ISO 9001:2015 AICTE-CII: GOLD Category Institute NAAC-'A' Grade Institute (CGPA: 3.21) NIRF-2022 Rank Band : 201-250

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE

Opp : Yerragattu Gutta, Hasanparthy (Mandal), WARANGAL - 506 015, Telangana, INDIA.

काकतीय प्रैद्योगिकी एवं विज्ञान संस्थान, वरंगल - ५०६ ०१५ तेलंगाना, भारत

కాకతీయ సాంకేతిక విజ్ఞాన శాస్త్ర విద్యాలయం, వరంగల్ - ౫౦౬ ౦౧౫ తెలంగాణ, భారతదేశము

(An Autonomous Institute under Kakatiya University, Warangal)

(Approved by AICTE, New Delhi; Recognised by UGC under 2(f) & 12(B); Sponsored by EKASILA EDUCATION SOCIETY)

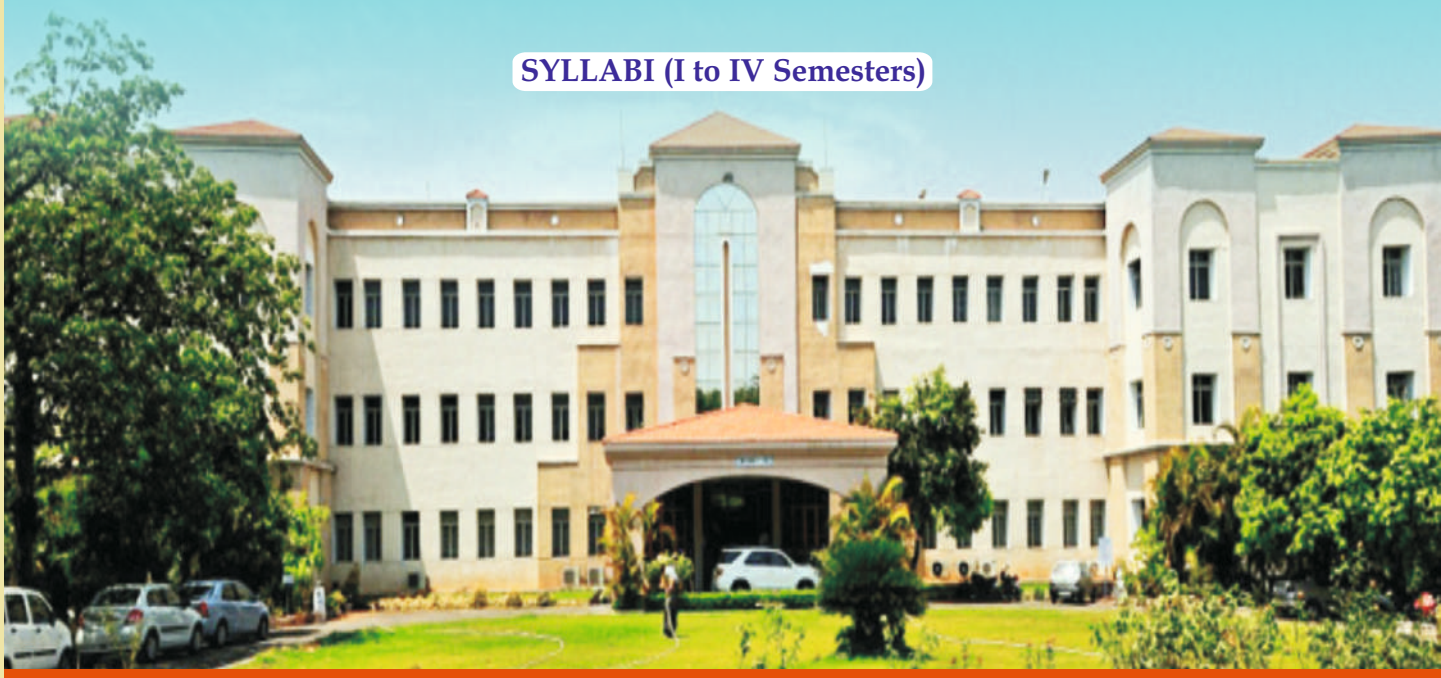
website: www.kitsw.ac.in | E-mail: principal@kitsw.ac.in | : +91 9392055211, +91 7382564888

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

PG - M.TECH. - SOFTWARE ENGINEERING

RULES & REGULATIONS FOR POSTGRADUATE PROGRAMME
M.TECH. 2-YEAR DEGREE PROGRAMME (PRR-20)

SYLLABI (I to IV Semesters)



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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

• PG - M.Tech. •
(SOFTWARE ENGINEERING)

Rules & Regulations for postgraduate Programme
M.Tech. 2-Year Degree Programme (PRR-20)

Syllabi (I Semester to IV Semester)

VISION OF THE INSTITUTE

- *To make our students technologically superior and ethically strong by providing quality education with the help of our dedicated faculty and staff and thus improve the quality of human life*

MISSION OF THE INSTITUTE

- *To provide latest technical knowledge, analytical and practical skills, managerial competence and interactive abilities to students, so that their employability is enhanced*
- *To provide a strong human resource base for catering to the changing needs of the Industry and Commerce*
- *To inculcate a sense of brotherhood and national integrity*

VISION OF THE DEPARTMENT

- *Attaining centre of excellence status in various fields of Computer Science and Engineering by offering worth full education, training and research to improve quality of software services for ever growing needs of the industry and society.*

MISSION OF THE DEPARTMENT

- *Practice qualitative approach and standards to provide students better understanding and profound knowledge in the fundamentals and concepts of computer science with its allied disciplines.*
- *Motivate students in continuous learning to enhance their technical, communicational, and managerial skills to make them competent and cope with the latest trends, technologies, and improvements in computer science to have a successful career with professional ethics.*
- *Involve students in analyze, design and experimenting with contemporary research problems in computer science to impact socio-economic, political and environmental aspects of the globe.*

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)	
PG - M.Tech. (SOFTWARE ENGINEERING)	
PROGRAM EDUCATIONAL OBJECTIVES (PEOs)	*The post graduates of* ***SOFTWARE ENGINEERING*** *will be able to...*
PEO1 (Research and Innovation)	*Enhance the computer science and software engineering technologies by contributing in research and developing the innovative software applications.*
PEO2 (Technical expertise and Successful career)	*Perform well in industry profession, teaching and entrepreneurship with rapid adaptation of current trends in software engineering and computer science domains.*
PEO3 (Soft skills and Lifelong learning)	*Demonstrate professional ethics, project management principles, communication and technical report writing abilities in solving real world problems by adapting the current research for the sustainable development of society.*

PG - M.Tech. (SOFTWARE ENGINEERING)
PROGRAM OUTCOMES (POs)

PO1	*An ability to independently carry out research/investigation and development work to solve practical problems.*
PO2	*An ability to write and present an effective technical report/ document.*
PO3	*Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.*
PROGRAM SPECIFIC OUTCOMES (PSOs)	
At the time of graduation, the post graduates of SE will be able to …	
PSO1 (Research Orientation)	*Apply appropriate software design, tools, techniques, report writing skills and conduct experiments to solve research issues in contemporary domains of computer science.*
PSO2 (Industry Ready)	*Demonstrate comprehensive knowledge of various stages of software development life cycle in solving real world problems by adapting the current software engineering tools and principles from the literature.*

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE:: WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)

PRR-20

SCHEME OF INSTRUCTION & EVALUATION OF M.Tech. (SOFTWARE ENGINEERING)
I-SEMESTER OF 2-YEAR M.TECH DEGREE PROGRAMME

[4 Th+2 P+1 MC+1 AC]

S. No.	Course Category	Course Code	Course Title	Teaching scheme			Credits	Evaluation Scheme								
								CIE							ESE	Total Marks
				L	T	P		I²RE - TA				Minor	MSE	Total		
								ATLP	CRP	CP	PPT					
1	PC	P20SE101	**Professional Core-1:** Service Oriented Architecture	3	-	-	3	8	8	8	6	10	20	60	40	100
2	PC	P20SE102	**Professional Core-2:** Advanced Data Structures & Algorithms	3	-	-	3	8	8	8	6	10	20	60	40	100
3	PE	P20SE103	**Professional Elective-I/ MOOC-I**	3	-	-	3	8	8	8	6	10	20	60	40	100
4	PE	P20SE104	**Professional Elective-II/ MOOC-II**	3	-	-	3	8	8	8	6	10	20	60	40	100
5	PC	P20SE105	**Core Lab-I:** CASE Tools Laboratory	-	-	4	2	-	-	-	-	-	-	60	40	100
6	PC	P20SE106	**Core Lab-II:** Advanced Algorithms through Python Laboratory	-	-	4	2	-	-	-	-	-	-	60	40	100
7	MC	P20MC107	Research Methodology & IPR	2	-	-	2	8	8	8	6	10	20	60	40	100
8	AC	P20AC108	Audit Course 1	2	-	-	1	8	8	8	6	10	20	60	40	100
Total				**16**	-	**8**	**19**	**48**	**48**	**48**	**36**	**60**	**120**	**480**	**320**	**800**

[L= [Lecture, T = Tutorials, P = Practicals, C = Credits, ATLP = Assignments, CRP = Course Research Paper, CP = Course Patent, PPT = Course Presentation, Minor=Minor Examination, MSE=Mid Semester Examination and ESE=End Semester Examination]

Professional Elective 1	Professional Elective 2	Audit Course 1
P20SE103A: Software Quality Assurance & Testing	P20SE104A: Secure Software Engineering	P20AC108A: English for Research Paper Writing
P20SE103B: Object Oriented Software Engineering	P20SE104B: Cyber Security and Forensic Laws	P20AC108B: Sanskrit for Technical Knowledge
P20SE103C: Software Architecture and Design patterns	P20SE104C: Cloud Computing	P20AC108C: Constitution of India
P20SE104D: MOOCs	P20SE104D: MOOCs	P20AC108D: Pedagogy Studies

Total Contact Periods/Week: 24 **Total Credits: 19**

Additional Learning: Students are advised to do MOOCs to bridge the gap in the curriculum as suggested in the DAC. The credits will be provided in the grade sheet.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE:: WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)
SCHEME OF INSTRUCTION & EVALUATION OF M.Tech. (SOFTWARE ENGINEERING)
II-SEMESTER OF 2-YEAR M.TECH DEGREE PROGRAMME

PRR-20

[4 Th+2 P+1 Mini Project +1 AC]

S. No.	Course Category	Course Code	Course Title	Teaching scheme			Credits	Evaluation Scheme								
								CIE							ESE	Total Marks
								I²RE - TA				Minor	MSE	Total		
				L	T	P		ATLP	CRP	CP	PPT					
1	PC	P20SE201	**Professional Core-3:** Agile Development Methodologies	3	-	-	3	8	8	8	6	10	20	60	40	100
2	PC	P20SE202	**Professional Core-4:** Data Science	3	-	-	3	8	8	8	6	10	20	60	40	100
3	PE	P20SE203	**Professional Elective-III/ MOOC-III**	3	-	-	3	8	8	8	6	10	20	60	40	100
4	PE	P20SE204	**Professional Elective-IV/ MOOC-IV**	3	-	-	3	8	8	8	6	10	20	60	40	100
5	PC	P20SE205	**Core Lab-III:** Agile Development and DevOps Laboratory	-	-	4	2	-	-	-	-	-	-	60	40	100
6	PC	P20SE206	**Core Lab-IV:** Data Science Laboratory	-	-	4	2	-	-	-	-	-	-	60	40	100
7	PROJ	P20SE207	Mini Project with Seminar	-	-	4	2	-	-	-	-	-	-	100	-	100
8	AC	P20AC208	Audit Course 2	2	-	-	1	8	8	8	6	10	20	60	40	100
Total				**14**	**-**	**12**	**19**	**40**	**40**	**40**	**30**	**50**	**100**	**520**	**280**	**800**

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Professional Elective3	Professional Elective 4	Audit Course 2
P20SE203A: Software Configuration Management	P20SE204A: Bigdata Analytics	P20AC208A: Stress Management by Yoga
P20SE203B: Web Services Testing	P20SE204B: Block chain Technologies and Applications	P20AC208B: Value Education
P20SE203C: Software Reliability Engineering	P20SE204C: Internet of Things	P20AC208C: Personality Development through Life Enlightenment Skills
P20SE203D: MOOCs	P20DS204D: MOOCs	P20AC208D: Disaster Management

Total Contact Periods/Week: 26 **Total Credits: 19**

Note: The students shall undergo mandatory Industrial training/ Internship for at least 6 to 8 weeks during summer vacation at Industry/R&D organization. Internship evaluation will be done during the III semester.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE:: WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)

PRR-20

SCHEME OF INSTRUCTION & EVALUATION OF M.Tech. (SOFTWARE ENGINEERING)
III-SEMESTER OF 2-YEAR M.TECH DEGREE PROGRAMME

[2 Th+1 Dissertation+1 Internship]

S. No.	Course Category	Course Code	Course Title	Teaching scheme			Credits	Evaluation Scheme								
								CIE							ESE	Total Marks
								I²RE - TA				Minor	MSE	Total		
				L	T	P		ATLP	CRP	CP	PPT					
1	PE	P20DS301	Professional Elective 5	3	-	-	3	8	8	8	6	10	20	60	40	100
2	OE	P20OE302	Open Elective	3	-	-	3	8	8	8	6	10	20	60	40	100
3	PROJ	P20DS303	Dissertation *Phase-I*	-	-	18	9	-	-	-	-	-	-	100	-	100
4	PROJ	P20DS304	Internship Evaluation	-	-	2	-	-	-	-	-	-	-	100	-	100
			Total	**6**	**-**	**20**	**15**	**16**	**16**	16	12	20	40	320	80	400

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Professional Elective 5	Open Elective
P20SE301A: Data Visualization	P20OE302A: Business Analytics
P20SE301B: Social Network Analysis	P20OE302B: Industrial Safety
P20SE301C: Deep Learning	P20OE302C: Operations Research
P20DS301D: MOOCs	P20OE302D: Cost Management of Engineering Projects
	P20OE302E: Composite Materials
	P20OE302F: Waste to Energy

Total Contact Periods/Week: 26 **Total Credits: 15**

Additional Learning: Students are advised to do MOOCs to bridge the gap in the curriculum as suggested in the DAC. The credits will be provided in the grade sheet.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE:: WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)

PRR 20

SCHEME OF INSTRUCTION & EVALUATION OF M.Tech. (SOFTWARE ENGINEERING)

IV-SEMESTER OF 2-YEAR M.TECH DEGREE PROGRAMME

[1 Dissertation]

S. No.	Course Category	Course Code	Course Title	Teaching scheme			Credits	Evaluation Scheme								
								CIE							ESE	Total Marks
								I²RE - TA				TA	MSE	Total		
				L	T	P		ATLP	CRP	CP	PPT					
1	PROJ	P20SE401	Dissertation *Phase-II*	-	-	30	15	-	-	-	-	-	-	60	40	100
Total				**-**	**-**	**30**	**15**	**-**	**-**	**-**	**-**	**-**	**-**	**60**	**40**	**100**

[L= [Lecture, T = Tutorials, P = Practicals, C = Credits, ATLP = Assignments, CRP = Course Research Paper, CP = Course Patent, PPT = Course Presentation, Minor=Minor Examination, MSE=Mid Semester Examination and ESE=End Semester Examination]

Total Contact Periods/Week: 30 **Total Credits: 15**

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RULES AND REGULATIONS FOR POSTGRADUATE PROGRAMME –MBA 2-YEAR DEGREE PROGRAMME (PRR-20M)
CHOICE BASED CREDIT SYSTEM (CBCS)

(Applicable from the academic year 2020-21)

1. INTRODUCTION

1.1 Kakatiya Institute of Technology & Science, Warangal (KITSW) is an UGC autonomous institute under Kakatiya University (KU) Warangal. The institute offers 2 year (4 semesters) Master of Business Administration (MBA) degree programme, under Choice Based Credit System (CBCS) with effect from the academic year 2020-21.

1.2 The provisions contained in these regulations given the conditions for imparting course of instructions, conducting examinations and evaluation of students performance leading to MBA 2 -year degree programme to be offered by the Kakatiya Institute of Technology & Science, Warangal and awarded by Kakatiya University, Warangal.

1.3 These regulations shall be called the ***Kakatiya Institute of Technology & Science, Warangal (KITSW) regulations for the award of MBA 2-year degree programme*** *by Kakatiya University, Warangal.*

1.4 They shall come into effect from the date of getting approval from the Academic Council of theKakatiya Institute of Technology & Science, Warangal

1.5 They shall be applicable for all students enrolling for MBA 2-year degree programme at the Kakatiya Institute of Technology & Science, Warangal from the academic year 2020-21.

2. DEFINITIONS

2.1 ***"MBA"*** means Master of Business Administration, an Post Graduate Degree awarded from theKakatiya University, Warangal

2.2 ***"University"*** means Kakatiya University, Warangal

2.3 ***"Institute"*** means Kakatiya Institute of Technology & Science, Warangal

2.4 ***"UGC"*** means University Grants Commission, New Delhi

2.5 ***"AICTE"*** means All India Council for Technical Education, New Delhi

2.6 ***"MHRD"*** means Ministry of Human Resource & Development, Govt. of India, New Delhi

2.7 ***"TSCHE"*** means Telangana State Council for Higher Education, Govt. of Telangana, Hyderabad

2.8 ***"GB"*** means Governing Body of the Institute

2.9 ***"AC"*** means Administrative Committee of the Institute

2.10 ***"FC"*** means Finance Committee of the Institute

2.11 ***"Academic Council"*** means Academic Council of the Institute

2.12 ***"Principal"*** means Principal of the Institute

2.13 ***"Dean"*** means Dean of specific affairs of the Institute

2.14 ***"HoD"*** means Head of the Department of specific programme offered by the Institute

2.15 ***"BoS"*** means Board of Studies in the engineering of a specific programme offered by theInstitute

2.16 ***"CoE"*** means Controller of Examinations of the Institute.

3.1 ADMISSION

Course	Spelalization	Eligibility	
		Qualifying Degree	ICET Exam
MBA	Management	B.Com/B.Sc/B.A/B.B.M /B.Pharm/B.Sc(Agri)/B E/B.Tech or equivalent. They should have qualified at ICET	ICET Exam

3.2 The Admissions shall be made in accordance with the guidelines issued by TSCHE.

3.3 **For ICET candidates**

The candidates should have passed B.Com/B.Sc/B.A/B.B.M/B.pharm/B.Sc.(Agri) /BE/B.Tech or equivalent. They should have qualified at the ICET and possess a valid ICETscore. The seats will be assigned purely on the basis of merit of ICET.

For Sponsored seats

The candidates should have passed B.Com/B.Sc/B.A/B.B.M/B.pharm/B.Sc.(Agri) /BE/B.Tech or equivalent.

The criterion for selection of sponsored candidates shall be by their merit at the entrance examination to be conducted by the ICET Admission shall made into sponsored category only with the candidates who are qualifiedeither ICET or as decided by the admission committee.

a) His/ Her application shall be duly recommended by the sponsoring agency for admission to the course and forwarded to the Convener, ICET
b) He/ She must be permanent employee with the sponsoring agency for at least two years,after obtaining the qualifying degree.
c) The sponsoring agency must be a Government establishment or a public-sector undertaking, or a reputed private engineering college
d) The sponsoring agency shall certify that the candidates will be granted leave for pursuing the MBA Regular course of study.
e) The candidates who are working Research Projects approved by the competent authorityare also required to fulfill the above conditions before they are sponsored for admission.

4. ACADEMIC SESSION

4.1 Each academic session is divided into two semesters (odd and even), each of 15 weeksincluding two Mid Semester Examinations (MSE).

a) **Odd Semester**: Academic session of the first semester will be decided based on counseling schedule declared by the TSCHE.

b) **Even Semester**: Academic session of the second semester will be commenced as per the almanac released by the institute.

4.2 The Institute shall announce the schedule for all the academic activities well before the commencement of the academic year and take all the necessary steps to follow them scrupulously.

4.3 The academic activities in a semester normally include registration, course work, ContinuousInternal Evaluation (CIE), End Semester Examination (ESE) and declaration of results.

5. REGISTRATION

5.1 All the students are required to register in person at the beginning of each academic year onthe dates specified in the academic calendar (almanac).

5.2 The sole responsibility for registration rests with the student concerned.

5.3 Registration of students will be centrally organized by the Academic section.

5.4 The Registration procedure involves:

a) Filling of the prescribed registration form
b) Payment of fees and clearance of outstanding dues (if any)
c) Signing undertakings (undertaking for regular attendance, discipline and against ragging)along with the parents

5.5 If for any compelling reasons like illness, etc., a student is unable to register on the announced day of registration, he/she can register within 12 working days from the beginning of the academic year on payment of an additional late fee as prescribed by the Institute.

5.6 **No late registration shall be permitted after 12th working day** from the scheduled date of commencement of class work for that academic year.

5.7 Only those students will be permitted to register who have

a) cleared all institute and hostel dues of previous semesters
b) paid all required prescribed fees for the current academic year
c) not been debarred / detained from registering for a specified period on disciplinary or any other grounds
d) cleared the minimum academic requirement as detailed in Regulation No. 15

6. CURRICULUM

Well-designed and well-implemented ATLP and I²RE based student centered pedagogyis adapted

6.1 ATLP: Assignment based Teaching Learning Process (ATLP) is introduced for assessment of class-wise learning outcomes to promote student learning with understanding.

6.2 I²RE: Innovation, Incubation, Research and Entrepreneurship (I²RE) based Learning activity is adapted to meet the diverse needs of students and industry expectations.

6.3 Importance to the course study analysis and course projects

6.4 The Model curriculum/ Course structure as suggested by AICTE, New Delhi; Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as denoted by UGC, New Delhi is followed for all PG programmes.

6.5 The duration of the programme leading to MBA degree will be 4 semesters (2 academic years)

6.6 The curricula for 2-year MBA degree programme as proposed by the department andrecommended by the BoS shall have the approval of the Academic Council.

6.7 As suggested by AICTE, the courses offered for MBA programme are broadly classified as: Program Core courses; Program Elective courses ; Labs based on core course, Audit courses, Mini Project with Seminar; **Project Work**phase-1 / **Project Work**phase -II

6.8 The courses offered would have a ***Lecture – Tutorial – Practical (L-T-P)*** component to indicate contact hours. Separate laboratory (practical) course may exist (0-0-P) in certain cases as decided.

6.9 The academic programmes of the Institute follow the credit system.

6.10 Each course shall have credits(C), which reflects its weightage. The number of credits of a course in a semester shall ordinarily be calculated as under:

$$\textit{Number of credits of a course, } C = L + (T + P)/2$$

- where ***L, T, P*** represent the No. of Lecture, Tutorial and Practical hours / week
- The fraction to be rounded off to next integer value

6.11 **Course Code:** Each course offered in the Postgraduate (MBA) curriculum at this institute shallbe listed by using a total of 8 digits, as follows:

Ex: P20MB101

a) The first letter, to represent the Post Graduate Programme
Ex. P for Postgraduate Course

b) The next two numericals, to represent the year in which the syllabus is proposed / revised.
Ex. 20 for the year 2020 from which syllabus is applicable for the batches admitted from academic year 2020-21

c) The next two letters, to represent the concerned department offering that course.
Ex. MB for Master of Business Management

d) The last three numerical, to represent the course number and semester in which it is being offered.

