation, Understand computer	r forensics			
workst	ations and software, Conduct an investigation, Complete a case, Critique a case,				
Netwo	rk Forensics: open-source security tools for network forensic analysis, require	ements for			
preserv	ation of network data.	0			
V		9			
Mobil	Forensics: mobile forensics techniques, mobile forensics tools.				
Legal	Aspects of Digital Forensics: IT Act 2000, amendment of IT Act 2008.				
Recent	trends in mobile forensic technique and methods to search and seizure electronic	evidence			
Textb					
I. Jon	n Sammons, The Basics of Digital Forensics, Elsevier	<i>.</i> •			
2. John Vacca, Computer Forensics: Computer Crime Scene Investigation, Laxmi Publications					
Keterences					
1. William Oettinger, Learn Computer Forensics: A beginner's guide to searching, analyzing, and					
sec	uring digital evidence, Packt Publisning; 1st edition (30 April 2020), ISBN: 18386	0481/8.			
2.1h	omas J. Hoit, Adam M. Bossier, Kathryn C. Seigfried-Spellar, Cybercrime and Di	gital			
For	ensics: An Introduction, Routledge				

HIGH PERFORMANCE COMPUTING (Professional Elective – V)

Course	M.TechIII-Sem.	L	Τ	P	С
Subject Code	22CSPE32	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	explain the concepts in grid computing	3	3	3	3	3
CO2	set up cluster and run parallel applications	3	3	3	3	3
CO3	illustrate the cluster projects and cluster OS	3	3	3	3	3
CO4	explain concepts of pervasive computing & quantum computing	3	3	3	3	3
CO5	analyze classical & quantum logic gates with various algorithms	3	3	3	3	3

Unit	Title/Topics	Hours
Ι		9
Grid (Computing: Data & Computational Grids, Grid Architectures And Its Relations	Го Various
Distrib	uted Technologies. Autonomic Computing, Examples Of The Grid Computi	ng Efforts
(IBM)		
II		11
Cluste	r Computing at a Glance: Introduction, A Cluster Computer and its Architectu	re, Cluster
Classif	ications, Commodity Components for clusters, Network Services/Communic	ation SW,
Cluster	Middleware and SSI, RMS, Programming Environments and Tools, Cluster Appl	ications.
Lightv	veight Messaging Systems: Introduction, Latency Bandwidth Evaluation of Com	nunication
perform	nance, Traditional Communication Mechanisms for clusters, Lightweight Com	nunication
Mecha	nisms.	
III		4+6=10
Part A	: Job and Resource Management Systems: Need of Job management, Comp	onents and
Archite	ecture.	
Part B	: Scheduling Parallel Jobs on Clusters: Introduction, Rigid Jobs with process	migration,
Mallea	ble Jobs with Dynamic Parallelism, Communication-Based Coschedulin	1g, Batch
Schedu	ıling.	
Cluste	r Operating Systems: COMPaS.	
IV		9
Pervas	ive Computing Concepts & Scenarios: Hardware & Software; Human -	- Machine
Interfa	ce.	
Device	Connectivity: Java For Pervasive Devices; Application Examples.	
V		9
Classi	cal Vs Quantum Logic Gates: One, Two & Three Qubit Quantum Gates; Fredkir	ı & Toffoli
Gates;	Quantum Circuits; Quantum Algorithms.	
Textb	ooks	
1. Gri	d Computing, J. Joseph & C. Fellenstien, Pearson Education	
2. Hig	h Performance Cluster Computing, Raj kumarBuyya, pearson Education.	
3. Per	vasive Computing, J. Burkhardt et.al, Pearson Education	
4. Ap	proaching Quantum Computing Marivesar, Pearson Education.	
Refere	nces	
1. The	e Grid 2: Blue Print for a New Computing Infrastructure, Ian Foster and Carl Kesselma	ın, 2 nd
Edi	tion, The Elsevier Series.	-
2. Qu	antum computing and Quantum Information, Neilsen& Chung L, Cambridge Universi	ty Press.
3. Ar	etworking approach to Grid Computing, Minoli, Wiley	

QUANTUM COMPUTING (Professional Elective – V)