Ex. **XYZ**; X - Semester number ; YZ – Course number

101 represents course number 01 offered in first semester

In general, a **course code " P20MB101"**represents an **Postgraduate Course number-01 for the batches admitted from the year 2020 in Master of Business Administration in first semester**

6.12 The syllabus of each course in the MBA curriculum shall be divided into four (4) units.

7. ATTENDANCE

7.1 All the students are normally required to have 100% attendance in aggregate. However,condonation for shortage of attendance upto 25% may be granted by the Principal based on recommendation of HoD concerned.

7.2 The condonation for shortage of attendance upto 25% (as mentioned in Regulation No. 7.1) shall be taken up only when the student takes prior permission for his absence stating fully the genuine reasons along with supporting documents to the HoD concerned.

7.3 Students not having the mandatory requirement of minimum 75% of attendance in aggregate shall be detained and shall not be permitted to appear for the MSE-II & ESE of that semester

7.4 All such students who are detained have to repeat the entire semester when it is offered, by following the due registration procedure.

7.5 Attendance of all courses shall be entered before the end of each working day by the faculty concerned through the College Management System (CMS) portal of the institute website. Students are advised to track the status of their attendance and academic assessment scores through this CMS portal.

8. CONDUCT AND DISCIPLINE

8.1 All students shall be required to conduct themselves in a manner befitting the reputation of the institution, within and outside the premises of the Institute; and are expected to complete
their studies without any break.

8.2 As per the order of Hon"ble Supreme Court of India, ragging in any form is strictly banned.
Involvement of a student in ragging will be considered as a gross indiscipline and may lead tohis / her expulsion from the Institute.

8.3 Detailed rules regarding the conduct and discipline (code of conduct) are given in Appendix-1

9. EVALUATION PROCEDURE

9.1 The evaluation of students in every course of 2-year MBA programme (4 semesters) is a continuous process and is based on their performance in different examinations as mentionedbelow:

a) Sessional, involving **Continuous Internal Evaluation (CIE)** conducted all through the semester which includes **Teachers Assessment (TA)** through ATLP assignments, I²RE, special assignments, Minor exams and **Mid- Semester Examinations (MSE)**

b) Terminal often designated as **End Semester Examination (ESE)** which includes written examination for theory courses and practical/ Project courses.

9.2 A student"s performance in a course (subject) shall be judged by taking into account the resultof Continuous Internal Evaluation (CIE) and End Semester Examination (ESE) together.

9.3 Continuous Internal Evaluation (CIE) and End Semester Examination (ESE) shall have 60:40weightage i.e. CIE carrying 60% weightage and ESE carrying 40% weightage.

9.4 **Continuous Internal Evaluation (CIE) for Theory Course:**

9.4.1 Continuous Internal Evaluation (CIE) throughout the semester shall consist of Teachers Assessment (TA) which includes assignments and special assignments as part of I²RE, minor exams and mid semester exams.

9.4.2 The distribution given to each component of CIE for a theory course is given below:

S. No.	Teacher Assessment (TA) Particulars	Weightage
1.	Innovation Incubation Research and Entrepreneurship- Teachers Assessment (I²RE -TA)	30%
2.	Minor Examination (**M-I & M-II**)	10%
3.	Mid Semester Examination (MSE) **(MSE-I & MSE-II)**	20%
4.	**Total Weightage**	**60%**

9.4.3 I²RE - TA:

a) For each course there shall be two Assignments (A-I & A-II), Special Assignments consisting of two course research papers (CRP-I & CRP-II) & two course case studies (CCS-I & CCS-II) and one course case study presentation at regular intervals of time

b) A-I shall be based on Unit-I & Unit-II syllabi and to be submitted before MSE-I, A-II shall be based on Unit-III & Unit-IV syllabi and to be submitted before MSE-II.

c) **Course research papers:** Under this special assignment, the student is expected to summarize and submit a two page summery on each of the two course research papers (CRP-I & CRP-II) posted by course faculty.

d) **Course case study (CCS) Analysis Report**: Under this special assignment, the student is expected to submit well documented case study analysis report on eachof the two course case study topics given by course faculty. The case studies give actual instantiations of management theory. Course faculty shall give useful case studies from best practices within the country and worldwide to illustrate the practice of management and the theories that go into it.

e) **Case study presentation (CSP):** Student shall prepare informative PPT and give an effective oral presentation on any of the course special assignments i.e., course research papers/course case studies posted by the course faculty or any businessidea.

9.4.4 TA-Minor Examination:

a) There shall be two minor examinations (M-I and M-II) of one hour duration each.

b) Minor-I shall be based on Unit-I syllabus, Minor-II shall be based on Unit-IIIsyllabus.

c) Average of Minor-I and Minor-II marks shall be taken under TA.

9.4.5 TA-Mid Semester Examination (MSE):

a) There shall be two mid semester examinations (MSE-I and MSE-II) of two hourduration each.

b) It is mandatory for the student to take both MSEs

c) MSE evaluation shall be done as given below:

MSE marks awarded = (70% of the best of MSE-I & MSE-II marks) + (30% of theother MSE marks)
Ex: A student secured following marks MSE-I marks: 10 out of 20MSE-II marks : 20 out of 20
MSE marks awarded = (70% of 20) + (30% of 10) = 14 + 3 =17

9.4.6 The marks obtained by the students in MSE must be submitted to the Controller of Examination (CoE) by the course faculty within 1 week from the date of conduct of the examination.

9.4.7 The dates for MSE and ESE will be declared by the CoE in consultation with the Dean, Academic Affairs.

9.5 **End Semester Examination (ESE) for Theory Course:**

There shall be an End Semester Examination (ESE) carrying 40% weightage, at the end of each semester for three hour duration for each course.

The weightage to different components under CIE carrying 60% weightage and ESE carrying40% weightage is as below:

PRR – 20M Continuous Internal Evaluation - TA				Max. Marks	Minimum marks
MSE – 1		20 Marks	*(70% of the best of MSE-I &MSE-II marks) + (30% of the other MSE marks)*	20	07/20
MSE – 2		20 Marks			
Minor – 1		10 Marks	*Average of M-I & M-II marks*	10	04/10
Minor – 2		10 Marks			
Assignment – 1		8 Marks	*Average of A-I & A-II marks*	08	10/30
Assignment – 2		8 Marks			
Special Assignments	CRP-1	04 Marks	*Two page summary Report on course research paper - I*	04	
	CRP-II	04 Marks	*Two page summary Report on course research paper - II*	04	
	CCS-I	04 Marks	*Case study analysis report on CCS-I*	04	
	CCS-II	04 Marks	*Case study analysis report on CCS-II*	04	
CRP-I/CCS-I/CRP- II/CCS-II/Course Project/Business Idea		06 Marks	*PPT Presentation and viva voce (CRP or CP)*	06	
PRR-20 End Semester Examination (ESE)				40	14/40
Total				**100**	**35/100**

9.6 Continuous Internal Evaluation (CIE) for Mini Project with Seminar:

(i) The *Post Graduate Mini Project Evaluation Committee (PGMPEC)* shall be constituted with HoD as a Chairman, Project Coordinator as a Convener and three to five other faculty members representing various specializations in that particular programme as members.

(ii) Student has to take up independent mini project on innovative ideas, innovative solutions to common problems using their knowledge relevant to courses offered in their program of study, which would supplement and complement the program assigned to each student.

(iii) *PGMPEC* shall allot a faculty supervisor to each student for guiding on

(a) selection of topic

(b) literature survey and work to be carried out

(c) preparing a report in proper format and

(d) effective mini project oral presentation before the PGMPEC

(e) Use of anti-plagiarism software to detect plagiarism in the report andsubmission of Mini project report within acceptable plagiarism levels

(f) Effective mini project oral presentation before the PGMPEC

(iv) There shall be only Continuous Internal Evaluation (CIE) for Mini Project withSeminar

(v) The CIE for mini project with seminar is as follows:

Assessment	Weightage
Mini project Supervisor Assessment	**20%**
PGMPEC Assessment: ***(i)*** *Registration presentation* ***(10%)*** ***(ii)*** *Working model / process / software package / system developed/Hypothesis/Methodology/Recommendations based on the conclusions/limitations of the study* ***(20%)*** ***(iii)*** *Mini project report* ***(20%)*** ***(iv)*** *Mini project paper* ***(10%)*** ***(v)*** *Mini project video pitch* ***(10%)*** ***(vi)*** *Final presentation (with PPT) and viva voce* ***(10%)***	**80 %**
Total Weightage:	**100%**

Note: It is mandatory for the student to

(i) appear for final presentation (with PPT) and viva-voce to qualify for courseevaluation

(ii) write mini project paper in given journal format

(iii) create a good video pitch to present mini project

	Mini Project Topic: The topic should be interesting and conducive to discussion. Topics may be found by looking through recent issues of peer reviewed Journals/Technical Magazines on the topics of potential interest (a) Based on the study done, each student is expected to disclose methodology used and indicate a set of recommendations which should follow from the conclusions inferred. If possible quantify the benefits that can be gained from following recommendations. Limitations of the study can be highlighted *(b)* **Report:** Each student is required to submit a well-documented report on the chosen mini project topic as per the format specified by *PGMPEC* (c) **Anti-Plagiarism Check:** The mini project report should clear plagiarism check as per the Anti-Plagiarism policy of the institute (d) **Presentation:** Each student should prepare PPT with informative slides and makean effective oral presentation before the *PGMPEC* as per the schedule notified by the department (e) **Video Pitch:** Each student should create a pitch video, which is a video presentation on his / her mini project. Video pitch should be no longer than 5 minutes by keeping the pitch concise and to the point, which shall also include key points about his / her business idea / plan (*if any*) and social impact (vi) The student has to register for the Mini project as supplementary examination in thefollowing cases: (a) he/she is absent for oral presentation and viva-voce (b) he/she fails to submit the report in prescribed format (c) he/she fails to fulfill the requirements of Mini project evaluation as per specified guidelines (vii) (a) The CoE shall send a list of students registered for supplementary to the HoD concerned (b) The *PGMPEC*, duly constituted by the HoD, shall conduct Mini project evaluation and send the award list to the CoE within the stipulated time
9.7	**Evaluation for Project Work:** Project Work shall be normally conducted in two stages: Project Work *Phase-I* in third semester and Project Work *Phase-II* in fourth semester. **Project Work Phase-I:** (i) The Department *Post Graduate Review Committee (DPGRC)* shall be constituted with HoD as a Chairman, Project Coordinator as a Convener and three to five other faculty members representing various specializations in that particular programme as members. (ii) (a) Student has to take up independent Project Work Phase-I on innovative ideas, innovative solutions to common problems using their knowledge relevant to coursesoffered in their program of study, which would supplement and complement the program assigned to each student (or) (b) Student shall take up industrial project (in any industry) relevant to the courses offered in their programme of study, which would supplement and complement the program assigned to each student (iii) DPGRC shall allot a faculty guide to each student for guiding on (a) selection of topic (b) literature survey and 50% work to be carried out (c) preparing a report in proper format and (d) effective Project Work Phase-I oral presentation before the DPGRC (e) right conduct of research and academic activity to promote academic integrity (f) use of anti-plagiarism software to detect plagiarism in the report and submission ofMini project report within acceptable plagiarism levels (iv) In case of students with industrial projects, internal guide shall be there to track the progress from time to time (v) There shall be only Continuous Internal Evaluation (CIE) for Project Work Phase-I

(vi) CIE for the Project Work Phase-I in third semester is as follows:

Assessment	Weightage
Project Work Phase-I Supervisor Assessment	50%
DPGRC Assessment: ***(i)*** *Registration Presentation* ***(10%)*** ***(ii)*** *Progress Report on Phase-I* ***(10%)*** ***(iii)*** *Video pitch on Phase-I* ***(10%)*** ***(iv)*** *Progress Presentation -I and viva voce* ***(20%)***	50%
Total Weightage:	100%

Note: It is mandatory for the student to

(i) appear for progress presentation-I and viva voce to qualify for course evaluation

(ii) create a good video pitch on Project Work phase-I

(a) **Project Work Topic:** The topic should be interesting and conducive to discussion. Topicsmay be found by looking through recent issues of peer reviewed Journals/Technical Magazines on the topics of potential interest

(b) Based on the study done, each student is expected to disclose methodology used and indicate a set of recommendations which should follow from the conclusions inferred. If possible quantify the benefits that can be gained from following recommendations. Limitations of the study can be highlighted.

(c) **Progress Report:** Each student is required to submit a well-documented progress report on Project Work phase-I as per format specified by DPGRC

(vii) The student has to register for the Project Work Phase-I as supplementary examination in the following cases:

(a) he/she is absent for oral presentation and viva-voce

(b) he/she fails to submit the report in prescribed format

(c) he/she fails to fulfill the requirements of Project Work Phase-I evaluation as per specified guidelines

(viii) (a) The CoE shall send a list of students registered for supplementary to the HoD concerned

(b) The DPGRC, duly constituted by the HoD, shall conduct Project Work Phase-I evaluation and send the award list to the CoE within the stipulated time

Project Work Phase-II:

(i) Student has to continue the Project Work in 4th semester as Project Work Phase-II

(ii) There shall be Continuous Internal Evaluation (CIE) for 60 marks and End Semester Examination for 40 marks.

(iii) The evaluation for Project Work Phase-II is as follows:

Assessment	Weightage
Project Work Supervisor Assessment (10%) *DPGRC* Assessment: *(i) Progress presentation -II (10%)* *(ii) Progress presentation -III (10%)* *(iii) Working model/process/software package/system developed//Hypothesis/Methodology/Recommendations based on theconclusions/limitations of the study (10%)* *(iv) Project Work Video pitch (10%)* *(v) Project Work Paper (10%)*	60%
End Semester Examination: *(i) Project Work Report (20%)* *(ii) Oral presentation (with PPT) and viva-voce (20%)*	40%
Total Weightage:	100%

Note: It is mandatory for the student to

(i) appear for oral presentation (with PPT) and viva-voce to qualify for coursevaluation

(ii) write Project Work paper in given journal format

(iii) create a good video pitch on Project Work phase-I & II

(a) Based on the study done, each student is expected to disclose methodology used and indicate a set of recommendations which should follow from the conclusions inferred. If possible quantify the benefits that can be gained from following recommendations. Limitations of the study can be highlighted.

(b) **Project Work Report:** Each student is required to submit a well-documented Project Work report as per the format specified by DPGRC

(c) **Anti-Plagiarism Check:** The Project Work report should clear plagiarism check as per the Anti-Plagiarism policy of the institute

(d) **Presentation:** Each student should prepare PPT with informative slides and make an effective oral presentation before the DPGRC as per the schedule notified by the department

(e) **Video Pitch:** Each student should create a pitch video, which is a video presentation on his / her Project Work Phase-I & II. Video pitch should be no longer than 5 minutes by keeping the pitch concise and to the point, which shall also include key points about his / her business idea / plan (if any) and social impact

	(iv) Project Work Synopsis (PWS): (a) Students, with the consent of supervisor, shall apply to the DPGRC for conduct of Project Work synopsis presentation (PWS). This shall normally happen when the supervisor feels that the student has done significant work to qualify for M.Tech. Project Presentation. (b) Those students who clear PWS shall only be allowed to submit the Project Work report for end semester examination **(v) Project Work Report:** After clearing PWS, student shall be required to submit two bound copies of Project Work report, one for the department and other for the Project Work Supervisor. The Project Work report shall be evaluated by the DPGRC and external examination shall be conducted on a pre-notified date.
9.8	**Evaluation of MOOCs:** *a)* **SWAYAM-MOOCs:** Massive Open Online Courses (MOOCs) are such online courseswhich are developed as per the pedagogy and made available on the SWAYAM (Study Web of Active-learning by Young and Aspiring Minds) platform of *Government of India* b) **SWAYAM** shall notify to all Institutions, on 1st June, 1st November every year, the list of online learning courses going to be offered in the forth coming semester. c) The student shall be allowed to register for MOOCs courses for the designated Professional electives and Open electives mentioned in the curriculum. d) The student shall select a relevant MOOCs course carrying 3 credits. e) The Institutional MOOCs coordinator with the help of departmental MOOCs coordinator shall guide the students throughout the course.
	9.8.1 **Evaluation and Certification of MOOCs**: a) The Principal Investigator (PI) shall be a subject matter expert (SME) belonging to a reputed educational institution, called Host Institution b) The host Institution and PI shall be responsible for evaluating the registered students for MOOCs course c) After conduct of examination and completion of the evaluation, the PI through host institution shall award Marks/Grade as per the evaluation scheme announced.
	9.8.2 **Credit Mobility of MOOCs**: a) Institution shall allow the credit mobility for the courses earned through MOOCs. b) A certificate regarding successful completion of the MOOCs courses shall beissued through host Institution and sent to the parent institution. c) The parent institution shall give equivalent credit weightage to the students forthe credits earned through online learning courses through SWAYAM platform in the credit plan of the programme.

9.8.3 In case the student is unable to complete the MOOCs course, he/she shall be allowed to select one of courses listed under respective PE/OE offered at institute/department concerned and appear for supplementary examination. In such case, the student is deemed to have passed the course, if he/she scoresminimum 35% of maximum marks allotted to the course in the registered supplementary ESE only (i.e. 35 marks out of 60 in ESE).

10. MINIMUM REQUIREMENT FOR PASSING A COURSE

10.1 **Theory Course**: A student is deemed to have passed in a theory course, if he / she secures

a) 35 percent of marks assigned to End Semester Examination (ESE) and
b) 35 percent of marks assigned to the Mid Semester Examination End Semester Examination (ESE) of the course taken together and
c) 35 percent of marks assigned to Teacher"s Assessment (TA), Mid Semester Examination (MSE) and End Semester Examination (ESE) of the course taken together.

10.2 The marks assigned to MSE will be considered as per the Regulation no. 9.4.5.

10.3 **Laboratory Course**: A student is deemed to have passed in a laboratory course, if he / she secures

a) 35 percent of marks assigned to End Semester Examination (ESE) and
b) 35 percent of marks assigned to the Teachers Assessment (TA) and End Semester Examination (ESE) of the laboratory course taken together.

11. GRADING SYSTEM

11.1 At the end of the semester a student is awarded a letter grade in each of his / her coursestaking into account the total marks secured (X) in that course

where, X = Marks secured in CIE + Marks secured in ESE

11.2 For arriving at a grade obtained by a student in a particular course (subject), initially numeric marks obtained by the student out of 100 are to be determined. Once a numeric mark is obtained, the same is to be converted to a letter gradefollowing the guidelines given in 11.3 below.

11.3 The Institute shall follow absolute grading system. The grades will be awarded to each course as under:

Grade	Total Marks Secured (X)
S	$X \geq 90$
A	$80 \leq X < 90$
B	$70 \leq X < 80$
C	$60 \leq X < 70$
D	$35 \leq X < 60$
P	$35 \leq X < 35$
F	$X < 35$

11.4 The typical grades and their numerical equivalents on 10-point scale (called Grade Points) are as follows:

Performance	Letter Grade	Grade Points (Gi)
Superior	S	10
Excellent	A	9
Very Good	B	8
Good	C	7
Average	D	6
Pass	P	3
Fail	F	0

11.5 **F-Grade** is a Fail Grade. The course in which the student has earned F-Grade will be termed as backlog course.

11.6 In addition, there shall be a transitional **M-Grade.** M-Grade for "Debarred" due to indiscipline / malpractice during examination.

11.7 A Semester Grade Point Average (SGPA) will be computed for each semester. The SGPA will be calculated as follows:

$$SGPA = \sum_{i=1}^{n} C_i G_i \quad \sum_{i=1}^{n} C_i$$

where „n" is the no. of courses (subjects) offered (excluding mandatory non-credit courses) for the semester „C_i" is the credits alloted to a particular course, „Gi" is the grade-points carried by the letter corresponding to the grade awarded to the student for the course as illustrated in 11.3.

11.8 The SGPA would indicate the performance of the student in the semester to which it refers. SGPA will be rounded off to the second place of decimal and recorded as such.

11.9 Starting from the second semester, at the end of each semester, a Cumulative Grade Point Average (CGPA) will be computed for every student as follows:

$$CGPA = \sum_{i=1}^{m} C_i G_i \quad \sum_{i=1}^{m} C_i$$

where „m" is the total number of courses (subjects) the student has been offered from the first semester onwards upto and including the present semester, „C_i and „G_i" are as explained in 11.7.

11.10 The CGPA would indicate the cumulative performance of the student from the first semester up to the end of the semester to which it refers. CGPA will be rounded off to the second place of decimal and recorded as such.

11.11 SGPA and CGPA are calculated in consideration of only credits cleared, i.e. F-Grade creditsare not included for calculation.

12. SUPPLEMENTARY EXAMINATIONS

12.1 A student who obtained the F-Grade in a course (theory or practical) can appear in a subsequent End Semester Examination (ESE) in the same course as supplementary candidate.

12.2 However the marks secured in Continuous Internal Evaluation (CIE) by the student in thatcourse during the semester study shall remain unaltered.

12.3 The students those who have passed in the supplementary examination will be awardedgrade with „*" marked on the courses passed in the supplementary.

12.4 **Advance Supplementary Examination:** Advance Supplementary Examination shall be conducted for the students having backlog courses in IV semester of MBA programme, immediately after publishing results of MBA IV semester regular examinations.

13. REVALUATION

13.1 Revaluation is allowed for only theory courses.

13.2 If the award of the revaluator varies from the original award by less than 20% of maximum marks prescribed for the course, best of the two awards thus available shall be taken as final.

13.3 If the award of the revaluator varies from the original award by more than 20% of the maximum marks prescribed for the course, the answer script will be examined by the second revaluator. If the award of the both revaluators is more than 20% of the maximum marks, then average of the two awards thus available shall be taken as final. Otherwise, best of the original award and the second revaluator award shall be taken as final.

14. CONDITIONS FOR PROMOTION

14.1 A student shall have to satisfy the attendance requirements for the semester (as per the Regulation No. 8) for promotion to the next higher semester.

15. IMPROVEMENT EXAMINATION

15.1 Students who wish to improve their SGPA / CGPA are permitted for SGPA / CGPA improvement only for theory courses. The student may opt to re-appear all the courses of a

semester at the immediately succeeding End Semester Examination (ESE) for improving his / her grades. However, the students should clear all the courses of a particular semester in which he / she intends to take an improvement examination.

15.2 Further, when once the student appears for the improvement examination he / she shall forego the grades secured in the earlier End Semester Examination (ESE) in the whole set of courses prescribed for that semester. However, the marks secured in Continuous Internal Evaluation (CIE) by the student in those courses during the semester study shall remain unaltered.

15.3 Students those who have re-appeared for improvement will be awarded grade with „$" marked on the courses appeared for improvement examination. „$" will state the grade improvement. Such improved grades will not be counted for the award of Prizes, Medalsand Rank.

15.4 However, the students who register for improvement examinations and wish to drop from appearing the examinations, by written application to the CoE, before commencement of examinations, shall be permitted to retain their earlier grades.

16. GRADUATION REQUIREMENT

16.1 A student shall be declared to be eligible for award of the MBA degree, if he / she has registered and completed all the courses with a minimum P-grade scored in every courseand secured a total of stipulated 103 credits.