Course	M.TechIII-Sem.	L	Τ	Р	С
Subject Code	22CSPE33	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	explain the concepts of quantum computing	3	3	3	3	3
CO2	use mathematical foundations for quantum computing	3	3	3	3	3
CO3	outline the architecture and programming models	3	3	3	3	3
CO4	utilize basic techniques of quantum computing	3	3	3	3	3
CO5	elaborate major algorithms and discuss about OSS toolkits	3	3	3	3	3

Unit	Title/Topics	Hours
Ι	Introduction to Quantum Computing	6
Motiva	ation for studying Quantum Computing, Major players in the industry (IBM,	Microsoft,
Rigetti	, D-Wave etc.), Origin of Quantum Computing, Overview of major concepts in	n Quantum
Compu	iting, Qubits and multi-qubits states, Bra-ket notation, Bloch Sphere repr	esentation,
Quanti	im Superposition, Quantum Entanglement.	
II	Mathematical Foundations	10
Math I	Foundation for Quantum Computing, Matrix Algebra: basis vectors and orthogona	ality, inner
produc	t and Hilbert spaces, matrices and tensors, unitary operators and projectors, Dira	c notation,
Eigen	values and Eigen vectors.	
III	Building Blocks	8+5=13
Part-A	A: Architecture & Information Representation: Architecture of Quantum	Computing
platfor	m, Details of q-bit system of information representation: Block Sphere, Multi-qu	bits States,
Quanti	im superposition of qubits (valid and invalid superposition), Quantum Entangleme	ent, Useful
states	from quantum algorithmic perceptive e.g. Bell State, Operation on qubits: Mea	suring and
transfo	rming using gates, Quantum Logic gates and Circuit: Pauli, Hadamard, p	hase shift,
contro	lled gates, Ising, Deutsch, swap etc.	
Part-H	B: Programming Model for Quantum Computing: Steps performed on classical	computer,
Steps 1	performed on Quantum Computer, Moving data between bits and qubits.	· · · · · · · · · · · · · · · · · · ·
IV	Basic Techniques	5
Ampli	tude amplification, Quantum Fourier Transform, Phase Kick-back, Quant	um Phase
estima	tion, Quantum Walks.	1
V	Major Algorithms & OSS Toolkits	14
Shor's	Algorithm, Grover's Algorithm, Deutsch's Algorithm, Deutsch -Jozsa Algorithm	ithm, IBM
quantu	m experience, Microsoft Q, Rigetti PyQuil (QPU/QVM).	
Textb	ooks	
1. Ni	elsen M. A., Quantum Computation and Quantum Information, Cambridge Univer	sity Press.
2. D	avid McMahon, "Quantum Computing Explained", Wiley.	
Refere	ences	
1. Ph	illip Kaye Raymond Laflamme Michele Mosca, An Introduction to Quantum C	Computing,
Ox	ford University Press.	

BUSINESS ANALYTICS (Open Elective)

Course	M.TechIII-Sem.	L	Τ	P	С
Subject Code	22OE31	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3
CO1	identify and relate variables in business analytics	3	3	3
CO2	build a suitable statistical model through business analytics	3	3	3
CO3	apply predictive analytics and structure business analytics in organization	3	3	3
CO4	forecast variables/attributes and fit trend	3	3	3
CO5	analyze decisions in light of constraints	3	3	3

Unit	Title/Topics	Hours	
Ι		9	
Busine	ess analytics: Overview of Business analytics, Scope of Business analytics	, Business	
Analyt	ics Process, Relationship of Business Analytics Process and organization, c	competitive	
advant	ages of Business Analytics. Statistical Tools: Statistical Notation, Descriptive	Statistical	
metho	ds, Review of probability distribution and data modelling, sampling and estimation	on methods	
overvi	ew.		
II		11	
Trendi	ness and Regression Analysis: Modelling Relationships and Trends in Data, sin	nple Linear	
Regres	ssion. Important Resources, Business Analytics Personnel, Data and models for	or Business	
analyti	cs, problem solving, Visualizing and Exploring Data, Business Analytics Technol	ogy.	
III		4+6=10	
Part A	A: Organization Structures of Business analytics, Team management, Managem	ent Issues,	
Design	ning Information Policy, Outsourcing, Ensuring Data Quality, measuring cont	ribution of	
Busine	ess analytics, Managing Changes. Descriptive Analytics		
Part I	3: Predictive analytics, predicative Modelling, Predictive analytics analysis, Da	ita Mining,	
Data N	dining Methodologies, Prescriptive analytics and its step in the business analytic	cs Process,	
Prescr	iptive Modelling, nonlinear Optimization.		
IV		9	
Foreca	sting Techniques: Qualitative and Judgmental Forecasting, Statistical Forecastin	ng Models,	
Foreca	sting Models for Stationary Time Series, Forecasting Models for Time Series wi	th a Linear	
Trend,	Forecasting Time Series with Seasonality, Regression Forecasting with Casual	Variables,	
Selecti	ing Appropriate Forecasting Models. Monte Carlo Simulation and Risk Analy	sis: Monte	
Carle S	Simulation Using Analytic Solver Platform, New-Product Development Model, N	lewsvendor	
Model	, Overbooking Model, Cash Budget Model.	0	
V		9	
Decisi	on Analysis: Formulating Decision Problems, Decision Strategies with the withou	it Outcome	
Probat	bilities, Decision Trees, The Value of Information, Utility and Decision Maki	ng. Recent	
Irends in Embedded and collaborative business intelligence, Visual data recovery, Data			
Storyte	eiling and Data journalism		
1 extb	00KS		
I. Bus	niederians, Christopher M. Starkey, Pearson FT Press	Dara G.	
Refere	nices		
1 Ruc	iness Analytics by James Evans, Pearsons Education		

INDUSTRIAL SAFETY (Open Elective)

Course	M.TechIII-Sem.	L	Τ	P	С
Subject Code	22OE32	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3
CO1	summarize the industrial safety	3	3	3
CO2	explain the fundamentals of maintenance engineering	3	3	3
CO3	outline the prevention of wear and corrosion	3	3	3
CO4	determine the faults	3	3	3
CO5	illustrate periodic and preventive maintenance	3	3	3

Unit	Title/Topics	Hours		
Ι	Industrial safety	9		
Accide	ent, causes, types, results and control, mechanical and electrical hazards, types,	causes and		
preven	tive steps/procedure, describe salient points of factories act 1948 for health and sa	afety, wash		
rooms	, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, S	afety color		
codes.	Fire prevention and firefighting, equipment and methods.			
II	Fundamentals of maintenance engineering	11		
Defini	tion and aim of maintenance engineering, Primary and secondary functions and res	ponsibility		
of maintenance department, Types of maintenance, Types and applications of tools used for				
mainte	nance, Maintenance cost & its relation with replacement economy, Servi	ce life of		
equipn	nent.			
III	Wear and Corrosion and their prevention	4+6=10		
Part A	A: Wear- types, causes, effects, wear reduction methods, lubricants-types and ap	pplications,		
Lubric	ation methods, general sketch, working and applications, i. Screw down grea	se cup, ii.		
Pressu	re grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubricati	on vi. Side		
feed lu	brication, vii. Ring lubrication			
Part I	3: Definition, principle and factors affecting the corrosion. Types of corrosion	, corrosion		
preven	tion methods.			
IV	Fault tracing	9		
Fault 1	racing-concept and importance, decision tree concept, need and applications, se	equence of		
fault-f	anding activities, show as decision tree, draw decision tree for problems in mac	hine tools,		
hydrau	ilic, pneumatic, automotive, thermal and electrical equipment's like, i. Any one ma	chine tool,		
ii. Pun	np iii. Air compressor iv. Internal combustion engine, v. Boiler, vi. Electrical mot	tors, Types		
of faul	ts in machine tools and their general causes.			
V	Periodic and preventive maintenance	9		
Period	ic inspection-concept and need, degreasing, cleaning and repairing schemes, over	rhauling of		
mecha	nical components, overhauling of electrical motor, common troubles and remedies	of electric		
motor,	repair complexities and its use, definition, need, steps and advantages of	preventive		
mainte	nance. Steps/procedure for periodic and preventive maintenance of: i. Machine too	ols, ii.		
Pumps	, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of	preventive		
mainte	nance of mechanical and electrical equipment, Advantages of preventive ma	aintenance.		
Repair	cycle concept and importance			
Textb	ooks			
1. Ma	Intenance Engineering Handbook, Higgins & Morrow, Da Information Services.			
2. Ma	Intenance Engineering, H. P. Garg, S. Chand and Company			
Refere	ences			
1. Pu	mp-hydraulic Compressors, Audels, McGraw Hill Publication.			
2. Fo	undation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.			