16.2 Normally a student should complete all the requirements consecutively in 4 semesters (2 academic years) for the award of MBA degree. However, the students who fail to fulfill allthe requirements for the award of MBA degree within a period of 4 consecutive semesters (2 academic years from the registration in 1st semester) shall forfeit his / her enrolment to the program.

16.3 a) **CGPA to Percentage conversion**: As per UGC and AICTE guidelines, the CGPA will beconverted to percentage of marks as below:

Percentage of marks = (CGPA – 0.75) x 10

Ex: If CGPA is 6.75, the equivalent Percentage of marks = (6.75-0.75) x 10 = 60%

b) CGPA to Class conversion:

S. No.	Division	Eligibility Criteria
1	First Division with Distinction	a) Student should secure CGPA≥7.75 b) Student should pass all the courses along with the batch ofstudents admitted with him / her within 3 consecutive semesters c) Student who appeared for improvement examination upto 3rdsemester will also be considered d) Student who have cleared any course in supplementary examination shall not be awarded Distinction
2	First Division	a) Student should secure CGPA, which is 6.75 ≤ CGPA < 7.75 withinthe time frame of the programme i.e. 8 semesters b) Student who have cleared any course in supplementary examination and secured CGPA>6.75
3	Second Division	Student should secure CGPA, which is 5.75 ≤ CGPA < 6.75 within the time frame of the programme i.e. 8semesters
3.	Pass Division	Student should secure CGPA, which is 3.25 ≤ CGPA < 5.75 within the time frame of the programme i.e. 8 semesters
5.	Fail	Student with CGPA < 3.25 will not be eligible for award of degree

16.4 The University will award degrees to the students who are evaluated and recommendedby the Institute.

17. MALPRACTICE IN EXAMINATION

17.1 Malpractice in examination is an illegal activity and is prohibited.

17.2 Mobile phones are strictly prohibited in the examination hall.

17.3 Exchange of question paper and material like pen, pencil, sharpener, eraser, scale, calculator,etc., during examination is strictly prohibited.

17.4 Malpractice in examination is viewed very seriously. Malpractice includes oral communication between candidates, possessing forbidden material, mobile phones (switched off/on) etc.

17.5 **Any malpractice or engaging in any improper conduct and violation of the examination code bystudent during examinations is liable for the punishment as given below**

No	Nature of Malpractice	No	Punishment
1.	Taking help from others, consulting and or helping other examinees during the examination period inside the examination hall or outside it, with or without their consent or helping other candidates to receive help from anyone else	a)	Cancelling the examination of thepaper in which he / she indulgedin malpractices
2	If the examinee attempts to disclose his / her identity to the valuer by writing his / her Hall-Ticket Number at a place other than the place prescribed for it or any coded message including his / her name or addressing the valuer in any manner in the answer book		Cancelling the examination of thepaper in which he / she indulgedin malpractices
3.	Candidate is found in possession of forbidden material; relevant or not relevant but not used	b)	Cancellation of the result of (i) all examinations taken including current examination in that session (or) (ii) current examination and proposed examinations to be taken during that session (or) current examination
3.	Destroying the material found in his / her possession or acting in any other manner with a view to destroying evidence	c)	Cancellation of the result of all examinations taken or proposed to be taken during that session and prohibition his/ her admission to or continuation in any course of the Institute for a period of one year. The student will be eligible to appear for the next corresponding semester/year examination in the succeeding academic year
4..	Smuggling main answer book / additional answer book / question paper / matter in to or out of the examination hall & Conspiring to interchange Hall Ticket Number		-do-
5..	Candidate is found in possession offorbidden material, relevant or not relevant but used		-do-
6..	In case of (i) impersonation, (ii)misbehavior with the invigilators/any person related to examination work, (iii) insertion of written sheets in different hand writing in the main/additional answer book, and (iv) creation of disturbance in and around the examination hall during or before the examination	d)	Cancellation of the result of all examinations taken or proposed to be taken during that session and prohibiting his/her admission in to or continuation in any course of the Institute for a period of two years. Further, the candidate shall not be allowed to appear for any examination during the period of punishment
7..	If a candidate is found guilty of malpractice in the improvement examination (after completion of course)	e)	Punishment will be awarded subject to the above rules and further, he/she will not be permitted to appear for further improvement examination

18. ROLL NUMBER ALLOTMENT

The Roll Number given to the student shall have a total 8 digits as follows:

Ex:M20MB005

a) The first letter, to represent Masters degree programme.
Ex: M. for Masters Programme

b) The next two numerical, to represent the year in which the student admitted into I semester.
Ex: 20 for 2020

c) The next two letters, to represent the concerned department to which the student belongs.
Ex: MB for Master of Business Administration

d) The last three numerical, to represent the three digit roll number of the student.

In general, a **student with roll number "M20MB005"** represents a **Student of Master of Business Administration admitted in the year 2020 bearing a roll number of 005.**

19. AMENDMENTS

Notwithstanding anything contained in this manual, the Academic Council of the Institute reservesthe right to modify / amend the curricula, requirements and rules & regulations pertaining to its undergraduate programmes, without any further notice.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE:: WARANGAL – 15

PRR20

(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTION & EVALUATION OF M.Tech. (SOFTWARE ENGINEERING)

I-SEMESTER OF 2-YEAR M.TECH DEGREE PROGRAMME

[4 Th+2 P+1 MC+1 AC]

S. No.	Course Category	Course Code	Course Title	Hours per Week			Credits	Evaluation Scheme								
								CIE							ESE	Total Marks
								I²RE - TA				Minor	MSE	Total		
				L	T	P		ATLP	CRP	CP	PPT					
1	PC	P20SE101	**Professional Core-1:** Service Oriented Architecture	3	-	-	3	8	8	8	6	10	20	60	40	100
2	PC	P20SE102	**Professional Core-2:** Advanced Data Structures & Algorithms	3	-	-	3	8	8	8	6	10	20	60	40	100
3	PE	P20SE103	**Professional Elective-I/ MOOC-I**	3	-	-	3	8	8	8	6	10	20	60	40	100
4	PE	P20SE104	**Professional Elective-II/ MOOC-II**	3	-	-	3	8	8	8	6	10	20	60	40	100
5	PC	P20SE105	**Core Lab-I:** CASE Tools Laboratory	-	-	4	2	-	-	-	-	-	-	60	40	100
6	PC	P20SE106	**Core Lab-II:** Advanced Algorithms throughPython Laboratory	-	-	4	2	-	-	-	-	-	-	60	40	100
7	MC	P20MC107	Research Methodology & IPR	2	-	-	2	8	8	8	6	10	20	60	40	100
8	AC	P20AC108	Audit Course 1	2	-	-	1	8	8	8	6	10	20	60	40	100
			Total	**16**	-	**8**	**19**	**48**	**48**	**48**	**36**	**60**	**120**	**480**	**320**	**800**

[L= [Lecture, T = Tutorials, P = Practicals, C = Credits, ATLP = Assignments, CRP = Course Research Paper, CP = Course Patent, PPT = Course Presentation, Minor=Minor Examination, MSE=Mid Semester Examination and ESE=End Semester Examination]

Professional Elective 1	Professional Elective 2	Audit Course 1
P20SE103A: Software Quality Assurance & Testing	P20SE104A: Secure Software Engineering	P20AC108A: English for Research Paper Writing
P20SE103B: Object Oriented Software Engineering	P20SE104B: Cyber Security and Forensic Laws	P20AC108B: Sanskrit for Technical Knowledge
P20SE103C: Software Architecture and Design patterns	P20SE104C: Cloud Computing	P20AC108C: Constitution of India
P20SE104D: MOOCs	P20SE104D: MOOCs	P20AC108D: Pedagogy Studies

Total Contact Periods/Week: 24 **Total Credits: 19**

P20SE101 : SERVICE ORIENTED ARCHITECTURE

Class: M.Tech. I-Semester

Specialization: Software Engineering

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: fundamentals of service-oriented architecture, and service-oriented architecture project and life cycle phases

LO2: service models and layers, analysis and modeling with web services and microservices

LO3: analysis and modeling with representational state transfer services and micro services, web service guidelines for service application programming interface and contract design

LO4: design guidelines of representational state transfer and micro services for service application programming interface and contract, and fundamentals of versioning

UNIT - I (9)

Understanding Service-Orientation: Introduction to service-orientation, Problems solved by service-orientation, Effects of service-orientation on the enterprise, Goals and benefits of service-oriented computing, Four pillars of service-orientation

Understanding Service-Oriented Architecture: The four characteristics of service-oriented architecture, The four common types of service-oriented architecture, The end result of service-orientation and service-oriented architecture, service-oriented architecture project and lifecycle stages

UNIT - II (9)

Understanding Layers with Services and Microservices: Introduction to service layers, Breaking down the business problem, Building up the service-oriented solution

Analysis and Modeling with Web Services and Microservices: Web service modeling process

UNIT - III (9)

Analysis and Modeling with Representational State Transfer Services and Microservices: Representational state transfer service modeling process, Additional considerations

Service Application Programming Interface and Contract Design with Web Services: Service model design considerations, Web service design guidelines

UNIT - IV (9)

Service Application Programming Interface and Contract Design with Representational State Transfer Services and Microservices: Service model design considerations, Representational state transfer service design guidelines

Service Application Programming Interface and Contract Versioning with Web Services and Representational State Transfer Services: Versioning basics, Versioning and compatibility, Representational state transfer service compatibility considerations, Version identifiers, Versioning strategies, Representational state transfer service versioning considerations

Text Book:

[1] Thomas Erl, *Service-Oriented Architecture: Analysis and Design for Services and Microservices*, 2nd ed. New Jersey: Prentice Hall, 2016.

Reference Books:

[1] Shankar Kambhampaty, *Service-Oriented Architecture & Microservices Architecture: for Enterprise, Cloud, Big Data and Mobile*, 3rd ed. New Delhi: Wiley, 2018.

[2] Guido Schmutz, Peter Welkenbach, Daniel Liebhart, *Service-Oriented Architecture: An Integration Blueprint*, Mumbai: Packt Publishing Limited, 2010.

[3] Jeffrey Hasan, Mauricio Duran, *Expert Service-Oriented Architecture in C#*, 2nd ed. New York: Apress, 2006.

[4] Douglas K.Barry, David Dick, *Web Services, Service-Oriented Architectures, and Cloud Computing*, 2nd ed. Massachusetts: Morgan Kaufmann, 2013.

Course Learning Outcomes (COs):
On completion of this course, students will be able to...

CO1: *identify the services and their interdependencies in a case study application*
CO2: *analyze and model a business application using web services and micro services*
CO3: design a service application programming interface and service contract using web services
CO4: design a service application programming interface and a service contract with microservices

Course Articulation Matrix (CAM): *P20SE101: Service Oriented Architecture*

CO		PO1	PO2	PO3	PSO1	PSO2
CO1	*P20SE101.1*	2	1	2	2	2
CO2	*P20SE101.2*	2	1	2	2	2
CO3	*P20SE101.3*	2	1	2	2	2
CO4	*P20SE101.4*	2	1	2	2	2
P20SE101		2	1	2	2	2

M20SE102 ADVANCED DATA STRUCTURES & ALGORITHMS

Class: M.Tech. I-Semester

Specialization: Software Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	60 Marks
End Semester Exam	40 Marks

Course Learning Objectives (Los):

This course will develop students' knowledge in/on...

LO1: time and space complexity, asymptotic notations, Binary Search Tree, AVL Trees and red black trees.

LO2: multi way search trees, dynamic programming and greedy methods to solve computational problems

LO3: graph algorithms and flow networks

LO4: number-theoretic and string matching algorithm

UNIT-I (9)

Algorithms: Definition, Properties, Performance analysis - time complexity and space complexity, Asymptotic notations

Data Structures: Definition, Linear and non linear data structures

Binary Search Tree: Binary search tree operations- Insertion, Deletion, Search, Recursive and non-recursive traversals; Threaded binary trees, AVL trees operations – Insertion, Deletion and Traversal; Red-Black Trees properties and operations

UNIT-II (9)

Multi way Search Trees: Introduction to m-way search trees, Operations on B-trees-Insertion, Deletion, Search; Introduction to B+-trees

Dynamic Programming: Matrix-chain multiplication and optimal binary search trees

Greedy Algorithms: Elements of the greedy strategy and huffman codes

UNIT-III (9)

Graph Algorithms: Bellman - Ford algorithm Single source shortest paths in a DAG Dijkstra's algorithm, Johnson's algorithm for sparse graphs, Flow networks and Ford-Fulkerson method, maximum bipartite matching

UNIT-IV (9)

Number-Theoretic Algorithms: Elementary notions, Greatest common division Modular Arithmetic, Solving modular linear equations, The Chinese remainder theorem, Powers of an element, RSA cryptosystem, Primality testing, Integer factorization

String Matching: Naive string-matching algorithm, Rabin-Karp algorithm and Knuth-Morris-Pratt algorithm

Text Books:

[1] Debasis Samantha, *Classic Data Structures*, 2nd ed., New Delhi: PHI Learning Pvt. Ltd., 2009.

[2] Thomas H.Cormen, Charles E.Leiserson, Ronald L.Rivest, Cliford Stein, *Introduction to Algorithms*, 3rd ed., New Delhi: Prentice-Hall of India, 2010.

Reference Books:

[1] E.Horowitz, S.Sahni, S.Rajasekaran, *Fundamentals of Computer Algorithms,* 2nd ed., Hyderabad: Universities Press, 2018

[2] Mark Allen Weiss, *Data Structures and Algorithm Analysis in C++,* 4th ed., *New Delhi* : Pearson Education Inc, 2014.

[3] Rajiv Chopra , Shipra Raheja, *Design and Analysis of Algorithms*, 1st ed., New Delhi: New Age International Publishers, 2019

[4] S.Sridhar, *Design and Analysis of Algorithms*,3rd ed., Oxford University Press, UK: 2015

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1 : analyze the data with non linear data structure using binary search trees and AVL trees.

CO2: analyze balanced search trees such as B-trees, B+-trees

CO3: evaluate graph algorithms using dynamic programming and greedy method

CO4: develop the applications using number -theoretic and string matching algorithms

Course Articulation Matrix (CAM): P20SE102 ADVANCED ALGORITHMS						
CO		PO1	PO2	PO3	PSO1	PSO2
CO1	*P20SE102.1*	2	1	2	1	2
CO2	*P20SE102.2*	2	1	2	2	2
CO3	*P20SE102.3*	2	1	2	2	2
CO4	*P20SE102.4*	2	1	2	2	2
P20SE102		2	1	2	1.75	2

P20SE103A : SOFTWARE QUALITY ASSURANCE AND TESTING

Class: M.Tech. I-Semester **Specialization:** Software Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on…

LO1: software quality, quality assurance process and quality engineering

LO2: software testing, realities of software, examining the specifications & code, testing the software with blinders on

LO3: testing the software with Dynamic White-Box, Configuration, Compatibility & Usability

LO4: manage the testing documentation and its measuring success and bug bashes, writing and tracking test cases

UNIT – I (9)

Software Quality: Perspective and expectations, Historical perspective of quality, Quality frameworks, Quality assurance as dealing with defects, Defect prevention detection and containment strategies

Quality Assurance Process and Quality Engineering: QA activities in software processes, Verification and validation perspectives, Reconciling the two views quality engineering, Activities and process quality planning, Goal setting and strategy formation quality assessment and improvement quality engineering in software processes

UNIT – II (9)

Software Testing Background: Infamous software case studies, Bug, Why do bugs occur, The cost of bugs, Software testing functionalities, Good software tester characteristics.

The Realities of Software Testing: Testing axioms, Software testing terms and definitions, Precision and accuracy, Testing and quality assurance

Examining the Specification: Black-box and white-box testing, Static and dynamic testing, Performing a high level review of the specification, Low level specification test techniques

Testing the Software with Blinders On: Dynamic black-box testing, Test-to-pass and test-to-fail, Equivalence partitioning data testing, State testing, Other black-box test techniques

Examining the Code: Static white-box testing, Examining the design code, Formal reviews, Peer reviews, Walk through, Inspectors, Coding standards and guidelines, Examples of programming standards and guidelines, Obtaining standards, Generic code review checklist

UNIT – III (9)

Testing the Software with Dynamic White-Box Testing: Dynamic white-box testing, Dynamic white-box testing vs. debugging, Testing the pieces, Data coverage, Code coverage

Configuration Testing: An overview of configuration testing, Approaching the task, Obtaining the hardware, Identifying hardware standards, Configuration testing other hardware

Compatibility Testing: Compatibility testing overview, Platform and application versions, Standards and guidelines data sharing compatibility

Usability Testing: User interface testing, User interface testing, Guidelines, Intuitive consistent, Flexible, Comfortable, Correct, Useful, Accessibility testing, Accessibility features in software

UNIT – IV (9)

Testing the Documentation: Types of software documentation, The importance of documentation testing, Reviewing documentation, The realities of documentation testing

Web Site Testing: Black-box testing, Gray-box testing, White-box testing, Configuration and compatibility testing, Usability testing, Introducing automation

Automated Testing and Test Tools: The benefits of automation and tools, Test tools, software test automation, Random testing

Bug Bashes and Beta Testing: Having other people test your software, Test sharing, Beta testing, Outsourcing your testing

Planning Your Test Effort: The goal of test planning, Test planning topics

Writing and Tracking Test Cases: The goals of test case planning, Test case planning overview, Test case organization and tracking

Reporting Testing: Bugs fixation, Isolating and reproducing bugs, A bug's life cycle and bug tracking systems

Measuring Your Success: Metrics for testing, Common project-level metrics

Text Books:

[1] Jeff Tian, *Software Quality Engineering: Testing, Quality Assurance, and Quantifiable Improvement*, 1st. ed., John Wiley and Sons, Inc., and IEEE Computer Society Press, 2005.

[2] Ron Patton, *Software Testing*, 2nd ed., SAMS Publications, 2006.

Reference Books:

[1] Edwar.Dkit, *Software testing in the Real World*, 3rd ed., Pearson Education, 2003.

[2] M.G.Limaye, *Software Testing: Principles Techniques and Tools*, 1st. ed., Tata McGraw-Hill Education Pvt. Ltd, 2009.

[3] Cem Kaner, Jack Falk, Hung Quoc Nguyen, *Testing Computer Software*, 1st. ed.,International Thomson Computer Press, 1993.

[4] Anirban Basu , Software Quality Assurance, Testing and Metrics, 1st ed. PHI Learning,2015.

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1: understand scope of software quality and quality assurance process in quality engineering

CO2: apply realities of testing, examining the specifications & code, testing the software with Blinders On.

CO3: apply software testing with Dynamic White-Box, Configuration, Compatibility & Usability

CO4: evaluate the testing documentation, measuring success rates, writing and tracking test cases.

Course Articulation Matrix(CAM): P20SE103A SOFTWARE QUALITY ASSURANCE AND TESTING

CO		PO1	PO2	PO3	PSO1	PSO2
CO1	*P20SE103A.1*	1	1	2	1	2
CO2	*P20SE103A.2*	2	1	2	1	2
CO3	*P20SE103A.3*	2	1	2	1	2
CO4	*P20SE103A.4*	2	1	2	2	2
P20SEA103A		**1.75**	**1**	**2**	**1.25**	**2**

P20SE103B OBJECT ORIENTED SOFTWARE ENGINEERING

Class: M.Tech. I-**Semester** **Specialization:** Software Engineering

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	60 marks
End Semester Exam	40 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on...

LO1: fundamentals of software engineering and Unified Modeling Language
LO2: requirements elicitation and analysis
LO3: system design concepts and activities
LO4: mapping model to code and test the system

UNIT – I (9)

Introduction to Software Engineering: Software engineering failures, Software engineering concepts, Software engineering development activities, Managing software development

Modeling with Unified Modeling Languages: Modeling concepts, A deeper view into UML

Project Organization and Communication: A rocket example, Project organization concepts, Project communication concepts, Organizational activities

UNIT – II (9)

Requirements Elicitation: Usability examples, Requirements elicitation concepts, Requirements elicitation activities, Managing requirements elicitation

Analysis: An optical illusion, Analysis concepts, Analysis activities - from use cases to objects, Managing analysis

UNIT – III (9)

System Design - Decomposing the System: A floor plan example, System design concepts, System design activities - from objects to subsystems

System Design - Addressing design goals: A redundancy example, UML deployment diagrams, Managing system design

UNIT – IV (9)

Object Design - Reusing Pattern Solutions: Bloopers, Reuse concepts - Solution objects, Inheritance and design patterns; Reuse activities - Selecting design patterns and components, Managing reuse

Object Design - Specifying Interfaces: A railroad example, Interface specification concepts, Interface specification activities, Managing object design

Mapping Models to Code: A book example, Mapping concepts, Mapping activities, Managing implementation

Testing: Testing the space shuttle, Testing concepts, Testing activities, Managing testing

Text Book:

[1]. Bernd Bruegge, Allen H.Dutoit, *Object Oriented Software Engineering Using UML, Patterns and Java*, 3rd ed., United States of America: Pearson Education, 2010.

Reference Books:

[1]. Timothy C.Lethbridge, Robert Laganiere, *Object Oriented Software Engineering Practical Software Development using UML & Java*, 1st. ed.,New York: TMH, 2004.

[2]. Stephen R Schach, *Object Oriented & Classical Software Engineering*, 5th ed. New York: TMH, 2002.

[3]. Grady Booch, James Rambaugh, Ivar Jacobson, *The Unified Modeling Language user guide*, 1st. ed., India: Pearson education, 2005.

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1: illustrate the importance of software engineering
CO2: develop the software requirements specification document
CO3: design the workflow of the object oriented software system
CO4: build the system using selected reusable design patterns

Course Articulation Matrix (CAM): P20SE103B OBJECT ORIENTED SOFTWARE ENGINEERING

CO		*PO1*	*PO2*	*PO3*	*PSO1*	*PSO2*
CO1	**P20SE103B**.1	1	1	1	1	1
CO2	**P20SE103B**.2	1	1	2	1	1
CO3	**P20SE103B**.3	1	1	1	1	2
CO4	**P20SE103B**.4	2	1	2	1	2
P20SE103B		**1.25**	**1**	**1.5**	1	1.5

P20SE103C SOFTWARE ARCHITECTURE AND DESIGN PATTERNS

M.Tech. **Semester**: I

Specialization: Software Engineering

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	60 marks
End Semester Exam	40 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in ...

LO1: fundamentals on software architecture, and quality attributes of software architecture
LO2: design, documentation and evaluation of software architecture
LO3: basics on patterns, and creational and structural patterns
LO4: behavioral patterns and case studies for different patterns

UNIT I (9)

Introduction to Software Architecture: Software architecture, Software architecture importance, Contexts of software architecture

Quality Attributes - Understanding quality attributes, **Availability**, Interoperability, Modifiability, Performance, Security, Testability, Reusability, and Quality attribute modeling and analysis

UNIT II (9)

Architecture in the Life Cycle- Architecture in agile projects, Architecture and requirements, and Designing an architecture: Design strategy, Attribute-driven design Method, Steps of ADD

Documenting software architectures: Notations for architecture, Documentation views, Choosing the views, Combining views, Documenting behavior, Architecture documentation and quality attributes, Documenting architecture in an Agile development project

Architecture Evaluation: Evaluation factors, Architecture tradeoff analysis Method, Lightweight architecture evaluation

UNIT III (9)

Patterns: Pattern description, Organizing catalogs, Role in solving design problems, Selection and usage

Creational and Structural Patterns: Abstract factory, Builder, Factory method, Prototype, Singleton, Adapter, Bridge, Composite, Façade, and Flyweight.