OPERATIONS RESEARCH (Open Elective)

Course	M.TechIII-Sem.	L	Т	P	С
Subject Code	22OE33	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3
CO1	illustrate various methods and techniques of or	3	3	3
CO2	formulate IBFS for any problem	3	3	3
CO3	apply methods of non-linear programming	3	3	3
CO4	solve problems of scheduling and sequencing	3	3	3
CO5	identify suitable decision and apply to real world problems	3	3	3

Syllabus

Unit	Title/Topics	Hours		
Ι		9		
Optim	zation Techniques, Model Formulation, models, General L.R Formulation	, Simplex		
Techni	ques, Sensitivity Analysis, Inventory Control Models			
II		11		
Formu	lation of a LPP - Graphical solution revised simplex method - duality theory - du	al simplex		
method	l - sensitivity analysis - parametric programming			
III		4+6=10		
Part A	: Nonlinear programming problem - Kuhn-Tucker conditions			
Part B	: Min cost flow problem – max flow problem - CPM/PERT			
IV		9		
Schedu	ling and sequencing - single server and multiple server models - deterministic	inventory		
models	- Probabilistic inventory control models - Geometric Programming.			
V		9		
Compe	titive Models, Single and Multi-channel Problems, Sequencing Models,	Dynamic		
Progra	mming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation			
Textbo	ooks			
1. H.	A. Taha, Operations Research, An Introduction, PHI, 2008			
2. H.	M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.			
3. J.C. Pant, Introduction to Optimization: Operations Research, Jain Brothers, Delhi, 2008				
Refere	nces			
1. Hit	ler Libermann Operations Research: McGraw Hill Pub. 2009			
2. Pa	nnerselvam, Operations Research: Prentice Hall of India 2010			
3. Ha	rvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010			

COST MANAGEMENT OF ENGINEERING PROJECTS (Open Elective)

Course	M.TechIII-Sem.	L	Т	Р	С
Subject Code	22OE34	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3
CO1	interpret different costing systems	3	3	3
CO2	summarize the elements of project	3	3	3
CO3	analyze cost behavior and profit planning	3	3	3
CO4	examine the budgets	3	3	3
CO5	illustrate quantitative techniques for cost management	3	3	3

Unit	Title/Topics	Hours				
Ι		9				
Introdu	ction and Overview of the Strategic Cost Management Process Cost concepts	in decision				
making	; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Obje	ctives of a				
Costing	g System; Inventory valuation; Creation of a Database for operational control; P	rovision of				
data fo	r Decision-Making.					
II		11				
Project	: meaning, Different types, why to manage, cost overruns centres, various stages	s of project				
executi	on: conception to commissioning. Project execution as conglomeration of tec	hnical and				
nontec	nnical activities. Detailed Engineering activities. Pre-project execution main clea	rances and				
docum	ents Project team: Role of each member. Importance Project site: Data req	uired with				
signific	ance. Project contracts. Types and contents. Project execution Project cost c	ontrol. Bar				
charts	and Network diagram. Project commissioning: mechanical and process					
III		4+6=10				
Part A	A: Cost Behavior and Profit Planning Marginal Costing; Distinction betweer	1 Marginal				
Costin	g and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysi	is. Various				
decisio	n-making problems. Standard Costing and Variance Analysis.					
Part B	: Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing	g of service				
sector.	Just-in-time approach, Material Requirement Planning, Enterprise Resource Plan	ning, Total				
Quality	Management and Theory of constraints.	0				
IV		9				
Activit	y-Based Cost Management, Bench Marking; Balanced Score Card and V	alue-Chain				
Analys	is. Budgetary Control; Flexible Budgets; Performance budgets; Zero-base	d budgets.				
Measu	ement of Divisional profitability pricing decisions including transfer pricing.	0				
V		9				
Quanti	ative techniques for cost management, Linear Programming, PERT/CPM, Tra	nsportation				
proble	ns, Assignment problems, Simulation, Learning Curve Theory.					
1. Co	st Accounting A Managerial Emphasis, Prentice Hall of India, New Deini					
2. Cn	aries 1. Horngren and George Foster, Advanced Management Accounting					
Refere						
1. Ro	bert S Kaplan Anthony A. Alkinson, Management & Cost Accounting	-1.11				
$\begin{bmatrix} 2. & As \\ 2 & N \end{bmatrix}$	hish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler pu	Joiisner				
3. N.I	D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. I	_td.				