UNIT IV (9)

Behavioral Patterns: Chain of responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template method, Visitor

Case Studies: A-7E – A case study in utilizing architectural structures, The world wide web - a case study in interoperability, Air traffic control – a case study in designing for high availability, Celsius tech – a case study in product line development.

TEXT BOOKS:

1. Len Bass, Paul Clements & Rick Kazman, *Software Architecture in Practice, 3rd ed.*, NewDelhi: Pearson Education, 2015.
2. Erich Gamma, *Design Patterns: Elements of Reusable Object-Oriented Software,* NewDelhi: Pearson Education, 1995.

REFERENCE BOOKS:

1. Luke Hohmann, Addison wesley, "*Beyond Software architecture*", 2003.
2. David M. Dikel, David Kane and James R. Wilson, "*Software architecture*", New Delhi: Prentice Hall, 2001.
3. David Budgen, "*Software Design*", Second edition, New Delhi: Pearson education, 2003
4. Eric Freeman & Elisabeth Freeman," *Head First Design patterns*", New Delhi: O'Reilly, 2007.

Course Learning Outcomes (COs):

After completion of the course, the student will be able to ...

CO1: identify and assess the quality attributes of a system at the architectural level
CO2: design software architecture for large scale software systems
CO3: identify the most suitable design pattern for a given application design problem.
CO4: construct design solutions by using behavioral patterns.

Course Articulation Matrix (CAM): P20SE103C Software Architecture and Design Patterns

CO		PO1	PO2	PO3	PSO1	PSO2
CO1	*P20SE103C.1*	1	1	1	1	1
CO2	*P20SE103C.2*	1	1	2	1	1
CO3	*P20SE103C.3*	1	1	2	2	2
CO4	*P20SE103C.4*	1	1	2	2	2
P20SE103C		1	1	2	2	2

P20SE104A SECURE SOFTWARE ENGINEERING

Class: M.Tech. I-Semester

Specialization: Software Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Exam	40 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on...
LO1: security issues and properties of secure software
LO2: secure software requirement elicitation and architectural design
LO3: testing various security levels of software
LO4: managing secure software systems

UNIT-I (9)

Software Security Issues: Introduction, The problem, Software assurance and software security, Threats to software security, Sources of software insecurity, Benefits of detecting software security

Secure Software Properties: Properties of secure software, Influencing the security properties of software, Asserting and specifying the desired security properties

UNIT-II (9)

Requirements Engineering for Secure Software: Introduction, The SQUARE process model, Requirements elicitation and prioritization

Secure Software Architecture and Design: Introduction, Software security practices for architecture and design, Architectural risk analysis

UNIT-III (9)

Knowledge for Secure Software Design: Security principles, Security guidelines and attack patterns

Secure Coding and Testing: Code analysis, Software security testing, Security testing considerations throughput the SDLC

UNIT –IV (9)

Secure Systems Assembling Challenges: Introduction, Security failures, Functional and attacker perspectives for security analysis, System complexity drivers and security

Managing Secure Software: Governance and security, Adopting an enterprise software security framework, Deciding how much security is enough, Security and project management, Maturity of practices

Text Book:

[1] Julia H. Allen, Nancy R. Mead, Sean J. Barnum, Robert J. Ellison, Gary, *Software Security Engineering: A Guide for Project Managers*, 1st ed., Massachusetts United States:Addison-Wesley Professional Pearson Education, 2008.

Reference Books:

[1] Jason Grembi, "*Developing Secure Software*", 1st ed., New Delhi : Cengage Learning Publishers, 2009.

[2] Richard Sinn, "*Software Security* ", 1st ed., New Delhi : Cengage LearningPublishers, 2008.

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1: identify the issues and properties of secure software.

CO2: analyze the requirement elicitation and architectural design of secured software systems

CO3: evaluate various security levels in design and testing of secure software system

CO4: develop secure software and secure system assembling

Course Articulation Matrix (CAM): P20SE104A: SECURE SOFTWARE ENGINEERING						
CO		PO1	PO2	PO3	PSO1	PSO2
CO1	*P20SE104A.1*	2	1	2	1	2
CO2	*P20SE104A.2*	2	1	2	2	2
CO3	*P20SE104A.3*	2	1	2	2	2
CO4	*P20SE104A.4*	2	1	2	2	2
P20SE104A		2	1	2	1.75	2

P20SE104B : CYBER SECURITYAND FORENSIC LAWS

Class: M.Tech. I-Semester **Specialization**: Software Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives(LOs):
This course will develop students' knowledge in/on...
LO1: cyber crime and planning of cyber offenses in the society
LO2: cyber crimes in mobile and wireless devices
LO3: cyber security and cyber laws to control cybercrime
LO4: computer forensics & IPR issues in organizational implications

UNIT-I (9)

Introduction to Cybercrime: Introduction, Cybercrime and information security, Who are cybercriminals, Classifications of cybercrimes, Cyber crime-The legal perspectives and Indian perspective, Cybercrime and the Indian ITA 2000, A global perspective on cybercrimes

Cyber Offenses: How criminals plan them-Introduction, How criminals plan the attacks, Social engineering, Cyber stalking, Cyber cafe and cybercrimes, Botnets-The fuel for cybercrime, Attack vector, Cloud computing

UNIT-II (9)

Cybercrime: Mobile and Wireless Devices-Introduction, Proliferation of mobile and wireless devices, Trends in mobility, Credit card frauds in mobile and wireless computing era, Security challenges posed by mobile devices, Registry settings for mobile devices, Authentication service security

Attacks on Mobile/Cell Phones, Mobile Devices: Security implications for organizations, Organizational measures for handling mobile devices related security issues, Organizational security policies and measures in mobile computing era, Laptops

UNIT-III (9)

Cybercrimes and Cyber security: the Legal Perspectives-Introduction, Cybercrime and legal landscape around the world

Need of Cyber Laws: The Indian context, The Indian IT act, Challenges to Indian law and cybercrime scenario in India, Digital signatures and the Indian IT act, Amendmentsto the Indian IT act, Cybercrime and punishment, Cyber law, Technology and students Indian scenario

UNIT-IV (9)

Understanding Computer Forensics: Introduction, Historical background of cyber forensics, Digital forensics science, The need for computer forensics, Cyber forensics and digital evidence, Forensics analysis of e-mail, Digital forensics life cycle, Chain of custody concept, Network forensics, Approaching a computer, Forensics investigation, Challenges in computer forensics, Special tools and techniques, Forensics auditing

Cyber security: Organizational Implications-Introduction, Cost of cybercrimes and IPR issues, Web threats for organizations, Security and privacy implications Social media marketing- Security risks and perils for organizations, Social computing and the associated challenges for organizations

Text Book:

[1] Nina Godbole, Sunil Belapure, *Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives*, 1st ed., New Delhi: Wiley India Pvt. Ltd., 2011.

Reference Books:

[1] James Graham, Richard Howard and Ryan Otson, Cyber Security Essentials, 1st ed., New York: CRC Press T & F Group, 2011.

[2] Chwan-Hwa(john) Wu, J. David Irwin, Introduction to Cyber Security, 1st ed., New York: CRC Press T & F Group, 2013.

[3] Thomas A Johnson, Cyber Security Protecting Critical Infrastructures from Cyber Attackand Cyber Warfare, 1st ed., Missouri: CRC Press T & F Group, 2015.

[4] Nilakshi Jain and Ramesh Menon, Cyber Security and Cyber Laws, 1st ed., New Delhi: Wiley India Pvt. Ltd., 2020.

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1: analyze different cybercrimes and plans in committing cyber offenses

CO2: analyze vulnerabilities in mobile and wireless devices

CO3: examine the crime based on the Indian IT Act and cyber law

CO4: analyze the techniques in forensic investigation in organizational implications

Course Articulation Matrix (CAM): *P20SE104B: CYBER SECURITY AND FORENSIC LAWS*

CO		PO1	PO2	PO3	PSO1	PSO2
CO1	*P20SE104B.1*	1	1	1	1	2
CO2	*P20SE104B.2*	2	1	2	2	2
CO3	*P20SE104B.3*	1	1	2	1	2
CO4	*P20SE104B.4*	2	1	1	2	2
P20SE104B		1.5	1	1.5	1.5	2

P20SE104C : CLOUD COMPUTING

Class: M.Tech I-Semester **Specialization:** Software Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Exam	40 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on...
LO1: fundamental on cloud computing models.
LO2: cloud services and solutions
LO3: cloud storage and management
LO4: cloud virtualization, relevance of cloud and SOA

UNIT-I (9)

Introduction: Introduction, Essentials, Benefits, Why cloud, Business and IT perspective, Cloud and virtualization ,Cloud services requirements, Cloud and dynamic infrastructure , Cloud computing characteristics, Cloud adoption,
Cloud Models: Cloud characteristics, Measured service, Cloud models, Security in a public cloud, Public versus private clouds, Cloud infrastructure self service

UNIT-II (9)

Cloud as a Service: Gamut of cloud solutions, Principal technologies, Cloud strategy, Cloud design and implementation using Service oriented architecture,Conceptual cloud model, Cloud service defined
Cloud Solutions: Introduction, Cloud ecosystem, Cloud business process management, Cloud service management, Cloud stack, Computing on demand (CoD), Cloud sourcing

UNIT-III (9)

Cloud Offerings: Information storage, Retrieval, Archive and protection, Cloud analytics, Testing under cloud, Information security, Virtual desktop infrastructure, Storage cloud
Cloud Management: Introduction, Resiliency, Provisioning, Asset management, Cloud governance, High availability and disaster recovery, Charging models, Usage reporting, Billing and metering

UNIT-IV (9)

Cloud Virtualization Technology: Virtualization defined, Virtualization benefits, Server virtualization, Virtualization for x 86 architecture, Hypervisor management software, Logical partitioning (LPAR), VIO server, Virtual infrastructure requirements
Cloud Virtualization: Introduction, Storage virtualization, Storage area networks, Network, Attached storage, Cloud server virtualization, Virtualized data center

Cloud and SOA: Introduction, SOA journey to infrastructure, SOA defined, SOA and IAAS, SOA based cloud infrastructure steps, SOA business and IT services

Text Book:

[1] Kumar Saurabh, *Cloud Computing: Insights into New-Era Infrastructure*, 1st ed., Wiley India,2011.

Reference Books:

[1] HerbertSchildt, *Complete Reference with C*, Tata McGraw Hill, 4th Ed., 2000.

[2] Barrie Sosinsky, *Cloud Computing Bible*, 1st ed., John Wiley & Sons, 2010.

[3] Dac-Nhuong Le ,Raghvendra Kumar , Gia Nhu Nguyen , Jyotir Moy Chatterjee , *Cloud Computing and Virtualization*, 1st ed., 19 March 2018.

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1: summarize different cloud computing models.

CO2: identify various cloud services for real time applications.

CO3: analyze the roles of cloud storage and management systems.

CO4: elaborate various cloud virtualization technologies and SOA concepts.

Course Articulation Matrix (CAM): *P20SE104C Cloud Computing*						
CO		PO1	PO2	PO3	PSO1	PSO2
CO1	*P20SE104C.1*	1	1	-	1	2
CO2	*P20SE104C.2*	1	1	-	1	2
CO3	*P20SE104C.3*	1	1	2	1	2
CO4	*P20SE104C.4*	1	1	2	1	2
P20SE104C		1	1	2	1	2

P20SE105 : CASE TOOLS LABORATORY

Class: M.Tech. I-Semester

Specialization: Software Engineering

Teaching Scheme:

L	T	P	C
-	-	4	2

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Exam	40 marks

Course Learning Objectives (LOs):

The course will develop student's knowledge in/on...

LO1: computer aided software engineering tools.

LO2: object-oriented analysis and design models using UML case tools.

LO3: Win Runner/QTP for functional testing, Selenium for web testing.

LO4: Test Director for test management and Test link an open source testing tool.

List of Experiments on Object Oriented Analysis and Design:

Experiment-I

1. Project scheduling using Microsoft project management tool
2. Project estimation using Microsoft project management tool

Experiment-II

Construct Use case and class diagrams for the following

1. Online shopping
2. Banking system
3. Cab dispatching system

Experiment-III

Construct Collaboration and Sequence diagrams for the following

1. Librarian issues books to student
2. Mobile phone

Experiment-IV

Construct Activity and State chart diagrams for the following.

1. ATM transaction
2. Ticket machine
3. Credit card processing

Experiment-V

Case study: Develop class diagram of Unified library application and model it in different views i.e. logic view, component view, deployment view, database design and perform forward & reverse Engineering

List of Experiments on Testing

Experiment-VI

Manual testing: Take any system (e.g. ATM system) and study its system specifications and report the various bugs

Experiment-VII

Study of Win Runner testing tool and its implementation

1. Win Runner testing process and Win runner user interface
2. How Win Runner identifies GUI (Graphical User Interface) objects in an application and describes the two modes for organizing GUI map files
3. How to record a test script and explains the basics of Test Script Language (TSL)
4. How to synchronize a test when the application responds slowly
5. How to create a test that checks GUI objects and compare the behavior of GUI objects in different versions of the sample application

6. How to create and run a test that checks bitmaps in your application and run the test on different versions of the sample application and examine any differences, pixel by pixel
7. How to create Data-driven tests which supports to run a single test on several sets of data from a data table
8. How to read and check text found in GUI objects and bitmaps
9. How to create a batch test that automatically runs the tests
10. How to update the GUI object descriptions which in turn supports test scripts as the application changes

Experiment-VIII

Apply Selenium testing tool implementation on real time applications placement portal

Experiment-IX

Study of any bug tracking tool (e.g. Bugzilla, Bug Bit)

Experiment-X

Study of any test management tool (e.g. Test Director)

Experiment-XI

Study of any open source-testing tool (e.g. Test Link)

Experiment-XII

Take a mini project (e.g. University admission, Placement portal) and execute it. During the life cycle of the mini project create the various testing documents

Laboratory Manual:

[1] *CASE Tools laboratory manual*, Dept. of CSE, KITSW.

Reference Books:

[1] Meilir Page-Jones, *Fundamentals of Object Oriented Design in UML*, 1st ed. Noida: Pearson Education, 2000.

[2] Dr. K.V.K.K. Prasad, *Software Testing Tools: Covering WinRunner, Silk Test, Load Runner, JMeter and Test Director with case studies*, 1st ed., New Delhi: Dreamtech Press, 2004.

[3] Pascal Roques, *Modeling Software Systems Using UML2*, 1st ed., New Delhi: Wiley-India, 2009.

[4] Mark Priestley, *Practical Object-Oriented Design with UML*, 2nd ed., New Delhi: TATA McGraw Hill , 2009.

[5] Gandharba Swain, *Object Oriented Analysis & Design Through Unified Modeling Language*, 1st ed., New Delhi : Lakshmi Publications Pvt. Ltd, 2010.

Course Learning Outcomes (COs):

After completion of the course, the student will be able to...

CO1: analyze software project using Microsoft project management tool

CO2: design a software system using unified modeling approach

CO3: apply Win-runner, QTP and selenium tools in software testing

CO4: apply Test director and open source testing tools for test management

Course Articulation Matrix (CAM): P20SE105 CASE TOOLS LABORATORY

CO		PO1	PO2	PO3	PSO1	PSO2
CO1	*P20SE105.1*	2	2	1	2	2
CO2	*P20SE105.2*	2	2	1	2	2
CO3	*P20SE105.3*	2	2	1	2	2
CO4	*P20SE105.4*	2	2	1	2	2
P20SE105		**2**	**2**	**1**	**2**	**2**

P20SE106 : ADVANCED ALGORITHMS THROUGH PYTHON LABORATORY

Class: M.Tech. I–Semester **Specialization**: Software Engineering

Teaching Scheme:

L	T	P	C
-	-	4	2

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on...

LO1: implementation of programs on basic python programming concepts

LO2: implementation of operations supported by binary search trees, AVL trees and B-trees

LO3: implementation of computational problems using greedy and dynamic programming technique

LO4: implementation of number-theoretic algorithms and string matching algorithms

List of Experiments

Experiment-I

1. Program to demonstrate data types and operators
2. Program to demonstrate various conditional control structure statements
3. Program to demonstrate various loop control structure statements

Experiment-II

1. Program to demonstrate arrays
2. Program to demonstrate strings

Experiment-III

1. Program to demonstrate functions
2. Program to demonstrate recursion

Experiment-IV

1. Program to implement various operations supported by Binary Search Tree
2. Program to implement various operations supported by AVL trees

Experiment-V

1. Program to implement B-tree operations (Insert, Delete and Search)

Experiment-VI

1. Program to implement priority search tree
2. Program to implement k-d tree

Experiment-VII

1. Program to implement Bellman- Ford Algorithm for single source shortest path problem

Experiment-VIII

1. Program to implement Dijkstra's algorithm for finding shortest path between nodes.
2. Program to implement Johnson's algorithm for all-pairs shortest paths

Experiment-IX

1. Program to implement Ford-Fulkerson Algorithm for Maximum Flow Problem

Experiment-X

1. Program to find the maximal bipartite matching in a graph.
2. Program to check whether a given graph is Bipartite or not

Experiment-XI

1. Program to demonstrate working of Chinese remainder theorem
2. Program to implement RSA algorithm in cryptography

Experiment-XII

1. Program to implement Naive string-matching algorithm
2. Program to implement Rabin-Karp algorithm
3. Program to implement Knuth-Morris-Pratt algorithm

Laboratory Manual:

[1] *Advanced algorithms laboratory manual*, Dept. of CSE, KITSW.

Reference Books:

[1] Debasis Samantha, *Classic Data Structures*, 2nd ed., New Delhi: PHI Learning Pvt. Ltd, 2009.

[2] Thomas H.Cormen, Charles E.Leiserson, Ronald L.Rivest, Cliford Stein, *Introductionto Algorithms*, 3rd ed., New Delhi: Prentice-Hall of India, 2010.

[3] E.Horowitz, S.Sahni, S.Rajasekaran, *Fundamentals of Computer Algorithms*, 2nd ed., Hyderabad: Universities Press, 2018.

[4] Dr. R. Nageswara Rao, *Core Python Programming*, 2nd ed., New Delhi: Dreamtech Press, 2018.

[5] Jeeva Jose and P.Sojan Lal, *Introduction to Computing and Problem Solving with Python*, 1st ed., New Delhi: Khanna Book Publishing, 2019.

[6] Yashavant Kanetkar and Aditya Kanetkar, *Let us Python*, 1st ed., Chennai: BPB Publisher, 2019.

[7] Narasimha Karumanchi, *Data Structures and Algorithmic Thinking with Python*, 1st ed., Hyderabad: CareerMonk, 2015.

[8] M T Goodrich, Roberto Tamassia, *Algorithm Design and Applications*, United States of America: John Wiley, 2015.

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1: develop programs on basic python programming concepts

CO2: develop programs on Binary search trees, AVL trees and B-trees

CO3: develop programs on graph algorithms to solve computational problems using dynamic programming and greedy method

CO4: develop programs on number-theoretic algorithms and string matching algorithms

Course Articulation Matrix (CAM): **P20SE106 ADVANCED ALGORITHMS THROUGH PYTHON LABORATORY**

CO		PO1	PO2	PO3	PSO1	PSO2
CO1	P20SE106.1	2	2	1	2	1
CO2	P20SE106.2	2	2	1	2	1
CO3	P20SE106.3	2	2	1	2	1
CO4	P20SE106.4	2	2	1	2	1
P20SE106		**2**	**2**	**1**	**2**	**1**

P20MC107: RESEARCH METHODOLOGY AND IPR

Class: M. Tech., I-Semester

Specialization(s): SCE, DE, VE, PE, SE DS, DC & CSP

Teaching Scheme:

L	T	P	C
2	-	-	1

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1: research methodology, approaches, principles of experimental design and research plan

LO2: sampling design, data collection, data representation and statistical analysis

LO3: layout of a research report, technical paper writing, oral presentation and intellectual property

LO4: patent rights and developments in IPR.

UNIT-I (6)

Research Methodology: Meaning of research, Objectives, Motivation, Types, Approaches, Research methods Vs methodology, scientific method, Research process, Criteria for good research, Literature review, Research ethics, Plagiarism, Problems encountered by researchers in India

Defining the Research Problem and Research Design: Selecting a research problem, Necessity and techniques in defining research problem, Need for research design, Features of good design, Different research designs, Basic principles of experimental design, Developing a research plan

UNIT – II (6)

Sampling Design: Census and sample survey, Implications, Steps, Criteria of selecting a sampling procedure, Characteristics of a good sample design, Types of sample designs, Complex random sampling designs

Data Collection & Data Analysis: Collection of primary and secondary data, Observation method, Interview method, Collection of data through questionnaires, Schedules, Data organization, Methods of data grouping, Diagrammatic and graphic representation of data, Regression modeling, Direct and interaction effects, ANOVA, F-test, Time series analysis, Autocorrelation and Autoregressive modeling.

UNIT – III (6)

Interpretation and Report Writing: Interpretation Technique, Precaution in interpretation, Significance, steps and layout of report writing, Types of reports, Oral presentation, Mechanics of writing a research report, Precautions, Format of the research report, synopsis, dissertation, thesis, references/bibliography/webliography, Technical paper writing/ journal/ report writing, Making presentation, Use of visual aids.

Nature of Intellectual Property: Patents, Designs, Trade and Copyright.

Process of Patenting and Development: Technological research, innovation, patenting, development.

UNIT – IV (6)

Patent Rights: Scope of patent rights, Licensing and transfer of technology, Patent information and databases, Geographical Indications.

New Developments in IPR: Administration of Patent System, New developments in IPR, IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

Text Book(s):

[1] C.R Kothari and Gaurav Garg, *"Research Methodology, Methods & Techniques"*, 4th ed., New Age International Publishers, 2019 (*Chapters 1, 2, 3, 6, 7, 11, 14*)

[2] Deborah Ebouchoux, *"Intellectual Property, The Law of Trademarks, Copyrights, Patents and Secrets"*, 4th ed., Delmar, Cengage Learning, 2012 *(Chapter 1, 2, 3, 17, 18)*

[3] ***Anti-plagiarism policy of KITSW*** - A handout prepared by Dean, Research and Development, KITSW, Jan 2020.

[4] Frequently Asked Questions, Office of CGPDTM, INDIA 2020

[5] Patent Office Procedures: http://www.ipindia.nic.in/writereaddata/images/pdf/patent-office-procedures.pdf

References Book(s):

[1] Stuart Melville and Wayne Goddard, *"Research methodology: An Introduction for Science & Engineering Students"* 2nd ed., JUTA, 2007.

[2] Robert P. Merges, Peter S. Menell, Mark A. Lemley, *"Intellectual Property in New Technological Age - I"*, Clause 8, 2016.

[3] Dobera J Halbert, *"Resisting Intellectual Property"*, Taylor & Francis Ltd., 1st ed., 2005.

[4] Ranjit Kumar, *"Research Methodology: A Step by Step Guide for beginners"*, 3rd ed., Sage Publications India Pvt. Ltd, New Delhi, 2011.

[5] T. Ramappa, *"Intellectual Property Rights Under WTO"*, 4th ed., .S. Chand, 2008

[6] R. Ganesan, *"Research Methodology for Engineers"*, MJP Publishers, Chennai, 2011

[7] Patent application procedures: https://patentinindia.com/cost-patent-registration-india/

[8] http://www.ipindia.nic.in/history-of-indian-patent-system.htm

[9] Patent Law India: https://www.mondaq.com/india/patent/656402/patents-law-in-india--everything-you-must-know

[10] How to file patents: https://iptse.com/how-to-file-patents-understanding-the-patent-process-in-india/

[11] How Can I get a patent for my project: https://patentinindia.com/cost-patent-registration-india/

Course Learning Outcomes (COs):

On completion of this course, students will be able to

CO1: develop and formulate research problem using research methodology techniques.

CO2: utilize techniques of data modeling and analysis to solve research problem

CO3: choose an appropriate methodology to write a technical report and present a research paper

CO4: judge patent rights and adapt new developments in IPR for their patent publications

Course Articulation Matrix (CAM): **P20MC107 RESEARCH METHODOLOGY & IPR**

CO		PO 1	PO 2	PO 3	PSO 1	PSO 2
CO1	P20MC107.1	2	2	1	-	-
CO2	P20MC107.2	2	2	1	-	-
CO3	P20MC107.3	2	2	1	-	-
CO4	P20MC107.4	2	2	-	-	-
P20MC107		**2**	**2**	**1**	-	-

P20AC108A : ENGLISH FOR RESEARCH PAPER WRITING

Class: M.Tech. I-Semester

Specialization(s): SCE, DE, VE, PE, SE, DS, DC &CSP

Teaching Scheme:

L	T	P	C
2	-	-	1

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: planning for quality research writing with improved level of readability
LO2: constituents and attributes of a research paper
LO3: specifications for research transcription and pedagogic skills for reporting research
LO4: guidelines for publishing research papers in quality journal

UNIT-I (6)

Skills for Research Writing: Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy.

Improving Level of Readability: Avoiding Ambiguity and Vagueness, Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism.

UNIT-II (6)

Constituents of a Research Paper: Abstract, Styles of abstract, Keywords, Characteristics of poor abstract, Assessing quality of abstract, Introduction- outline in introduction, Assessing quality of introduction, Review of Literature, Ways of referringto authors in literature.
Attributes of a Research paper: Methodology, Use of tenses and articles in methodology, Results, Styles of reporting results, Discussion, Styles of writing discussions, Conclusions, Impact of writing conclusions, Assessing quality of conclusions, Final Check-Do's and Don'ts.

UNIT-III (6)

Specifications for Research Transcription: Structuring phrasing and summarizing of title and abstract, Structuring phrasing and summarizing of introduction, Critical review of literature, Limitations of previous work and demonstration of innovation in proposed research.

Pedagogic skills for reporting research: Structuring and justifying the methodology, Structuring, Reporting, Interpreting and summarizing results, Structuring, Comparing, Interpreting and summarizing discussions, Styles of writing discussions, Structuring, differentiating and summarizing of conclusions

UNIT-IV (6)

Quality Assurance and Corroboration of Research: Indexing and harnessing useful phrases, Adapting final check for readability, Clarity in logical order of argumentation, Checking for journal guidelines, Consistency, Accuracy, Acknowledgements and spell-check.

Text Books:

[1] Adrian Wallwork, *"English for Writing Research Papers"*, 2nd ed., New York, Dordrecht Heidelberg London, Springer books, 2016.

Reference Books:

[1] Goldbort R, *"Writing for Science, London"*, 2nd ed Yale University Press, 2006

[2] Day R, *"How to Write and Publish a Scientific Paper"*, 8th ed, Cambridge University Press,2016

[3] Adrian Wallwork , *"English for Academic Research ,Grammar, Usage and Style"*,2nd ed, Springer New York Dordrecht Heidelberg London, Springer Books ,2012.

Course Learning Outcomes (Cos):

On completion of this course, the student will be able to...

CO1: develop essential skills for research writing with improved level of readability.

CO2: organize the constituents of research paper and derive conclusions with a final check of Do's and Don'ts

CO3: justify, interpret, compare and summarize results for proposed methodologies in research paper

CO4: adopt quality assurance methods like final check for readability, consistency and accuracy of a research paper.

Course Articulation Matrix: P20AC108A ENGLISH FOR RESEARCH PAPER WRITING					
CO Code	PO 1	PO 2	PO 3	PSO 1	PSO 2
P20AC108A.1	1	2	2	-	-
P20AC108A.2	1	2	2	-	-
P20AC108A.3	1	2	2	-	-
P20AC108A.4	1	2	2	-	-
P20AC108A	1	2	2	-	-

P20AC108B: SANSKRIT FOR TECHNICAL KNOWLEDGE

Class: M.Tech. I – Semester

Specialization(s): SCE, DE, VE, PE, SE, DS, DC & CSP

Teaching Scheme:

L	T	P	C
2	-	-	1

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on

LO1: proficiency in illustrious Sanskrit, the scientific language in the world
LO2: the depth of grammar in sanskrit
LO3: deeper insight into tenses used in sanskrit
LO4: concepts related to various technical fields

UNIT – I (6)

Introduction: Alphabets, vowels, consonants, Māheśvara sutras, combined alphabets, verbs, basic words

UNIT –II (6)

Study of grammar I: Singular/dual/plural, nominative case, accusative case, instrumental case, dative case, ablative case, genitive case, locative case

UNIT– III (6)

Study of grammar II: Nouns and adjectives, indeclinable, present tense, past tense, future tense, order and request, prefixes, number word, combinations ablative case, genitive case, locative case and cases.

UNIT - IV (6)

Technical concepts related to various fields: Technical concepts of Mathematics, Chemistry, Electrical science, Mechanics & Mechanical Science, Metallurgy, Aeronautics, Marine science, measurement of time, astronomy, architecture, botany, agriculture, hygiene & health

Text Book(s):

[1] Dr.Vishwas, *Abhyaspustakam,* 1st ed. New Delhi: Samskrita-Bharti Publication, 2014
[2] Suresh Soni, *India's Glorious Scientific Tradition,* 1st ed. NewDelhi: Ocean books (P) Ltd, 2008 (Unit IV)

Reference Book(s):

[1] Vempati Kutumbshastri, *Teach Yourself Sanskrit,* 1st ed. New Delhi: Prathama Deeksha Rashtriya Sanskrit Sansthanam, 2012

Course Learning Outcomes (COs):

On completion of this course, students will be able to ...

CO1: understand to read and write basic Sanskrit language

CO2: identify the usage of grammar in the ancient Indian language

CO3: make use of tenses in Sanskrit language

CO4: analyze the ancient Sanskrit literature on Science and Technology

Course Articulation Matrix (CAM): P20AC108B SANSKRIT FOR TECHNICAL KNOWLEDGE						
CO		**PO1**	**PO2**	**PO3**	**PSO1**	**PSO2**
CO1	P20AC108B.1	2	1	1	-	-
CO2	P20AC108B.2	2	1	1	-	-
CO3	P20AC108B.3	2	1	1	-	-
CO4	P20AC108B.4	2	1	1	-	-
P20AC108B		**2**	**1**	**1**	-	-

P20AC108D : PEDAGOGY STUDIES

Class: M. Tech. I –Semester

Specialization(s): SCE, DE, VE, PE, SE, DS, DC & CSP

Teaching Scheme:

L	T	P	C
2	-	-	1

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):
This course will develop student's knowledge in/on

LO1: terminology of pedagogy studies, role of curriculum, relation between teaching and learning
LO2: effectiveness of pedagogical practices and teaching strategies
LO3: student centered approaches of learning
LO4: factors supporting effective pedagogy, research gaps and future directions of potential areas

UNIT-I (6)

Methodology: Aims and rationale, Policy background, Conceptual framework and terminology, Theories of learning- Behaviourism, Constructivism, Social constructivism, Critical theory, Difference between curriculum and syllabus,Curriculum, Importance of curriculum for students and teachers, Role played by the curriculum

Teaching- Learning Process: Introduction, Concept of pedagogy, Principles of teaching, Maxims of teaching, Phases of learning, Relationship between teaching and learning, Factors of teaching and learning in classroom situation, Difference between teaching and learning.

UNIT-II (6)

Overview of pedagogical practices in developing countries: Overview and aims, Pedagogy approaches, Pedagogy as practice, Pedagogy as ideas, Pedagogy and equity, Curriculum, Teacher education - initial teacher education, Continuing professional development, Training unqualified teachers, **E**ffectiveness of pedagogical practices, Pedagogic theory and pedagogical strategies, Teachers' attitudes and beliefs

Strategies of Teaching: Features, Characteristics, Advantages and limitations of lecture method, Demonstration method, Experimental method and Discussion method

UNIT-III (6)

Student Centred Approaches: Features, characteristics, Advantages and limitations of constructivist approach of learning, Discovery method of learning, Enquiry method, Project Based Learning (PBL), Activity Based Learning (ABL)

Practical Approaches: Features of experiential learning and Teacher's role, Peertutoring, Field visits and process of organizing, E-learning tools, Strengths and weaknesses.

UNIT-IV (6)

Role of teacher education, school curriculum, guidance materials in supporting effective pedagogy: Professional development, Alignment with classroom practices and follow-up support, Peer support, Support from the head teacher and the community, Curriculum and assessment, Barriers to learning: limited resources and large class sizes

Research gaps and future directions: Research design, contexts, Pedagogy, Teacher education, curriculum and assessment, Dissemination and research impact

Textbooks:

[1] Dr. S. K. Bhatia, Dr. Sonia Jindal, *A Textbook of curriculum, pedagogy and evaluation*, 1sted., New Delhi: Paragon International Publishers, 2016.

[2] Jo Westbrook, Naureen Durrani, Rhona Brown, David Orr, John Pryor, Janet Boddy, Francesca Salvi, *Pedagogy, Curriculum. Teaching Practices and Teacher Education in Developing Countries*, Education Rigorous Literature Review, Center for InternationalEducation, University of Sussex, December 2013.

Reference books:

[1] Ackers J, Hardman F, *Classroom interaction in Kenyan primary schools*, Compare, 31 (2):245-261, 2001.

[2] Agrawal M, *Curricular reform in schools: The importance of evaluation*, Journal ofCurriculum Studies, 36 (3): 361-379, 2004.

[3] Akyeampong K, *Teacher training in Ghana - does it count? Multi-site teacher educationresearch project (MUSTER) country report 1.* London: DFID, 2003.

[4] Akyeampong K, Lussier K, Pryor J, Westbrook J, *Improving teaching and learning of basicmaths and reading in Africa: Does teacher preparation count?* International Journal Educational Development, 33 (3): 272–282, 2013.

[5] Alexander RJ, *Culture and pedagogy: International comparisons in primary education.* Oxfordand Boston: Blackwell, 2001.

[6] Chavan M, *Read India: A mass scale, rapid, 'learning to read' campaign*, 2003.

[7] www.pratham.org/images/resource%20working%20paper%202.pdf.

Course Learning Outcomes (COs):
On completion of this course, the students will be able to...

CO1: describe the significance of curriculum, relationship between teaching and learning
CO2: justify the effectiveness of pedagogical practices of teaching and compare the lecture, demonstration, experimental and discussion methods of teaching strategies
CO3: analyse the role of student centered approaches in learning of a student and identify suitable approaches for the improvement
CO4: exemplify the role of professional development, curriculum, assessment for effective pedagogy and identify the research gaps in allied areas

Course Articulation Matrix: P20AC108D PEDAGOGY STUDIES

CO		PO 1	PO 2	PO 3	PSO 1	PSO 2
CO1	P20AC108D.1	-	1	-	-	-
CO2	P20AC108D.2	1	1	1	-	-
CO3	P20AC108D.3	1	1	1	-	-
CO4	P20AC108D.4	1	1	1	-	-
P20AC108D		**1**	**1**	**1**	**-**	**-**

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE:: WARANGAL – 15

(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTION & EVALUATION OF M.Tech. (SOFTWARE ENGINEERING)

II-SEMESTER OF 2-YEAR M.TECH DEGREE PROGRAMME

PRR-20

[4 Th+2 P+1 Mini Project +1 AC]

S. No.	Course Category	Course Code	Course Title	Hours per Week			Credits	Evaluation Scheme								
								CIE							ESE	Total Marks
								I²RE - TA				Minor	MSE	Total		
				L	T	P		ATLP	CRP	CP	PPT					
1	PC	P20SE201	**Professional Core-3:** Agile Development Methodologies	3	-	-	3	8	8	8	6	10	20	60	40	100
2	PC	P20SE202	**Professional Core-4:** Data Science	3	-	-	3	8	8	8	6	10	20	60	40	100
3	PE	P20SE203	**Professional Elective-III/ MOOC-III**	3	-	-	3	8	8	8	6	10	20	60	40	100
4	PE	P20SE204	**Professional Elective-IV/ MOOC-IV**	3	-	-	3	8	8	8	6	10	20	60	40	100
5	PC	P20SE205	**Core Lab-III:** Agile Development and DevOps Laboratory	-	-	4	2	-	-	-	-	-	-	60	40	100
6	PC	P20SE206	**Core Lab-IV:** Data Science Laboratory	-	-	4	2	-	-	-	-	-	-	60	40	100
7	PROJ	P20SE207	Mini Project with Seminar	-	-	4	2	-	-	-	-	-	-	100	-	100
8	AC	P20AC208	Audit Course 2	2	-	-	1	8	8	8	6	10	20	60	40	100
Total				**14**	**-**	**12**	19	**40**	**40**	**40**	**30**	**50**	**100**	**520**	**280**	**800**

[L= [Lecture, T = Tutorials, P = Practicals, C = Credits, ATLP = Assignments, CRP = Course Research Paper, CP = Course Patent, PPT = Course Presentation, Minor=Minor Examination, MSE=Mid Semester Examination and ESE=End Semester Examination]

Professional Elective3	Professional Elective 4	Audit Course 2
P20SE203A: Software Configuration Management	P20SE204A: Bigdata Analytics	P20AC208A: Stress Management by Yoga
P20SE203B: Web Services Testing	P20SE204B: Block chain Technologies and Applications	P20AC208B: Value Education
P20SE203C: Software Reliability Engineering	P20SE204C: Internet of Things	P20AC208C: Personality Development through Life Enlightenment Skills
P20SE203D: MOOCs	P20DS204D: MOOCs	P20AC208D: Disaster Management

Total Contact Periods/Week: 26 **Total Credits: 19**

P20SE201 AGILE DEVELOPMENT METHODOLOGIES

Class: M.Tech. II-Semester **Specialization: Software Engineering**

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Exam:	40 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on...

LO1: adapting Agile Development Process in software development

LO2: collaboration of Agile extreme programming team stakeholders

LO3: phases of release and planning in agile development process

LO4: design refactoring and test driven development

UNIT – I (9)

Introduction to Agile: Understanding success, Beyond deadlines, Importance of organizational success, Enter agility, Agile methods, Don't make your own method, Road to mastery

Understanding Extreme Programming (XP): XP life cycle, XP team, XP concepts, Knowing whether XP is suitable, Implementing XP, Assessing Agility

Practicing XP: Thinking – Pair programming, Root cause analysis, Retrospectives

UNIT – II (9)

Collaborating: Trust - Team strategies, Impressions, Organizational strategies; Sit together - Accommodating poor communication, Secretes of sitting together, Making room, Designing your workspace, Sample workspace, Real customer involvement, Ubiquitous language, Standup meetings, Coding standards, Reporting

Understanding Agile Values: The Agile Principles, The 12 Principles of Agile Software, Scrum and Self organizing teams, The rules of Scrum

UNIT – III (9)

Releasing: Bugfree release, Production ready software, Version control, Fast build, Automating legacy projects, Continuous integration, Documentation

Planning: Vision and documentation, Release planning, Iteration planning - The iteration timebox, Schedule, How to plan an iteration, After the planning session, Dealing with long planning sessions, Tracking the iteration, When things go wrong Stories; Estimating - How to estimate stories, How to estimate iteration task

UNIT – IV (9)

Developing: Incremental requirements - The living requirements document, Work incrementally; Customer tests – Describe, Demonstrate, Develop, Focus on business rules, Ask customers to lead, Test driven development, Refactoring, Incremental design and architecture, Spike solutions, Performance optimization, Exploratory testing

Text Book:

[1] James Shore, Shane Warden, *The art of Agile Development*, 1st ed., Sebastopol: O'Reilly Media, Inc., 2007.

[2] Andrew Stellman, Jennifer Greene, *Learning Agile: Understanding Scrum, Xp, Lean, and Kanban*, 1st ed., Sebastopol: O'Reilly Media, 2013.

Reference Books:

[1] Mike Cohn, *Agile Estimating and Planning*, 1st ed., Delhi : Pearson Education, 2005.

[2] Venkat Subramaniam, Andy Hunt, *Practices of an Agile Developer*, 1st ed., Sebastopol: O'Reilly Media, 2006.

[3] Jim Highsmith, *Agile Project Management: Creating Innovative Products*, 2nd ed., Delhi: Addison-Wesley Professional, 2009.

Course Learning Outcomes (COs):

On completion of this course, students will be able to ...

CO1: apply agile development for the organizational success of software development

CO2: analyze the extreme programming stakeholders collaboration effectively

CO3: select best among multiple solutions for a fast release in Agile process

CO4: design refactoring aspects to perform test driven error free code

Course Articulation Matrix (CAM): *P20SE201: AGILE DEVELOPMENT METHODOLOGIES*

CO		PO1	PO2	PO3	PSO1	PSO2
CO1	*P20SE201.1*	2	1	2	2	2
CO2	*P20SE201.2*	2	1	2	2	2
CO3	*P20SE201.3*	2	1	2	2	2
CO4	*P20SE201.4*	2	1	2	2	2
P20SE201		2	1	2	2	2

P20SE202 DATA SCIENCE

Class: M.Tech. II-Semester **Specialization:** Software Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on...
LO1: fundamentals of data science and essential mathematical concepts
LO2: statistical inferences and supervised learning techniques for data analytics
LO3: unsupervised learning algorithms, social area network and statistical natural language processing
LO4: recommender systems, case studies on stock prediction and tensor flow

UNIT – I (9)

Data Science: Introduction to data science, Tool boxes for data scientists, Fundamental python libraries for data scientists, Data science ecosystem installation, Python for data scientists

Mathematics for Data Analytics: Descriptive statistics, Data preparation, Exploratory data analysis, Estimation, Sample and estimated mean, Variance and standard scores, Covariance, Pearson's and Spearman's rank correlation

UNIT – II (9)

Statistical Inference: Introduction, Statistical inference-The frequent list approach, Measuring the variability in estimates, Hypothesis testing

Supervised Learning: Introduction, The problem, First steps, Definition of learning, Learning curves, Training, Validation and test, Two learning models, Generalities concerning learning models, Support vector machines, Random forest, Regression analysis, Linear regression, Simple linear regression, Multiple linear regression

UNIT – III (9)

Unsupervised Learning: Clustering, Similarity and distances, Taxonomies of clustering techniques

Empirical Research: Network analysis, Social network analysis, Centrality, Ego-networks, Community detection

Statistical Natural Language Processing for Sentiment Analysis: Introduction, Data cleaning, Text representation

UNIT – IV (9)

Recommender Systems: Introduction, How do recommender systems work, Content-based filtering, Collaborative filtering, Hybrid recommenders, Modeling user preferences, Evaluating recommenders, Practical case

Case Studies: Case study 1 – predicting stock prices based on social media, Case study 2 – using tensor flow

Text Books:

[1] Igual Laura, Seguí Santi, *Introduction to Data Science: A Python Approach to Concepts, Techniques and Applications*, 1st. ed.,Sebastopol: Springer Nature, 2017.

[2] Sinan Ozdemir, *Principles of Data Science: Learn the techniques and math you need to start making sense of your data,* 1st. ed., Birmingham: Packt Publishing Ltd, 2018.

Reference Books:

[1] Davy Cielen, Arno Meysman, Mohamed Ali, *Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools,* 1st. ed., Hong Kong: Manning Publications, 2016.

[2] Joel Grus, *Data Science from Scratch: First Principles with Python,* 1st. ed., Sebastopol: O'Reilly Media, 2015.

[3] Brendan Tierney, John D. Kelleher, *Data Science,* 1st. ed., Cambridge: The MIT Press, 2018.

[4] Rachel Schutt, Cathy O'Neil, *Doing data Science : straight talk from the frontline,* 1st. ed., Sebastopol: O'Reilly Media, 2013.

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1: demonstrate the concepts of data science and analytical mathematics

CO2: apply statistical inference and supervised learning algorithms for data analytics

CO3: analyze unsupervised learning and statistical natural language processing

CO4: evaluate recommender systems and stock prediction applications

Course Articulation Matrix (CAM): P20SE202 DATA SCIENCE						
CO		PO1	PO2	PO3	PSO1	PSO2
CO1	*P20SE202.1*	1	1	1	1	1
CO2	*P20SE202.2*	2	1	2	2	2
CO3	*P20SE202.3*	2	1	2	2	2
CO4	*P20SE202.4*	2	1	2	2	2
P20SE202		1.75	1	1.75	1.75	1.75

P20SE203A SOFTWARE CONFIGURATION MANAGEMENT

Class: M.Tech. II-Semester **Specialization:** Software Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on...

LO1: software configuration management (SCM), components of SCM and configuration management process model
LO2: baselines for software development and configuration identification
LO3: configuration control, status accounting, and data management
LO4: configuration change management and SCM metrics

UNIT – I (9)

Introduction to Software Configuration Management: Evolution in the software life cycle, SCM and process improvement, Benefits of SCM, SCM components, Configuration identification, Configuration change control, Configuration status accounting, Configuration auditing, Implementing SCM in the organization, Manage the risks of SCM

Configuration Management (CM) Process Model: CM benefits, Risks and cost impact, CM life-cycle management and planning, Implementing the CM process

UNIT – II (9)

Baselines: Baselines for software project, Establishing development baselines, Specification formats and standards, Application to smaller projects

Configuration Identification: How configuration identification works, Configuration identification general activity guides, Configuration items, Configuration item selection criteria, Configuration documentation, Configuration baselines, Document and item identification

UNIT – III (9)

Configuration control: The process of configuration control, Engineering change proposal, Request for deviation, RFD contents

Configuration status accounting: Life cycle, Concept and technology development, System development and demonstration, Production and deployment, Operational support, Configuration status accounting process evaluation checklist

Configuration Management and Data Management: CM-related data management concepts and principles, Document identification, Data status level management, Data and product configuration relationships, Data version control, Digital data transmittal, Data access control

UNIT – IV (9)

Configuration Change Management: Configuration change management, The maintenance process, Types of maintenance-Corrective maintenance, Adaptive maintenance, Perfective maintenance, Preventive maintenance, Maintenance costs, A model for maintenance, Configuration management steps, Change identification, Evaluation and coordination, Change implementation and verification

Metrics of configuration management: Metrics and their importance, Traditional CM metrics, IEEE process for measurement, Metrics as a component of the process maturity framework, Steps to take in using metrics, IEEE defined metrics, Developer's list of metrics

Text Books:

[1] Jessica Keyes, *Software Configuration Management,1st ed.,* Auerbach Publications, USA, 2013.