COMPOSITE MATERIALS (Open Elective)

Course	M.TechIII-Sem.	L	Т	P	С
Subject Code	22OE35	3	0	0	3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3
CO1	classify composite materials	3	3	3
CO2	analyze reinforcements and mechanical behaviour of components	3	3	3
CO3	manufacture metal matrix composites and carbon composites	3	3	3
CO4	prepare polymer matrix composites	3	3	3
CO5	estimate the strength of composites	3	3	3

Unit Title/Topics	Hours							
Ι	9							
Introduction: Definition – Classification and characteristics of Composite materials. Advantages								
and application of composites. Functional requirements of reinforcement and matrix. Effect of								
reinforcement (size, shape, distribution, volume fraction) on overall composite p	reinforcement (size, shape, distribution, volume fraction) on overall composite performance.							
II	11							
Reinforcements: Preparation-layup, curing, properties and applications of g	lass fibers, carbon							
fibers, Kevlar fibers and Boron fibers. Properties and applications of	whiskers, particle							
reinforcements. Mechanical Behavior of composites: Rule of mixtures, Invers	e rule of mixtures.							
Isostrain and Isostress conditions.								
	4+6=10							
Part A: Manufacturing of Metal Matrix Composites: Casting – Solid State of	liffusion technique,							
Cladding – Hot isostatic pressing. Properties and applications. Manufacturing	of Ceramic Matrix							
Composites								
Part B: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of	f Carbon – Carbon							
composites: Knitting, Braiding, Weaving. Properties and applications								
	9							
Manufacturing of Polymer Matrix Composites: Preparation of Moulding comp	ounds and prepregs							
- hand layup method - Autoclave method - Filament winding method - Comp	ression moulding –							
Reaction injection moulding. Properties and applications.	0							
	9							
Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maxi	mum strain criteria,							
Interacting failure criteria, hygrothermal failure. Laminate first play failur	e-insignt strengtn;							
laminate strength-pry discount truncated maximum strain criterion, strength of	Jesign using capier							
Terrtheoltz								
1 Material Science and Technology Vol 12 Compositor by P.W.C.	hn VCH West							
Germany	illi – VCH, West							
2 Materials Science and Engineering An introduction WD Callister I	r Adapted by P							
2. Waterials Science and Eligneering, All Introduction. wD Callister, J. Balasubramaniam John Wiley & Sons NV Indian edition 2007	, Adapted by R.							
3 Hand Book of Composite Materials-ed-Lubin								
References								
1 Composite Materials – K K Chawla								
2 Composite Materials Science and Applications - Deborah D. J. Chung								
3 Composite Materials Design and Applications - Danial Gay Suong V He	and Stephen W							
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DISSERTATION WORK REVIEW - II

Course	M.TechIII-Sem.	L	Τ	P	С
Subject Code	22CSPR31	0	0	12	6

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	identify the problem, assess the scope and develop a prototype	3	3	3	3	3
CO2	execute the project using modern tools	3	3	3	3	3
CO3	develop project report along with its scalability	3	3	3	3	3
CO4	exhibit project management skills	3	3	3	3	3
CO5	make use of engineering knowledge for societal sustenance	3	3	3	3	3