[2] J. K. Buckle, M.A., F.B.C.S, *Software Configuration Management, 1st ed.,* Macmillan Education Ltd, London, 1982 (Unit II – Baselines).

Reference Books:

[1] Alexis Leon, *Software Configuration Management Handbook, 3rd ed.,* Artech House, 2015.

[2] Babich, W. *Software Configuration Management, 1st ed.,* Reading, Mass.: Addison-Wesley, 1986.

[3] Gunther, R. C. *Management Technology for Software Product Engineering, 1st ed,.* New York: John Wilcy, 1978.

[4] Samaras, T. T., and F. L. Czerwinski. *Fundamentals of Configuration Management, 1st ed.,* New York: Wiley. Inter science, 1971.

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1: demonstrate software configuration management and CM model
CO2: develop baselines and identify the configurations for software projects
CO3: analyze configuration and data management in SCM
CO4: develop SCM plan for a project and apply metrics to improve the plan.

Course Articulation Matrix(CAM): P20SE203A: SOFTWARE CONFIGURATION MANAGEMENT						
CO		PO 1	PO 2	PO 3	PSO 1	PSO 2
CO1	***P20SE203A.1***	1	1	2	2	2
CO2	***P20SE203A.2***	2	1	2	2	2
CO3	***P20SE203A.3***	2	1	2	2	2
CO4	***P20SE203A.4***	2	1	2	2	2
P20SE203A		**1.75**	**1**	**2**	**2**	**2**

P20SE203B WEB SERVICES TESTING

Class: M.Tech. II–Semester **Specialization: Software Engineering**

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Exam:	40 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on...

LO1: fundamental of web services testing and soapUI
LO2: test suites for web services testing
LO3: performance testing and load testing in soapUI
LO4: test scenarios, scripting and automated testing using soapUI

UNIT – I(9)

Introduction to Web Services Testing and soapUI: Web services testing and soapUI, SOA and web services, Service-oriented solutions, Building blocks of SOA, Simple object access protocol, Alternatives to SOAP; REST, Java script object notation, Web services description language, Message exchanging patterns, SOAP faults, Approaches of testing web services, The common challenges of web services testing, SoapUl, Capabilities of soapUl

UNIT – II(9)

First Steps with soapUI and Projects: Understanding web services definition, creation of soapUI projects, Invoking the guest management web services, SOAP requests and responses, Generate SOAP faults

Working with TestSuite: Creating test suites: adding test cases, addRoom test cases, getRoom details test cases, deleteRoom test cases; Running the first test suite, Adding test assertions, Adding properties to soapUI tests, Reading property values from a file

UNIT – III(9)

Load and Performance Testing: Non-functional testing of web services, Performance testing, Planning for web services performancetesting

Working with Load Test in soapUI: Limit of a load test, Threads in a soapUI load test, Load test strategies of soapUI, A closer look at the load test report and statistics of SoapUI, Using load test assertions in soapUI

UNIT – IV(9)

Advanced Testing Scenarios: Advanced functional testing with soapUI, WS-addressing, WS-security, ApacheAxis2, REST testing, REST parameters, Functional testing of REST services, testing databases using soapUI and assertions, JMS testing with soapUI

Extending soapUI with Scripting: Introduction to groovy script, Groovy scripting in soapUI, modelitems, Request and response handling using scripts

Automated Testing with soapUI: Test automation, Continuous integration, SoapUI JUnit integration, SoapUI command line integration, Maven soapUI plugin

Text Book:

[1] Charitha Kankanamge, *Web Services Testing with soapUI*, 1st ed., Birmingham: Packt Publishing Limited, 2012.

Reference Books:

[1] Pranai Nandan, *Mastering SoapUI*, 1st ed., Birmingham: Packt Publishing Limited, 2016.

[2] Rupert Anderson, *SoapUI Cookbook*, 1st ed., Birmingham: Packt Publishing Limited, 2015.

[3] Ian Molyneaux, *The Art of Application Performance Testing*, 1st ed., California: O'Reilly, 2009.

[4] DmytroShpakovskyi, *Modern Web Testing with TestCafe*, 1st ed., Birmingham: Packt Publishing Limited, 2020.

Course Learning Outcomes:

On completion of course, the student will be able to...

CO1: perform web services testing with soapUI

CO2: create new test suites and test cases in soapUI

CO3: develop test casesfor load and performance testing

CO4: validate web service applications with automated testing in soapUI

Course Articulation Matrix (CAM): P20SE203B WEB SERVICES TESTING

CO		PO1	PO2	PO3	PSO1	PSO2
CO1	*P20SE*203B.*1*	1	1	1	2	2
CO2	*P20SE*203B.*2*	2	1	2	2	2
CO3	*P20SE*203B.*3*	2	1	2	2	2
CO4	*P20SE*203B.*4*	2	1	2	2	2
*P20SE*203B		**1.75**	**1**	**1.75**	**2**	**2**

P20SE203C SOFTWARE RELIABILITY ENGINEERING

Class: M.Tech. II-Semester **Specialization:** Software Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on...

LO1: software reliability engineering process and operational profiles

LO2: software failure intensity and software reliability strategies

LO3: test cases and test procedures

LO4: software reliability growth models and tracking reliability growth

UNIT – I (9)

Introduction: Learning reliability concepts, Software reliability and hardware reliability

Problem, Process and Product: Problem and solution, The software reliability engineering process, Defining the product

Operational profiles: Developing operational profiles, Applying operational profiles

UNIT – II (9)

Engineering Reliability: Failures, Faults and errors, Availability, System and component reliabilities and failure intensities, Predicting basic failure intensity, Defining failure for the product, Choosing a common measure for all associated systems, Setting system failure intensity objectives, Determining developed software failure intensity objectives, Engineering software reliability strategies

UNIT – III (9)

Preparing for Test: Preparing test cases, Preparing test procedures

Executing Test: Planning and allocating test time for the current release, Invoking test, Counting failures, Identifying failures

UNIT – IV (9)

Understanding Software Reliability Growth Models: Selecting models, Mathematics of selected models for practitioners

Guiding Test: Tracking reliability growth, Certifying reliability, Estimating failure intensity for evolving programs, Handling unreported failures, Certifying with different risk levels and discrimination ratios

Text Book:

[1] J.D. Musa, *Software Reliability Engineering*, 1st ed., New York: McGraw Hill, 2004.

Reference Books:

[1] Patrick D. T.O'Connor, Andre Kleyner, *Practical Reliability Engineering,* 5th ed., New Delhi: John Wiley & Sons, 2012.

[2] Doron A. Peled, *Software Reliability Methods*, 1st ed., New York: Springer Verlag, 2013.

Course Learning Outcomes (COs):

On completion of this course, students will be able to ...

CO1: understand software reliability engineering process and operational profiles

CO2: determine software failure intensity objectives and analyze software reliability strategies

CO3: plan and execute test cases for the current release

CO4: compare different software reliability growth models

Course Articulation Matrix (CAM): P20SE203C SOFTWARE RELIABILITY ENGINEERING						
CO		**PO1**	**PO2**	**PO3**	**PSO1**	**PSO2**
CO1	*P20SE203C.1*	1	1	1	1	1
CO2	*P20SE203C.2*	2	1	2	1	1
CO3	*P20SE203C.3*	1	1	2	2	2
CO4	*P20SE203C.4*	2	1	2	2	1
P20SE203C		1.5	1	1.75	1.5	1.25

P20SE204A BIG DATA ANALYTICS

Class: M.Tech. II-**Semester** **Specialization:** Software Engineering

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	60 marks
End Semester Exam	40 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on...
LO1: fundamentals of big data analytics
LO2: big data management using NoSQL, HADOOP and MongoDB
LO3: big data processing using Cassendra, MapReduce and IIive
LO4: pre processing big data using Pig and Jaspersoft

UNIT - I (9)

Introduction to Big Data: Data, Types of digital data, Classification of digital data, Characteristics, Evolution and definition of big data, Need of big data, Challenges of big data, Traditional Business Intelligence(BI) verses Big data, Data environment versus big data environment.

Big Data Analytics: Overview of business intelligence, Meaning and characteristics of big data analytics, Need of big data analytics, Classification of analytics, Challenges tobig data analytics, Importance of big data analytics, Data science and analytics, Basic terminologies used in big data environment, BASE, Analytics tools.

UNIT - II (9)

Big Data Technologies: Introduction to NoSQL, Uses, Features and types, Need, Advantages, Disadvantages and application of NoSQL, Overview of NewSQL, comparing SQL, NoSQL, NewSQL

Introduction to Hadoop: Need, Features, Key advantage and versions of Hadoop, RDBMS versus Hadoop, Distributed computing challenges, History and overview of Hadoop, HDFS, processing data with Hadoop, Hadoop YARN, Essential of Hadoop ecosystems

Introduction to MongoDB: Overview, Need, Terms and data types used in MongoDB, MongoDB query language

UNIT - III (9)

Introduction of Cassendra : Apache Cassandra, Features, CQL data types, CQLSH, CRUD with create, read, update, delete operations, Collections, Alter commands, import and export, Querying system tables

Introduction to MapReduce Programming: Mapper, Reducer, Combiner, Partitioner, Searching, Sorting, Compression

Introduction to Hive: Overview of Hive, Hive architecture, Data types, File format in Hive, HQL, RCFile implementation, SerDe, User-Defined Function(UDF)

UNIT - IV (9)

Introduction to Pig: Overview of Pig, Pig on Hadoop, Use case for Pig: ETL processing, Data types in Pig, Running Pig, Execution modes of Pig, HDFS commands, Relational operators, Eval function, Complex data types, Word count example using Pig.

Jasper Report using Jaspersoft: Introduction to JasperReports, Connecting to MongoDB, NoSQL database, Connecting to Cassandra NoSQL database.

Big Data Trends: Rise of the new Age "Data Curators", CDOs are stepping up, Dark data in the cloud, Edge computing.

Text Book:

[1] Seema Acharya , Subhashini Chellappan, *Big Data and Analytics*,1st. ed., Wiley India Pvt. Ltd., 2016.

Reference Books:

[1] Judith Hurwitz, Alan Nugent, Dr. Fern Halper and Marcia Kaufman, *Big Data*, 1st. ed.,Wiley Publications, 2014.

[2] Soumendra Mohanty, Madhu Jagadeesh and Harsha Srivatsa, Apress Media, *Big Data Imperatives : Enterprise Big Data Warehouse, BI Implementations and Analytics,* 1st. ed., Springer Science + Business Media New York, 2013.

[3] Anand Rajaraman, Jure Leskovec, Jeffery D.Ullman, Springer,*Mining of Massive Datasets*, 1st. ed., 2013.

[4] Tom White , *IIadoop: The definitive Guide*, 1st. ed.,O'Reilly Media, 2010.

Course Learning Outcomes(COs):

Upon completion of this course, the student will be able to...

CO1: understand fundamentals of big dataand it'sanalytics.
CO2: apply NoSQL, HADOOP and MongoDB for big data management.
CO3: apply Cassendra, MapReduce and HIVE for big data processing.
CO4: analyze preprocessing models using Pig, Jaspersoft.

Course Articulation Matrix (CAM): *P20SE204A: Big Data Analytics*						
CO		**PO1**	**PO2**	**PO3**	**PSO1**	**PSO2**
CO1	*P20SE204A.1*	1	1	2	1	1
CO2	*P20SE204A.2*	2	1	2	2	1
CO3	*P20SE204A.3*	2	1	2	2	1
CO4	*P20SE204A.4*	2	1	2	2	1
P20SE204A		1.75	1	2	1.75	1

P20SE204B BLOCKCHAIN TECHNOLOGIES AND APPLICATIONS

Class: M. Tech. II-Semester **Specialization:** Software Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on…

LO1: Fundamentals of Blockchain, types of Blockchains and consensus algorithms
LO2: Cryptographic primitives and Bitcoin Blockchain
LO3: Ethereum ecosystem *and development tools*
LO4: Architecture of Hyperledger Fabric, Corda and alternative Blockchains

UNIT – I (9)

The History of Blockchain and Bitcoin: Electronic cash, Blockchain, Generic elements of a blockchain, Benefits and limitations of blockchain, Tiers of blockchain technology, Features of a blockchain

Types of Blockchain: Distributed ledgers, Distributed ledger technology, Public blockchains, Private Blockchains, Shared ledger, Fully private and proprietary blockchains, Tokenized blockchains, Token less block chains

Consensus: Consensus mechanism, Types of consensus mechanisms, Consensus in blockchain CAP theorem and blockchain

UNIT – II (9)

Public and Private keys: Asymmetric cryptography, RSA, Discrete logarithm problem in ECC, Hash functions, RSA digital signature algorithm, Elliptic curve digital signature algorithm

Introducing Bitcoin: Bitcoin, Digital keys and addresses, Transactions, Blockchain, Mining

Bitcoin Network and Payments: The Bitcoin network, Wallets, Bitcoin payments, Innovation in bitcoin, Bitcoin installation

Alternative Coins: Theoretical foundations, Bitcoin limitations, Litecoin, Zcash

UNIT – III (9)

Smart Contracts: History, Definition

Ethereum: Introduction, Ethereum - bird's eye view, The Ethereum network, Components of the Ethereum ecosystem, Programming languages

Ethereum Development Environment: Test networks, Setting up a private net, Starting up the private network

Development Tools and Frameworks: Languages, Solidity language, Web3

UNIT – IV (9)

Hyper Ledger: Projects under hyper ledger, Hyper ledger as a protocol, The reference architecture, Fabric

Corda: Architecture, Components, The development environment – Corda

Alternative Blockchains: Ripple, Quorum, Multichain, BigchainDB, Tendermint

Blockchain-based Traceability in Agri-Food Supply Chain Management: A practical implementation

Text Book:

[1] Imran Basir, *Mastering Bockchain*, 2nd ed., Birmingham – Mumbai: Packt Publishing Ltd., 2018.

Reference Books:

[1] Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller , Steven Goldfeder, *Bitcoin and Crypto currency Technologies: A Comprehensive Introduction*, 1st ed., Princeton University Press, 2016.

[2] Josh Thompson, *Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming*, 1st ed., Create Space Independent Publishing Platform, 2017.

[3] Andreas M. Antonopoulos, Dr. Gavin WoodAndreas, *Mastering Ethereum: Building Smart Contracts and Dapps*, 1st ed., O'REILLY, 2018.

[4] Andreas M Antonopoulos, *Mastering Bitcoin: Programming the Open Blockchain*, 2nd ed., O'REILLY, 2018.

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1: Differentiate the type of blockchains and consensus algorithms
CO2: Demonstrate Cryptographic techniques and Bitcoin Blockchain
CO3: Ddevelop a smart contract using Ethereum development tools
CO4: Develop distributed application on Hyper ledger Fabric

Course Articulation Matrix (CAM): P20SE204B Blockchain Technologies and Applications

CO		PO1	PO2	PO3	PSO1	PSO2
CO1	*P20SE204B.1*	1	1	1	1	1
CO2	*P20SE204B.2*	2	1	1	2	1
CO3	*P20SE204B.3*	2	1	2	2	2
CO4	*P20SE204B.4*	2	1	2	2	2
P20SE204B		1.5	1	1.25	1.5	1.25

P20SE204C INTERNET OF THINGS

Class: M.Tech. II–Semester

Specialization: Software Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on...
LO1: fundamentals of IoT, sensors and actuators used for IoT
LO2: IoT networking protocols and connectivity technologies
LO3: wireless sensor networks and applications
LO4: sensor cloud and IoT case studies

UNIT-I (9)

Introduction to IoT: Characteristics, Applications, Categories, Enablers and connectivity layers, Basic technologies, Sensors- Characterization and classification Actuators, Types of actuators, IoT components and implementations, Service Oriented Architecture, IoT interdependencies, Challenges for IoT

UNIT-II (9)

IoT Networking: Connecting terminologies, Gateway prefix allotment, Impact of mobility on addressing, Multihoming, Deviation from regular web, IoT identification and data protocols, IPV4, IPV6, MQTT, COAP, XMPP, AMQP

Connectivity Technologies: Introduction, IEEE 802.15.4, Zigbee, RFID, Wired and wireless hart, NFC, Bluetooth, Z-wave, ISA100.11A

UNIT-III (9)

Wireless Sensor Networks (WSN): Components of sensor node, Modes of detection, Challenges in WSN, Sensor web, Cooperation, Behavior of nodes in WSN, Social sensing in WSN, Applications of WSN, Wireless multimedia sensor networks, Wireless nano sensor networks, WSN coverage, Optimal geographical density control algorithm,Stationary WSN, Mobile WSN

UNIT-IV (9)

Sensor Cloud: Introduction, Comparison with WSN, Sensor cloud architecture, Advantages, Service life cycle model, Layered structure, Applications, Multiservice provisioning on multiple platforms, Issues and challenges

IoT Case Studies: Smart homes, Smart grids, Smart cities

Text Books:

[1] Jeeva Jose, *Internet of Things*, 1st ed., New Delhi: Khanna Book Publishing, 2018.

[2] Arshdeep Bahga and Vijay Madisetti, *Internet of Things-A Hands-on Approach*, 1st ed., Hyderabad: University Press, 2015.

Reference Books:

[1] Buyya Rajkumar, Amir Vahid Dastjerdi, *Internet of Things: Principles and paradigms*, 1st ed., Amsterdam: Elsevier, 2016.

[2] Karen Rose, Scott Eldridge, Lyman Chapin, *The Internet of Things: An Overview, Understanding the issues and Challenges of More Connected World*, 1st ed., Geneva: The Internet Society (ISOC), 2015.

[3] Dieter Uckelmann, Mark Harrison, Florian Michahelles, *Architecting the Internet of Things*, 1st ed., Verlag: Springer, 2011.

Course Learning Outcomes(COs):

On completion of this course, students will be able to...

CO1: demonstrate the fundamentals, sensor and actuators of IoT

CO2: examine IoT networking protocols and connectivity technologies

CO3 : analyze applications of wireless sensor networks

CO4: develop IoT applications based on sensor cloud

Course Articulation Matrix (CAM): **P20SE204C INTERNET OF THINGS**

CO		PO1	PO2	PO3	PSO1	PSO2
CO1	*P20SE204C.1*	2	1	2	2	2
CO2	*P20SE204C.2*	2	1	2	2	2
CO3	*P20SE204C.3*	2	1	2	2	2
CO4	*P20SE204C.4*	2	1	2	2	2
P20SE204C		**2**	**1**	**2**	**2**	**2**

P20SE205 AGILE DEVELOPMENT & DEVOPS LABORATORY

Class: M.Tech. II-Semeste

Specialization: Software Engineering

Teaching Scheme:

L	T	P	C
-	-	4	2

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):

This Course will develop student's knowledge in/on…

LO1: fundamentals of software development cycles, Agile, Devops as culture and cloud platforms.

LO2: configuration management tools (Ansible) and version control tools (Git).

LO3: continuous integration and continuous deployment tools (Jenkins framework)

LO4: docker, creation of images and containers using it, monitoring the applications with datadog.

List of Experiments

Experiment-I

Subscription to AWS, Management console, EC2 essentials & Build EC2 instances, Different IPs assign to EC2 instance, Elastic IP address. (Amazon Web Services)

Experiment-II

Creation of Ubuntu EC2 instance, connect (open putty session), practice Linux commands and terminate, SSH-authentication setup between different servers, Security groups, Key pairs (Public key, Private keys). (Amazon Web Services)

Experiment-III

Installing Git, Sign up process for Git, Subversion controls/Git working with local repositories, remote repositories, Software configuration management (SCM) using Git, Managing project from Git. (Git/GitHub)

Experiment-IV

Installation of Git server, Git commands, Cloning fetch/pull, Merging in Git, Branching strategies of Git. **(Git/GitHub)**

Experiment-V

Continuous integration continuous deployment tools, Jenkins installation, User profile and management in Jenkins, Builds setup and pipeline of jobs in Jenkins. **(Jenkins FrameWork)**

Experiment-VI

Jenkins master & slave node configuration, Jenkins workspace management, Securing Jenkins- authentication, Authorization, Confidentiality, Creating users. **(Jenkins FrameWork)**

Experiment-VII

Jenkins plugins- Installing Jenkins plugins, SCM plugin, Build and test, Artifacts, Integration with Git, Create a docker Image. **(Jenkins FrameWork)**

Experiment-VIII

Docker terminologies, Installation of Docker, Docker image creation and Docker hands-on, Docker container creation/start/stop/destroy. **(Docker)**

Experiment –IX

Installing Ansible on Linux (Aws-Ec2 server) and SSH-authentication setup, Understanding modules, Ansible playbooks, Playbooks creation and execution. **(Ansible)**

Experiment-X

Writing and executing different types of playbooks, Playbook with direct static tasks, Playbook with dynamic variable pass, Playbook with roles. **(Ansible)**

Experiment-XI

Playbook with loops and conditions, Playbook with multiple target servers, Playbook to restart the service if it goes down (Cron Job), Playbook to create an EC2 instance on AWS (Ex: Jenkins/Docker). **(Ansible)**

Experiment-XII:

Datadog account setup, sign in and sign up, Applications overview, Working with settings to monitor applications. **(Datadog)**

Laboratory Manual:

[1] *Advanced algorithms laboratory manual,* Dept. of CSE, KITSW.

Reference Books:

[1] Andrew Stellman and Jennifer Greene, *Learning Agile,* 1st ed. Mumbai: Shroff-O'Reilly, 2018.

[2] Pierluigi Riti , *Pro Devops with Google Cloud Platform with Docker ,Jenkins and Kubernetes,* 1st ed., New York: Apress, 2018.

[3] James shore and Shane warden, *The art of Agile development,* 1st ed., Mumbai: Shroff-O'Reilly, 2018.

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1: understand software development cycle, devops, and develop EC2 instances on cloud platform AWS.

CO2: configure and manage projects with Ansible and version control tool Git
build and integrate Builds, automating the process by using Jenkins Framework

CO3: create and deploy docker images by using docker as deployment tool and monitor application using datadog

CO8: maintain Devops applications effectively

Course Articulation Matrix (CAM): **P20SE205 AGILE DEVELOPMENT AND DEVOPS LABORATORY**						
CO		**PO1**	**PO2**	**PO3**	**PSO1**	**PSO2**
CO1	*P20SE205.1*	2	2	1	2	1
CO2	*P20SE205.2*	2	2	1	2	1
CO3	*P20SE205.3*	2	2	1	2	1
CO4	*P20SE205.4*	2	2	1	2	1
P20SE205		**2**	**2**	**1**	**2**	**1**

P20SE206 DATA SCIENCE LABORATORY

Class: M.Tech. II-Semester **Branch:** Software Engineering

Teaching Scheme:

L	T	P	C
-	-	4	2`

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in...

LO1: R-tool installation, basics and input output
LO2: data structures used and R-tool
LO3: data Transformations, Statistics, Graphics
LO4: machine learning algorithms implementation

List of Experiments

Experiment-I

R –Basics:

1. Installing R and packages in R
2. Programs on data types in R
3. Built-in functions in R
4. Creating and manipulating a vector in R

Experiment-II

R data structure

1. Creating matrix and manipulating matrix in R
2. Operations on Data frames in R
3. Operations on lists in R
4. Programs on operators in R

Experiment-III

Data Transformations

1. Functions
2. Strings and Dates

Experiment-IV

Probability

1. Calculating central measures
2. Grouping for Numeric data and Text data
3. Splitting and Combining data with R

Experiment-V

Data Dispersion

1. Measures of data dispersion
2. Range
3. Quartiles
4. Standard deviation

Experiment-VI

Visualizing dispersion and frequency tables

1. Simple Boxplot
2. Grouped Boxplot
3. Grouped Boxplots by Series
4. Histogram
5. Line charts
6. Bar chart
7. Clustered Bar chart
8. Pie chart

Experiment-VII

Linear Regression

1. Linear Regression
2. Non linear Regression

Experiment-VIII

1. Interpreting data using descriptive statistics with R
2. Interpreting data using statistical models with R
3. Time series forecasting using R
4. Hypothesis testing - Interpreting data with statistical models

Experiment-IX

1. Machine learning with Text data using R
2. **Create document term matrix**

Experiment-X

1. Random forest
2. Reinforcement algorithm
3. SVM implementation

Experiment-XI

1. Visualization of text data using Word cloud in R
2. Exploring data visually with R

Experiment-XII

1. Implementation of Neural networks algorithms

Laboratory Manual:

[1] *Data science lab using R-tool manual*, Dept. of CSE, KITSW.

Reference Books:

[1] Hadley Wickham and Garrett Grolemund, *R for Data Science*, 1st ed., New Delhi: O'Reilly Publications, 2018.

[2] J.D. Long and Paul Teetor ,R Cookbook Proven Recipes for Data Analysis, Statistics & Graphics, 2nd ed., New Delhi: O'Reilly Publications, 2019.

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1: configure and implement basic operations with the R-tool
CO2: apply various data structures and data sets in R-tool
CO3: implement data transformations, statistics and graphics
CO4: solve problems using various machine learning algorithms implementations

Course Articulation Matrix (CAM): **P20SE206 DATA SCIENCE LAB USING R-TOOL**

CO		PO1	PO2	PO3	PSO1	PSO2
CO1	*P20SE206.1*	2	2	1	2	1
CO2	*P20SE206.2*	2	2	1	2	1
CO3	*P20SE206.3*	2	2	1	2	1
CO4	*P20SE206.4*	2	2	1	2	1
P20SE206		**2**	**2**	**1**	**2**	**1**

P20SE207: MINI PROJECT WITH SEMINAR

Class: **M.Tech. II - Semester** Branch: **Software Engineeirng**

Teaching Scheme:

L	T	P	C
-	-	4	2

Examination Scheme:

Continuous Internal Evaluation	100 marks
End Semester Examination	---

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in...

LO5: implementing a project independently by applying knowledge to practice
LO6: literature review and well-documented report writing
LO7: creating PPTs and effective technical presentation skills
LO8: writing technical paper in scientific journal style & format and creating video pitch

Continuous Internal Evaluation (CIE) for Mini Project with Seminar:

1) The *Post Graduate Mini Project Evaluation Committee (PGMPEC)* shall be constituted with HoD as a Chairman, M.Tech. Coordinator as a Convener and three to five other faculty members representing various specializations in that particular programme as members.
2) Student has to take up independent mini project on innovative ideas, innovative solutions to common problems using their knowledge relevant to courses offered in their program of study, which would supplement and complement the program assigned to each student.
3) *PGMPEC* shall allot a faculty supervisor to each student for guiding on
   (a) Selection of topic
   (b) Literature survey and work to be carried out
   (c) Preparing a report in proper format
   (d) Right conduct of research and academic activity to promote academic integrity
   (e) Use of anti-plagiarism software to detect plagiarism in the report and submission of Mini project report within acceptable plagiarism levels
   (f) Effective mini project oral presentation before the PGMPEC

   There shall be only Continuous Internal Evaluation (CIE) for seminar
4) The CIE for mini project is as follows:

Assessment	Weightage
Mini project Supervisor Assessment	**20%**
PGMPEC Assessment: ***(i)*** *Registration presentation* **(10%)** ***(ii)*** *Working model / process / software package / system developed* **(20%)** ***(iii)*** *Mini project report* **(20%)** ***(iv)*** *Mini project paper* **(10%)** ***(v)*** *Mini project video pitch* **(10%)**	**80 %**
(vi) *Final presentation (with PPT) and viva-voce* **(10%)**	
Total Weightage:	**100%**

Note: It is mandatory for the student to
(i) appear for final presentation (with PPT) and viva-voce to qualify for course evaluation
(ii) write mini project paper in given journal format
(ii) create a good video pitch to present mini project

(a) **Mini Project Topic**: The topic should be interesting and conducive to discussion. Topics may be found by looking through recent issues of peer reviewed Journals/Technical Magazines on the topics of potential interest

(b) **Working Model**: Each student is requested to develop a working model/ process/ software package /system on the chosen work and demonstrate before the *PGMPEC* as per the dates specified by *PGMPEC*

(c) **Mini Project Report:** Each student is required to submit a well-documented mini project report as per the format specified by *PGMPEC*

(d) **Anti-Plagiarism Check:** The mini project report should clear plagiarism check as per the Anti-Plagiarism policy of the institute

(e) **Presentation:** Each student should prepare PPT with informative slides and make an effective oral presentation before the *PGMPEC* as per the schedule notified by the department

(f) **Video Pitch:** Each student should create a pitch video, which is a video presentation on his / her mini project. Video pitch should be no longer than 5 minutes by keeping the pitch concise and to the point, which shall also include key points about his / her business idea / plan (*if any*) and social impact

5) The student has to register for the Mini project as supplementary examination in the following cases:
   i) he/she is absent for oral presentation and viva-voce
   ii) he/she fails to submit the report in prescribed format
   iii) he/she fails to fulfill the requirements of Mini project evaluation as per specified guidelines

6) (a) The CoE shall send a list of students registered for supplementary to the HoD concerned
   (b) The PGMPEC, duly constituted by the HoD, shall conduct Mini project evaluation and send the award list to the CoE within the stipulated time

Course Learning Outcomes (COs):
On completion of this course, students will be able to...

CO1: apply knowledge to practice to design and conduct experiments and utilize modern tools for developing working models / process / system leading to innovation and entrepreneurship

CO2: demonstrate the competencies to perform literature survey, identify gaps, analyze the problem and prepare a well-documented Mini project report

CO3: make an effective oral presentation through informative PPTs, showing knowledge on the subject and sensitivity towards social impact of the Mini project

CO4: write a "Mini project paper" in scientific journal style and format from the prepared Mini project report and create a video pitch on Mini project

Course Articulation Matrix (CAM): P20SE207 MINI PROJECT WITH SEMINAR

CO		PO 1	PO 2	PO 3	PSO 1	PSO 2
CO1	P20SE207.1	2	-	2	2	2
CO2	P20SE207.2	2	-	2	2	2
CO3	P20SE207.3	-	2	-	1	1
CO4	P20SE207.4	-	2	-	1	1
P20SE207		2	2	2	1.5	1.5

20AC208A: STRESS MANAGEMENT BY YOGA

Class: M.Tech. II–Semester

Specialization(s): SCE, DE, VE, PE, SE, DS, DC &CSP

Teaching Scheme:

L	T	P	C
2	-	-	1

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on

LO1: awareness about different types of stress LO2: yoga in the management of stress

LO3: positive health and overall wellbeing

LO4: prevention of stress related health problems by yoga practice

UNIT – I (6)

Stress: Definition of Stress, Types of stress - Acute and chronic; Stressors; Definition of Yoga from various sources, Types of yoga – Karma yoga, Gnana yoga, Bhakti yoga and Raja yoga; Concept of Bhagavad Gita; Yoga versus exercise; Basics of Physiology and Psychology; Brain and its parts – central nervous system (CNS), peripheral nervous system (PNS), hypothalamic pituitary adrenal (HPA) axis; Sympathetic and Parasympathetic nervous systems; Fight and Flight mechanism; Relationship between stress and yoga

UNIT –II (6)

Ashtanga Yoga: Do's and Don'ts in life; Yamas – ahimsa, satya, asteya, bramhacharya and aparigraha; Niyama – shaucha, santosha, tapa, svadhyaya, ishvarapranidhana; Asana; Pranayama; Pratyahara; Dharana; Dhyana; Samadhi

UNIT– III (6)

Asana and Stress: Definition of Asana from Patanjali; Origin of various names of asanas; Various yoga poses and their benefits for mind and body; Sequence of performing asanas - standing, sitting, lying down on stomach, lying down on back and inverted postures; Activation of Annamaya kosha; Effect on various chakras, systems and glands thereby controlling the stress levels through the practice of asanas

UNIT - IV (6)

Pranayama: Anulom and Vilom Pranayama, Nadi shudhi Pranayama, Kapalabhati Pranayama, Bhramari Pranayama, Nadanusandhana Pranayama.

Meditation Techniques: Om Meditation; Cyclic meditation; Instant Relaxation technique (IRT); Quick Relaxation Technique (QRT); Deep Relaxation Technique (DRT)

Text Book(s):

[1] *"Yogic Asanas for Group Training - Part-I"*, Nagpur: Janardhan Swami Yogabhyasi Mandal.

[2] Swami Vivekananda, *"Rajayoga or Conquering the Internal Nature"*, Kolkata: Advaita Ashrama (Publication Department).

Reference Book(s):

[1] Nagendra H.R and Nagaratna R, *"Yoga Perspective in Stress Management"*, Bangalore : Swami Vivekananda Yoga Prakashan.

Course Learning Outcomes (COs):

On completion of this course, students will be able to ...

CO1: differentiate yoga and exercise

CO2: explain eight steps of Ashtanga yoga

CO3: describe different yogasanas, and their benefits for mind and body

CO4: discuss the benefits of pranayama and meditation as an effective tool for stress management

Course Articulation Matrix (CAM): P20AC208A STRESS MANAGEMENT BY YOGA

CO		PO1	PO2	PO3	PSO1	PSO2
CO1	P20AC208A.1	1	1	-		
CO2	P20AC208A.2	1	1	-		
CO3	P20AC208A.3	1	1	-		
CO4	P20AC208A.4	1	1	-		
P20AC208A		**1**	**1**	**-**		

P20AC208B: VALUE EDUCATION

Class: M.Tech. II – Semester **Specializations: SCE, DE, VE, PE, SE, DS & CSP**

Teaching Scheme: **Examination Scheme:**

L	T	P	C
2	-	-	1

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in...

LO1: value of education and self-development

LO2: importance of cultivation of values

LO3: personality and behavior development

LO4: character and competence

UNIT – I (6)

Values and self-development: Social values and individual attitudes; Work ethics; Indian vision of humanism; Moral and non-moral valuation; Standards and principles; Value judgments

UNIT – II (6)

Importance of cultivation of values: Sense of duty, devotion, self-reliance, confidence, concentration, truthfulness, cleanliness, honesty, humanity, discipline, power of faith; National Unity, patriotism; Love for nature

UNIT – III (6)

Personality and Behavior Development: Soul and scientific attitude; Positive thinking; Integrity, discipline and punctuality; Love and Kindness; Avoid fault thinking, free from anger; Dignity of labor

Universal brotherhood and religious tolerance: True friendship, love for truth, happiness vs suffering; Aware of self-destructive habits; Association and cooperation; Doing best for saving nature

UNIT – IV (6)

Character and Competence: Holy books vs blind faith; Self-management and good health; Science of reincarnation: Equality, non-violence, humility, role of women; All religions and same message; Mind your mind, self-control, honesty, studying effectively

Text Book:

[1] S. K. Chakroborty, *Values and Ethics for organizations: Theory and practice*, New Delhi: Oxford University Press, 2000.

Reference Books:

[1] D. N. Grose, *A text book of Value Education*, New Delhi: Dominant Publishers and Distributors, 2005.

[2] Yogesh Kumar Singh and Ruchika Nath, *Value Education*, New Delhi: A. P. H. Publishing Corporation, 2005.

[3] S. P. Ruhela, *Human Values and Education*, New Delhi: Sterling Publishers Pvt. Ltd., 1986.

[4] V. Narayan Karan Reddy, *Man, Education and Values*, New Delhi: B. R. Publishing Corporation, 1979.

[5] Bharatwaj Tilak Raj, *Education of Human Values*, New Delhi,: 2nd Ed., Mittal Publications, 2001

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1: illustrate social & moral values and inculcate Indian vision of humanism

CO2: develop sense of duty, national unity and love for nature

CO3: utilize positive thinking and develop universal brotherhood

CO4: build character & competence through holy books

Course Articulation Matrix (CAM): P20AC208B : VALUE EDUCATION

CO		PO1	PO2	PO3	PSO1	PSO2
CO1	P20AC208B.1	-	1	-		
CO2	P20AC208B.2	-	2	-		
CO3	P20AC208B.3	-	1	-		
CO4	P20AC208B.4	-	2	-		
	P20AC208B		1.5			

P20AC208C: PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

Class: M.Tech. II-Semester

Specialization(s): SCE, DE, VE, PE, SE, DS, DC & CSP

Teaching Scheme:

L	T	P	C
2	-	-	1

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge on/in...
LO1: holistic development of personality
LO2: accomplishment of day to day responsibilities and to achieve the highest goal
LO3: basic knowledge to maintain a stable mind, pleasing personality and determination
LO4: personality building towards becoming a role model

UNIT – I (6)

Holistic development of personality: Neetisatakam - Verses-19, 20, 21, 22(wisdom), Verses-29, 31, 32 (pride& heroism), Verses-26, 28, 63, 65(virtue), Verses-52, 53, 59(don'ts), Verses-71, 73, 75, 78(do's)

UNIT – II (6)

Approach to day to day work and duties: Shrimad Bhagwad Geeta - Chapter2-Verses 41, 47, 48 chapter3-Verses 13, 21, 27, 35; Shrimad Bhagwad Geeta - Chapter6-Verses 5, 13, 17, 23, 35, chapter18-Verses 45, 46, 48

UNIT – III (6)

Statements of basic Knowledge: Shrimad Bhagwad Geeta - Chapter2-Verses 56, 62, 68 chapter12-Verses 13, 14, 15, 16, 17, 18

UNIT – IV (6)

Personality of Role model: Shrimad Bhagwad Geeta - Chapter2-Verses 17, chapter3-Verses 36,37,42 chapter4-Verses 18,38,39, chapter18-Verses 37,38,63

Text Book:

[1] Swami Swarupananda, *Shrimad Bhagavad Geeta*, Advaita Ashram (Publication Department), Kolkata: Printed in Sharada Press, Car Street, Mangalore.

Reference Books:

[1] Prof. Satyavrata Siddhantalankar, *Bhagavad Geeta* , New Delhi: Oriented Publishing
[2] P.Gopinath, *Bhartrihari's Three Satakam (Niti-sringar-vairagya),* New Delhi: Rashtriya Sanskrit Sansthanam
[3] Maharaja Bhadrihari , *Nithishatakam Translated by P.Jwala Dutta Sharma*, Dharm Diwakar Press, Moradabad, 1909, First Edition
[4] world.com/section_personality_development.html

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO5: build an holistic personality

CO6: develop himself to accomplish his responsibilities and achieve his highest goal in life

CO7: perceive basic knowledge to maintain stable mind, pleasing personality and determination

CO8: originate himself to become a role model thus leading mankind to peace and prosperity

Course Articulation Matrix (CAM): P20AC208C PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTEMENT SKILLS

CO		PO1	PO2	PO3	PSO1	PSO2
CO1	P20AC208C.1	2	1	1		
CO2	P20AC208C.2	2	1	1		
CO3	P20AC208C.3	2	1	1		
CO4	P20AC208C.4	2	1	1		
P20AC208C		**2**	**1**	**1**		

P20AC208D: DISASTER MANAGEMENT

Class: M.Tech. II – Semester

Specialization(s): SCE, DE, VE, PE, SE, DS, DC & CSP

Teaching Scheme:

L	T	P	C
2	-	-	1

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1: disaster management cycle and relation between disaster & development
LO2: risk / vulnerability assessment and reduction strategies
LO3: management strategies, approaches, frameworks and governance
LO4: disaster mitigation aspects and recovery strategies

UNIT – I (6)

Introduction to Disaster: Concepts of hazard, vulnerability & risks; natural and manmade disasters- earthquake, cyclone, floods , volcanoes; famine, displaced populations, industrial & transport accidents; slow and rapid onset disasters - famine, draught , epidemics , air crash, tidal waves & tsunami

Mitigation and Management techniques of Disaster: Basic principles of disasters management, disaster management cycle, political, social, economic impacts of disasters, gender and social issues during disasters, principles of psychosocial issues and recovery during emergency situations, Impact of disaster on development, different stake holders in disaster relief, refugee operations during disasters, human resettlement and rehabilitation issues during and after disasters, intersectorial coordination during disasters, models in disasters

UNIT –II (6)

Disaster Risk and Vulnerability: Introduction to disaster risk and vulnerability, risk analysis techniques, process of risk assessment, analytical systems for risk assessment, natural hazard/ risk assessment, understanding climate risk, mapping of risk assessment, decision making for risk reduction, problems in risk assessment, strategies for risk reduction, community-based risk reduction; observation and perception of vulnerability, vulnerability identification, vulnerability types and dimensions, vulnerability and social and economic factors

Preparedness and Response:Disaster preparedness significance & measures, institutionalmechanism for disaster preparedness, disaster preparedness policy & programmes, concept and significance of disaster preparedness plan, community based disaster preparedness plan, prediction, early warnings and safety measures of disaster, resource mobilization, post disaster reliefs & logistics management, emergency support functions and coordination mechanism

UNIT– III (6)

Disaster Management and Governance: Institutional arrangements, disaster management strategies & approaches, Community Based Disaster Preparedness (CBDP) - components, teams, preparedness, linkages with development programmes

Disaster Response in India: Legal framework, National disaster management Act, 2005, institutions for disaster management – NDMA, NIDM, role of government agencies, NCMC committee, crisis management group, need, media, community resilience, social & economic problems, funding mechanism

UNIT - IV (6)

Disaster Risk Mitigation: Background, strengthening, Sendai framework and strengthening disaster risk governance, responsibility matrix

Disaster Recovery: Scope, approach, recovery process, steps involved in recovery process, early, mid& long-term recovery, reconstruction; coordination–central, state, & private sectors and voluntary organizations;rehabilitation–economical and psychological

Text Books:

[1] Manual on *Natural Disaster Management in India*, M C Gupta, NIDM, New Delhi, 2016*(Chapters 1- 5,7,9 &10)*

[2] N. G. Dhawan, A. S. Khan, *Disaster Management and Preparedness*, 1st ed., New Delhi: CBS Publication, 2014.*(Chapters 1,2,3,4,6,7,8 &10)*

Reference Books:

[1] Ashok Kumar and Vipul Anekant, *Challenges to internal security of India*, Tata McGraw hill,2020

[2] Larry R. Collins, *Disaster management and Preparedness*, CRC Press, 2004

[3] Tony Moore and Raj Lanka, *Hand book of Disaster and Emergency Management*, 3rd ed., Elsevier, 2006.

[4]R. K. Dave, *Disaster Management in India: Challenges and Strategies*, Prowess Publishing, 2018

[5] M. M. Sulphey, *Disaster Management*, 1st ed.,Prentice Hall of India, 2016.

[6] M. Pandey, *Disaster Management*, 1st ed., Wiley India, 2014.

[7] R. B. Singh, *Natural Hazards and Disaster Management: Vulnerability and Mitigation*, Noida: Rawat Publications, 2006

Course Learning Outcomes (COs):

On completion of this course, students will be able to ...

CO1:categorize disasters, analyse the phases of disaster management cycle and relation between disaster & development

CO2: perform risk / vulnerability assessment and devise response & preparedness strategies for risk / vulnerability reduction

CO3: identify the role of government and private agencies involved in disaster assistance

CO4: analyse the mitigation measures and recovery strategies to inculcate a culture of resilience

Course Articulation Matrix (CAM): P20AC208D DISASTER MANAGEMENT

CO		PO1	PO2	PO3	PSO1	PSO2
CO1	P20AC208D.1	2	1	1		
CO2	P20AC208D.2	2	1	1		
CO3	P20AC208D.3	1	1	-		
CO4	P20AC208D.4	2	1	-		
P20AC208D		**1.75**	**1**	**1**		

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE:: WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)

PRR-20

SCHEME OF INSTRUCTION & EVALUATION OF M.Tech. (SOFTWARE ENGINEERING)
III-SEMESTER OF 2-YEAR M.TECH DEGREE PROGRAMME

[2 Th+1 Dissertation+1 Internship]

S. No.	Course Category	Course Code	Course Title	Hours per Week			Credits	Evaluation Scheme								
								CIE							ESE	Total Marks
								I²RE - TA				Minor	MSE	Total		
				L	T	P		ATLP	CRP	CP	PPT					
1	PE	P20DS301	Professional Elective 5	3	-	-	3	8	8	8	6	10	20	60	40	100
2	OE	P20OE302	Open Elective	3	-	-	3	8	8	8	6	10	20	60	40	100
3	PROJ	P20DS303	Dissertation *Phase-I*	-	-	18	9	-	-	-	-	-	-	100	-	100
4	PROJ	P20DS304	Internship Evaluation	-	-	2	-	-	-	-	-	-	-	100	-	100
			Total	6	-	20	15	16	16	16	12	20	40	320	80	400

[L= [Lecture, T = Tutorials, P = Practicals, C = Credits, ATLP = Assignments, CRP = Course Research Paper, CP = Course Patent, PPT = Course Presentation, Minor=Minor Examination, MSE=Mid Semester Examination and ESE=End Semester Examination]

Professional Elective 5	Open Elective
P20SE301A: Data Visualization	P20OE302A: Business Analytics
P20SE301B: Social Network Analysis	P20OE302B: Industrial Safety
P20SE301C: Deep Learning	P20OE302C: Operations Research
P20DS301D: MOOCs	P20OE302D: Cost Management of Engineering Projects
	P20OE302E: Composite Materials
	P20OE302F: Waste to Energy

Total Contact Periods/Week: 26 **Total Credits: 15**

P20SE301A DATA VISUALIZATION

Class: M.Tech. III-Semester

Branch: Software Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on...

LO1: fundamentals of data visualization and categories of data

LO2: spatial and geospatial data visualization techniques

LO3: time-oriented, trees, graphs and networks based data visualization techniques

LO4: text & document visualization and research directions

UNIT – I (9)

Data Visualization: Visualization functionalities, Visualization importance, The difference between visualization and computer graphics, The visualization process, The scatter plot

Data Foundations: Types of data, Data preprocessing, Visualization foundations, The eight visual variables, Taxonomies

UNIT – II (9)

Visualization Techniques for Spatial Data: One-dimensional data, Two-dimensional data, Three-dimensional data, Visualizing volume data, Dynamic data

Visualization Techniques for Geospatial Data: Visualizing geospatial data, Map projections, Visualization of point data, Visualization of line data

UNIT – III (9)

Visualization Techniques for Time-Oriented Data: Introduction, Definitions, Characterizing time-oriented data, Relating data and time, Visualizing time-oriented data, Categorization

Visualization Techniques for Trees, Graphs, and Networks: Displaying hierarchical structures, Displaying arbitrary graphs, networks, Node-link graphs, Matrix representations for graphs

UNIT – IV (9)

Text and Document Visualization: Levels of text representations, The vector space model, Single document visualizations, Document collection visualizations

Visualization Systems: Systems based on data type, Systems based on analysis type, Toolkits, Libraries, Research directions in visualization

Text Book:

[1] Matthew O. Ward, Georges Grinstein, Daniel Keim , *Interactive Data Visualization:*
[1] *Foundations, Techniques, and Applications,* 2nd ed., Boca Raton: A K Peters/CRC Press, 2015.