Guidelines

S.No	Title					
1	Students should start the Dissertation Work Review (which would be monitored in two stages i.e., DWR-I and DWR-II) under approved internal guide immediately after M Tech. II semester SEE and complete before M Tech. III semester SEE					
2	Every candidate shall be required to submit a dissertation on a tonic approved by the					
2	Every candidate shall be required to submit a dissertation on a topic approved by the Dissertation Review Committee and present in DWR-I, in consultation with his Supervisor, the title, objective and plan of action of his Dissertation work to the DRC for					
2	approval with	nin Iour	weeks from the commence	ement o	I III Semester.	
3	Unity after of	lata wia	the approval of DRC the s		topic of the discontation	WOIK.
4	do so with the	he appro	oval of the DRC. Howev	er, the c	late of registration for the	project
5	A condidate	shall sub	mit his Dissortation program		ort in two stages at least wi	th a gan
5	of three Mon	ths betw	veen them.	less lepo	it in two stages at least wi	ui a gap
6	The work on	the diss	ertation shall be initiated	at the be	ginning of the III semester	and the
	duration of	the Dis	sertation is two semester	ers. A c	candidate is permitted to	submit
	Dissertation	Thesis c	only after successful com	pletion of	of all theory and practical	courses
	with the appr	roval of .	DRC. For the approval of	DRC, t	he candidate shall submit f	he draft
7	The Dissorter	tion Wo	the Review II in III Some	tor corri	ore life DKC.	
/ 8	Fyaluation sh	hould be	done by the DPC for 50	marks ar	od rest by the Supervisor	
0	The Supervi	sor and	DPC will examine the	Droblem	Definition Objectives S	cope of
2	Work, Litera	ture Sur	vey in the same domain a	nd progr	ess of the Dissertation Wor	rk.
10	A candidate	has to s	secure a minimum of 50	% of m	arks to be declared succe	essful in
	Dissertation	Work R	eview - II. If he fails to o	btain the	e minimum required marks	, he has
	to reappear f	or Disser	rtation Work Review-II as	s and wh	en conducted next.	
			Evaluation Proce	dure		
CIE St	ipervisor: 50	Marks	CIE DRC: 50 Mar	ks	Total CIE: 100 Ma	rks
Alexand	ltem	Marks	Item	Marks	Item	Marks
Abstract		05	Abstract	05	Abstract	10
Scope		05	Scope	05	Scope	10
Literature Survey		10	Literature Survey	10	Litoratura Survey	20
Research Design		10	Research Design	10	Research Design	20
Report		10	Report	10	Report	20
0 & A		05	0&A	05	0 & A	10
	Fotal	50	Total	50	Total	100

IV-SEMESTER SYLLABUS

DISSERTATION WORK REVIEW - III

Course	M.TechIV-Sem.	L	Т	P	С
Subject Code	22CSPR41	0	0	12	6

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	identify the problem, assess the scope and develop a prototype	3	3	3	3	3
CO2	execute the project using modern tools	3	3	3	3	3
CO3	develop project report along with its scalability	3	3	3	3	3
CO4	exhibit project management skills	3	3	3	3	3
CO5	make use of engineering knowledge for societal sustenance	3	3	3	3	3

Guidelines

S.No	Title							
1	Students sh	nould cont	inue the Dissertation We	ork Revie	ew-III on approval of DW	R-II and		
	commence	immediat	tely after M.Tech. III s	semester	SEE and submit after s	uccessful		
	completion	completion of all theory and lab courses.						
2	The DWR-	III in IV	Sem. carries 100 interna	ıl marks.	Evaluation should be don	ne by the		
	DRC for 50) marks ar	nd the Supervisor will eva	aluate it f	or the other 50 marks.			
3	The DRC v	vill exami	ne the overall progress o	f the Diss	sertation Work and decide	whether		
	or not the I	Dissertatio	n is eligible for final sub	mission.				
4	A candidat	e has to se	cure a minimum of 50%	of marks	to be declared successful	in DWR		
	- III. If he f	fails, he ha	s to reappear for the sam	ne as and	when offered.			
5	Unless DV	WR - III	successfully complete	ed, no c	andidate allowed to ap	pear for		
	Dissertation	n Viva-Vo	ce examination (SEE).					
6	DWR-II an	d III shall	be conducted in phase I	(Regular)) and Phase II (Supplement	ntary).		
7	These stud	ents shall	reappear for DWR - II	I in the r	next academic year in the	e process		
	above men	tioned.						
8	After appro	oval from	the DRC, a soft copy of	f the thes	is should be submitted for	or ANTI-		
	PLAGIAR	ISM check	and be included in the f	inal thesi	S.			
9	The Thesis	will be a	ccepted for submission,	if the sin	nilarity index is less than	30% . In		
	case of any	failure, tl	he student should ascerta	ain confo	rmity and re-submit after	a month.		
	The candid	ate should	attach the copy of plagi	arism rep	ort in both soft and hard c	opies.		
10	Three copi	es of the I	Dissertation Thesis certif	fied by th	e supervisor shall be sub	mitted to		
	the departr	nent along	g with a copy of comm	unication	on research paper relate	ed to the		
	Dissertation	n work in	any UGC approved journ	nal.				
			Evaluation Proc	edure	ſ			
CIE Su	pervisor: 5	0 Marks	CIE DRC: 50 Ma	rks	Total CIE: 100 Ma	arks		
It	tem	Marks	Item	Marks	Item	Marks		
Abstract &	k Scope	05	Abstract & Scope	05	Abstract & Scope	10		
Research	Design	05	Research Design	05	Research Design	10		
Tools Used		05	Tools Used	05	Tools Used	10		
Algorithm/Code		10	Algorithm/Code	10	Algorithm/Code	20		
Execution & Test Run		10	Execution & Test Run	10	Execution & Test Run	20		
Publicati	on/ Report	10	Publication/ Report	10	Publication/ Report	20		
Q & A		05	Q & A	05	Q & A	10		
Total		50	Total	50	Total	100		

DISSERTATION VIVA VOCE

Course	M.TechIV-Sem.	L	Τ	P	С
Subject Code	22CSPR42	0	0	28	14

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PSO1	PSO2
CO1	describe the problem, scope and research methodology	3	3	3	3	3
CO2	illustrate tools used	3	3	3	3	3
CO3	summarize the findings	3	3	3	3	3
CO4	outline inferences out of project	3	3	3	3	3
CO5	explain conclusions, recommendations and future scope	3	3	3	3	3

Guidelines

S. No.	Title								
1	Dissertation Viva-Voce examination Evaluation in IV Semester is for 100 marks SEE.								
2	The candidate has to secure a minimum of 50% marks in DVV SEE.								
3	The DVV SEE shall be conducted by a board consisting of the Supervisor, Head of the								
	Department and the external examiner for adjudication.								
4	If the report of the external examiner is unsatisfactory, the candidate shall revise and								
	resubmit the Thesis as recommended by the committee and/or after three months.								
Evaluation Procedure for SEE 100 Marks									
Description		Marks							
Introduction		10							
Literature Review		10							
Tools Used		20							
Algorithm and Execution		30							
Report		10							
Q & A		20							
Total		100							
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(Approved by AICTE, Affiliated to JNTUH, Accredited by NBA & NAAC with 'A' Grade)									
	Р	Kandlak hone: 08418 – 200	toya (V), Me 720 / 9247605	dchal D 5109 Fax:	9istrict, : 08418	Hydera - 2002	abad-5 40, <u>ww</u>	01 401 w.cmritonline.	ac.in
UNDERTAKING BY STUDENT/PARENT REGARDING R22 REGULATIONS									
ACADEMIC YEAR: 20 20									
Colleg	ge Code	R0							
Course		I - M.Tech.							Affix recent Stamp Size Photograph
Branch		Computer Science and Engineering (CSE)							
Roll N	lo.		R 0	1	D	5	8		
Student Name									
Fathers' Name									
Declaration									
1. I am completely aware of academic regulations prescribed by CMR Institute of Technology from the Academic Year 2022-23 onwards under which I was admitted									
 I am aware of course registration before commencement of each semester with help of faculty 									
mentor/advisor/Head of the Department.									
3. I am aware of attendance detention procedure/system and minimum attendance requirement, of 75% without condonation, to be promoted to the next academic semester/year.									
4. I am aware of credit detention regulations and minimum credits to be earned by me to promote to next academic year.									
5. Guidelines for Mini-Project with Seminar/Dissertation Work Review-II/ Dissertation Work Review-III/ Dissertation Viva Voce as per R22 Regulations.									
6. I am aware that minimum marks required in Continuous Internal Evaluation (CIE) are 40% of									
40 CIE i.e. 16 marks out of 40, minimum 40% of Semester End examination (SEE) for 60 marks i.e. 24 marks out of 60 and minimum 50% of total marks of 100 i.e. 50 marks out of 100									
marks both CIE & SEE marks taken together.									
7. Re-registration of course if marks in CIE are less than 40% of 40 marks to improve CIE marks. When this option is exercised, I will forego the marks of SEE if any.									
8. Guidelines for re-admission from one regulation to readmitted year regulations.									
 9. Malpractice rules and punishment. 10. Durishment of reacting if investor for a state of the state of									
10. Punishment of ragging, it involved in ragging of any student(s).									
Date		Signature of the Student					Si t	gnature of he Parent	
	Endorse	ement by the	Head of	the co	ncerr	ned D	epart	ment and	Principal
Date		Name of the Dept. Head					5	Signature	
Date		Name of the Principal					\$	Signature	
College Stamp									