Reference Books:

[1] Claus Wilke, *Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures,* 1st ed., Sebastopol: O'Reilly Media Inc, 2019.

[2] Alexandru C. Telea , *Data Visualization: Principles and Practice ,* 2nd ed., Boca Raton :CRC Press, 2015.

[3] Kristen Sosulski, *Data Visualization Made Simple Insights into Becoming Visual,* 2nd ed., Oxon: Routledge, 2015.

[4] Ben Fry, *Visualizing Data*, 1st ed., Sebastopol, O'Reilly Media Inc, 2008.

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO9: understand the fundamentals of data visualization

CO10: apply visualization techniques for representing the spatial and geospatial data

CO11: apply visualization techniques for representing the time-oriented and unstructured data

CO12: analyze text and document visualization techniques

Course Articulation Matrix (CAM): P20SE301A DATA VISUALIZATION

CO		PO1	PO2	PO3	PSO1	PSO2
CO1	*P20SE301A.1*	1	1	1	1	1
CO2	*P20SE301A.2*	2	1	2	2	2
CO3	*P20SE301A.3*	2	1	2	2	2
CO4	*P20SE301A.4*	2	1	2	2	2
P20SE301A		1.75	1	1.75	1.75	1.75

P20SE301B SOCIAL NETWORK ANALYSIS

Class:M.Tech. III-Semester **Branch:** Software Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on...
LO1: mathematical conceptsand research design
LO2: multivariate techniques, visualization and testing hypotheses
LO3: directed and undirected networks
LO4: structural equivalence and regular equivalence

UNIT – I (9)

Introduction: requirements of networks, Types of networks, Types of relations, Goals of analysis, Network variables as explanatory variables, Network variables as outcome variables

Mathematical Foundations: Introduction, Graphs, Paths and components, Adjacency matrices, Ways and modes, Matrix products

Research Design: Introduction, Experiments and field studies, Whole-network and personal-network research designs, Sources of network data, Types of nodes and types of ties, Actor attributes, Sampling and bounding, Sources of data reliability and validity issues, Ethical considerations

UNIT – II (9)

Multivariate Techniques Used in Network Analysis: Introduction, Multidimensional scaling, Correspondence analysis, Hierarchical clustering

Visualization: Introduction, Layout, Embedding node attributes, Node filtering, Ego networks, Embedding tie characteristics, Visualizing network change, Exporting visualizations, Closing comments

Testing Hypotheses: Introduction, Permutation tests, Dyadic hypotheses, Mixed dyadic–monadic hypotheses, Node-level hypotheses, Whole-network hypotheses, Exponential random graph models, Stochastic actor-oriented models (SAOMs)

UNIT – III (9)

Characterizing Whole Networks: Introduction, Cohesion, Reciprocity, Transitivity and the clustering coefficient, Triad census, Centralization and core–periphery indices

Centrality: Introduction, Basic concept, Undirected, Non-valued networks, Directed, Non-valued networks, Valued networks, Negative tie networks

Subgroups: Introduction, Cliques, Girvan–Newman algorithm, Factions and modularity optimization, Directed and valued data, Computational considerations, Performing a cohesive subgraph analysis, Supplementary material

UNIT – IV (9)

Equivalence: Introduction, Structural equivalence, Profile similarity, Blockmodels, The direct method, Regular equivalence, The REGE algorithm, Core–periphery models

Analyzing Two-mode Data: Introduction, Converting to one-mode data, Converting valued two-mode matrices to one-mode, Bipartite networks, Cohesive subgroups and community detection, Core–periphery models, Equivalence

Large Networks: Introduction, Reducing the size of problem, Choosing appropriate methods, Sampling, Small-world and scale-free networks

Text Book:

[1] Stephen P Borgatti, Martin G Everett, Jeffrey C Johnson, *Analyzing Social Networks*, 2nd ed., Melbourne, Sage publications, 2018.

Reference Books:

[1] Stanley Wasserman, Katherine Faust, *Social Network Analysis: Methods And Applications*, 1st ed., New York, Cambridge University Press, 1999.

[2] Derek.L.Hansen, BenShneiderman, Marc A. Smith, *Analyzing social media networks with NodeXL*, 1st ed., Burlington, Elsevier Publication, 2010.

[3] MaKsimTsvetovat, Alexander Kouznetsov, *Social Network Analysis for Startups*, 1st ed., California, O'Reilly Media publications, 2011.

[4] BorkoFurht, *Handbook of Social Network Technologies and Applications*, 1st ed., New York, Springer publications, 2010.

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1: illustrate networks in graph-theoretic language and identify sources and boundaries of network data

CO2: apply clustering algorithms to detect groups in proximity data and analyze testable hypotheses at the dyadic, monadic and whole-network level

CO3: analyze directed & undirected networks and evaluate measures of transitivity, reciprocity & clustering

CO4: interpret sampling methods and block models for both regular and structural equivalence

Course Articulation Matrix (CAM): P20SE301B SOCIAL NETWORK ANALYSIS

CO		PO1	PO2	PO3	PSO1	PSO2
CO1	*P20SE301B.1*	-	1	-	1	-
CO2	*P20SE301B.2*	2	1	-	2	1
CO3	*P20SE301B.3*	2	1	1	2	1
CO4	*P20SE301B.4*	2	1	1	2	1
P20SE301B		1.5	1	0.5	1.75	0.75

P20SE301C DEEP LEARNING

Class: M.Tech. III–Semester **Specialization**: Software Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on ...

LO1: machine learning and neural network fundamentals

LO2: principles and architectures of CNN and RNN

LO3: building deep networks using DL4J, TensorFlow and Keras for various applications

LO4: tuning specific deep network architectures

UNIT – I (9)

Introduction: A review of machine learning, The math behind machine learning, Regression, Classification, Clustering, Under fitting and overfitting, Optimization, Convex optimization, stochastic gradient descent, Logistic regression

Foundation of Neural Networks and Deep Learning: Neural networks, Training neural networks, Activation functions, Loss functions, Hyper parameters

UNIT –II (9)

Fundamentals of Deep Networks: Deep learning, Architectural principles of networks, Building blocks of deep networks

Major Architectures of Deep Networks: Unsupervised pretrained networks, Convolution Neural Networks (CNNs), Recurrent neural networks, Recursive neural networks

UNIT– III (9)

Building Deep Networks: Matching deep networks to the right problem, The DL4J suite of tools, Basic concepts of DL4J API, Modeling CSV data with multilayer perceptron networks, Modeling handwritten images using CNNs, Modeling sequence data by using recurrent neural networks, Using auto encoders for anomaly detection, Using variational auto encoders to reconstruct MNIST digits, Applications of deep learning in natural language processing

TensorFlow and Keras Frameworks: Neural network foundation with TensorFlow 2.0, A real example recognition of hand written digits, Predictions using liner regression, Deep convolution neural network, Recognizing CIFAR-10 images with deep learning, Answering questions about images, Style transfer

UNIT - IV (9)

Tuning Deep Networks: Basic concepts in tuning deep networks, Working with layer count, Parameter count and memory, Weight initialization strategies, Understanding learning rates, Applying methods of optimization, Regularization

Tuning Specific Deep Network Architectures: Convolution Neural Network (CNNs), Recurrent neural networks, Restricted boltzmann machines, Deep Belief Networks (DBNs)

Text Books:

[1] Josh Patterson , Adam Gibson, *Deep Learning (A Practitioner's Approach)*, 1st ed., Sebastopol CA: O'Reilly Media Inc., 2017.

[2] Antonio Gulli, Amita Kapoor, Sujit Pal, *Deep Learning with TensorFlow 2.0 and Keras*, 2nd ed., Mumbai: Packt, 2019 (Chapters : 1, 3, 4, 5).

Reference Books:

[1] Deng & Yu, *Deep Learning: Methods and Applications, 1st ed.,* USA: Now Publisher, 2013

[2] Ian Goodfellow, Yoshua Bengio, Aaron Courville, *Deep Learning*, 1st ed., Massachusetts: MIT Press, 2016.

[3] Sebastian Raschka, Vahid Mirjalili - *Python Machine Learning*, 2nd ed., Mumbai: Packt, 2019.

Course Learning Outcomes (COs):

On completion of this course, students will be able to ...

CO1: understand deep learning networks and different parameters in neural network

CO2: analyze different deep learning architectures

CO3: build deep networks using DL4J, TensorFlow and Keras frameworks

CO4: built networks with tuning deep network architectures to improve performance

Course Articulation Matrix (CAM): P20SE301C DEEP LEARNING						
CO		PO1	PO2	PO3	PSO1	PSO2
CO1	P20SE301C.1	1	1	2	2	2
CO2	P20SE301C.2	1	1	2	2	2
CO3	P20SE301C.3	2	1	2	2	2
CO4	P20SE301C.4	2	1	2	2	2
P20SE301C		**1.5**	**1**	**2**	**2**	**2**

P20OE302A : BUSINESS ANALYTICS

Class: M. Tech., III – Semester

Specialization: **SCE, DE, VE, PE, SE DS, DC & CSP**

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):

This course will develop student's knowledge in/on

LO1: fundamental concepts of business analytics and descriptive analytics
LO2: data collection and data visualization methods
LO3: text analysis and simulation methods in business analytics
LO4: social media, web and health care analytics

UNIT-I (9)

Introduction to Business Analytics: Introduction to business analytics, why analytics, business analytics: the science of data-driven decision making, business context, technology data science, descriptive analytics, predictive analytics, prescriptive analytics descriptive, predictive, and prescriptive analytics techniques, big data analytics, web and social media analytics, machine learning algorithms, framework for data-driven decision making, analytics capability building, roadmap for analytics capability building, challenges in data-driven decision making and future

Descriptive Analytics: Introduction to descriptive analytics, data types and scale, structured and unstructured data, cross-sectional, time series, and panel data, types of data measurement scales, population and sample, measures of central tendency, percentile, decile, and quartile, measures of variation

UNIT-II (9)

Data **Collection:** Introduction, the value of data, data collection preliminaries, data collection methods, data types, problem formulation preliminaries, challenges in data collection, data collation, validation and presentation, data collection in the retailing industry

Data Visualization: Introduction, motivating example, methods of data visualization, software and data visualization

UNIT-III (9)

Text Analytics: Introduction, motivating text analysis, methods of text analysis, natural language processing

Simulation: Introduction, motivating examples, simulation modeling method and case studies

UNIT-IV (9)

Applications of Business Analytics: Iintroduction, Ssocial media and web analytics, display advertising in real time, A/B experiments for measuring value of digital media and handling e-retailing challenges, strategies for mobile devices, the future of social media analytics

Health Care Analytics: Introduction, methods of health care analytics

Textbooks:

[1]. U Dinesh Kumar, Business Analytics: The Science of Data-Driven Decision Making, 1st ed., 2017. (Units-I)

[2]. Bhimasankam Pochiraju, Sridhar S, Essentials of Business Analytics: A Textbook,1st ed. Springer Nature Switzerland, 2019. (Units-II, III, IV).

Reference Books:

[1]. R N Prasad, Seema Acharya, Fundamentals of Business analytics: Big Data, 2nd ed. Wiley Publications, 2017.

[2]. Foster Provest, Tom Fawcett Data Science for Business:, 1st ed. USA: O'Reilly, 2013.

Course Learning Outcomes (COs):

On completion of this course, the students will be able to

CO5: describe the concepts of business analytics and descriptive analytics

CO6: apply the data collection and data visualization methods in business analytics

CO7: categorize text analysis and simulation methods in business analytics

CO8: apply social media & web analytics and health care analytics in real world problems

Course Articulation Matrix: P20OE302A : BUSINESS ANALYTICS							
CO		PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	P20OE302A.1	-	-	-			
CO2	P20OE302A.2	1	1	-			
CO3	P20OE302A.3	1	1	-			
CO4	P20OE302A.4	2	2	-			
P20OE302A		**1.33**	**1.33**	-			

P20OE302B INDUSTRIAL SAFETY

Class: M. Tech. III –Semester

Specialization(s): SCE, DE, VE, PE, SE, DS, DC & CSP

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on

LO1: need for safety in industries
LO2: fundamentals of maintenance engineering
LO3: causes for wear& corrosion and method of lubrication
LO4: faults tracing in equipments and importance of preventative maintenance

UNIT –I (9)

INDUSTRIAL SAFETY: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948; for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods

UNIT –II (9)

FUNDAMENTALS OF MAINTENANCE ENGINEERING: Definition and aim of maintenance engineering, primary and secondary functions and responsibility of maintenance department, types of maintenance, types and applications of tools used for maintenance, maintenance cost & its relation with replacement economy, service life of equipment

UNIT –III(9)

PREVENTION OF WEAR AND CORROSION : Wear- types, causes, effects, wear reduction methods, lubricants; types and applications, lubrication methods, general sketch, working and applications- screw down grease cup, pressure grease gun, splash lubrication, gravity lubrication, wick feed lubrication, side feed lubrication, ring lubrication, definition, principle and factors affecting the corrosion, types of corrosion, corrosion prevention methods

UNIT –IV(9)

FAULT TRACING AND PREVENTATIVE MAINTAINCE : Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment - machine tool, pump, air compressor, internal combustion engine, boiler, electrical motors, types of faults in machine tools and their general causes, periodic and preventative maintenance; advantages of preventative maintenance, Repair cycle importance

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Textbook:

[1] John Ridley and John Channing., *Safety at work*, 6th ed., UK: Elsevier Butterworth-Heinemann,2003.[Unit 1& Unit 2] chapter [2,3,5,6,7,8]

[2] Amit Gupta., "Industrial Safety and environment" Laxmi Publications (P) LTD., New Delhi., 2006., 1973., [Unit3 & Unit 4] chapters [10,11,12,13,14,15,16,17]

Reference Books:

[1] R. Keith Mobley Editor, Lindley R. Higgins Darrin J. Wikoff., *Maintenance Engineering Handbook*, 7th ed., New York: Mc Graw Hill International, 2008

[2] Mohammed Ben–Daya.,UdayKumar., Prabhakar Murthy D.N., *Introduction to Maintenance Engineering*, New Delhi: Wiley India Pvt. Ltd., 2016.

Course Learning Outcomes(COs):

Upon completion of this course, students will be able to....

CO1: summarize the principles of industrial safety and maintenance

CO2: describe the functions of maintenance department and list the types of maintenance & tools used for maintenance

CO3: identify the causes for wear ,tear& corrosion and suitable lubrication method for a given application

CO4: describe the significance of decision-tree and apply it for problems in equipment to detect and classify the faults and need of preventative maintenance.

Course Articulation Matrix (CAM) : P20OE302BINDUSTRIAL SAFERTY				
COs		PO1	PO2	PO3
CO1	P20OE302B.1	1	1	1
CO2	P20OE302B.2	1	1	1
CO3	P20OE30B.3	1	1	1
CO4	P20OE302B.4	1	1	1
P20OE302B		**1**	**1**	**1**

P20OE302C: OPERATIONS RESEARCH

Class: M.Tech. III – Semester

Specialization(s): Common to All

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1: linear programming problems
LO2: non linear optimization problem
LO3: sequencing, scheduling and network model
LO4: decision making theory and queuing models

UNIT – I (9)

Linear Programming Problem (LPP): Mathematical formulation of LPP, Solution of linear programming problems-Simplex method, artificial variable technique, Duality in LPP and Dual Simplex method; Sensitivity analysis.

UNIT –II (9)

Non-Linear Programming Problem (NLPP): Classification of NLPP, Unconstrained optimization techniques- Iterative methods - Random search methods, steepest decent method, Conjugate gradient method, Fibonacci method and Golden section method.

Constrained Optimization Techniques-- Lagrange's method and Kuhn-Tucker method.

UNIT– III (9)

Sequencing and Scheduling: Sequencing and scheduling of n jobs one, two and three machine problems, scheduling of n jobs through k machines problem.

Project Network: Network construction-CPM and PERT; Resource analysis in network problems.

UNIT - IV (9)

Decision Analysis and Game Theory: Introduction, Decisions under uncertainty-Laplace criterion, Max-min criterion, Savage Criterion and Hurwitz criterion; Game Theory-Introduction, two person zero sum games and the maximin-minimax principle; Mixed strategy games- graphical method and linear programming method, dominance property.

Queuing Theory- Elements and operating characteristics of a queuing system, Poisson queuing systems, study of single server queuing model with infinite capacity.

Text Books:

[1] Kanti swarup, P.K.Gupta, Man Mohan, *Operations Research*, S. Chand & Sons, New Delhi. 16th edn., 2013. (Chapters: 2, 4, 5, 6, 12, 16, 17, 21, 25, 27)

[2] S.S. Rao, *Optimization Techniques*, New Age International, New Delhi, 3rd edn., 2013. (Chapters: 6)

Reference Book(s):

[1] H.A. Taha, *Operations Research an Introduction*, Prentice Hall of India, 6th Edn., 2006

[2] N.D Vohra, *Quantitative Techniques in Management*, 3rd edn, TMH, 2010

Course Learning Outcomes (COs):

On completion of this course, students will be able to ...

CO1: model engineering real time problems and solve them using various LPP techniques

CO2: optimize the engineering problems using NLPP methods

CO3: apply the tools and techniques to solve sequencing and scheduling problems and project network models

CO4: analyze conflicting situations using game theory and solve various queuing model parameters

Course Articulation Matrix (CAM): P20OE302C: OPERATIONS RESEARCH

CO		PO1	PO2	PO3	PSO1	PSO2
CO1	P20OE302C.1	2	1	1		
CO2	P20OE302C.2	2	1	1		
CO3	P20OE302C.3	2	1	1		
CO4	P20OE302C.4	2	1	1		
P20OE302C		2	1	1		

P20OE302D: COST MANAGEMENT OF ENGINEERING PROJECTS

Class: M.Tech. III-Semester

Specialization(s): SCE, DE, VE, PE, SE, DS, DC & CSP

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

UNIT-I (9)

Overview of Cost Accounting: Cost concepts in decision making, Objectives of a costing system, Different costs of Projects - Relevant cost, Differential cost, Incrementalcost, Opportunity cost, Activity Based Costing.

Project: Meaning, Types of projects, Benefits of project management, Project life cycle.

UNIT-II (9)

Standard Costing: Meaning, Advantages and limitations, Standard costing in manufacturing and process industries, Standard costing and standardized costing, Standard cost and estimated cost.

Cost Control and Reduction: Cost control meaning, Distinction between cost control and cost reduction, Advantages and disadvantages of cost control and cost reduction, Cost control techniques, Essential for success of cost controls and cost reduction programme, Areas of cost reduction, Tools and techniques of cost reduction.

UNIT-III (9)

Cost Behavior and Profit Planning: Marginal Cost, Absorption Cost, Break-even analysis, Cost-Volume-Profit (CVP) analysis, Profit-Volume (PV) ratio, Sales ratio, Margin of safety.

Budgets: Budgetary control, Flexible budget, Performance based budgets, Zero based budgets.

UNIT-IV (9)

Quantitative Techniques for Cost Management: Linear Programming Problems (LPP includes graphic method and simplex method), Transportation problems, Assignment problems.

Text Books:

[1] S.P. Jain, K.L.Narang, *Advanced Cost Accounting*, New Delhi: Kalyani Publishers, 2014 (Chapter 7, 10 ,11 13, 14, 16 &27)

[2] N.D. Vohra, *Quantitative Techniques in Management*, 3rd ed. New Delhi: Tata McGraw Hill Book Co. Ltd. 2007 (Chapter 2,3, 5 and 6)

References:

[1] Ashish K. Bhattacharya, *Principles & Practices of Cost Accounting*, 3rd ed. New Delhi: Prentice Hall India Learning Private Limited, 2004.

[2] Harold Kerzner, *Project Management: A systems approach to Planning, Scheduling and Controlling,* 10th ed. New Delhi: John Wiley & Sons Inc., 2009.

[3] V K Kapoor, *Operations Research,* New Delhi: Sultan Chand & Sons, 2013.

[4] Charles T. Horngren and George Foster, *Cost Accounting A Managerial Emphasis*, New Delhi: Prentice Hall of India, 1991.

Course Learning Outcomes (Cos):

Upon completion of this course, the student will be able to...

CO1: interpret overview of cost accounting and project management

CO2: distinguish standard costing in manufacturing and process industries, estimate cost control and reduction

CO3: estimate cost behavior, profit planning and budget

CO4: apply quantitative techniques for linear programming, transportation and assignment problems

Course Articulation Matrix (CAM): P20OE302D : COST MANAGEMENT OF ENGINEERING PROJECTS						
CO		PO1	PO2	PO3	PSO1	PSO2
CO1	P20OE302D.1	1	1	1		
CO2	P20OE302D.2	1	1	1		
CO3	P20OE302D.3	2	1	1		
CO4	P20OE302D.4	2	1	1		
P20OE302D		**1.5**	**1**	**1**		

P20OE302E: COMPOSITE MATERIALS

Class: M. Tech., III -Semester

Specialization: SCE, DE, VE, PE, SE, DS, DC & CSP

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on...

LO1: composite material properties and applications

LO2: properties and applications of fibers and rule of mixture

LO3: manufacturing and applications of metal matrix, ceramic matrix and carbon-carbon composites

LO4: polymer matrix composites, manufacturing and applications

UNIT- I (9)

Composite Materials: Definition, classification, characteristics, advantages, applications, functional requirements of reinforcement and matrix, effect of reinforcement on composite performance - size, shape, distribution and volume fraction

UNIT-II (9)

Reinforcements: Preparation - layup, curing, fibers-glass, carbon, kevlar, boron, properties and applications- fibers, whiskers, particle reinforcements, mechanical behavior of composites, rule of mixtures, inverse rule of mixtures, isostrain and isostress conditions

UNIT-III (9)

Manufacturing of Metal Matrix Composites: Casting – solid state diffusion technique, cladding – hot isostatic pressing, properties and applications

Manufacturing of Ceramic Matrix Composites: Liquid metal infiltration – liquid phase sintering, properties and applications

Manufacturing of Carbon/carbon Composites: Knitting, braiding, weaving; properties and applications

UNIT-IV (9)

Manufacturing of Polymer Matrix Composites: Preparation of molding compounds and prepregs, manufacturing of polymer matrix composites - hand layup, autoclave, filament winding, compression molding and reaction injection molding, properties and applications

Text Books:

[1] Chawla K.K., *Composite Materials*, 4th ed., New York: Springer, Verlag, 2019. (*Chapters 1, 2, 5, 6, 7 & 8*)

Reference Books:

[1] Agarwal, B.D. and Broutman, L. J., *Analysis and Performance of Fiber Composites*, 4th ed., USA: John Wiley & Sons, 2017.

[2] Strong A.B., *Fundamentals of Composite Manufacturing*, 2nded., SME, 2007.

[3] Sharma S.C., *Composite materials*, 1sted., New Delhi: Narosa Publications, 2000.

[4] Mathews F.L. and Rawlings R.D., *Composite materials: Engineering and Science*l, 1st ed., England: Chapman and Hall, 1994.

[5] Krishnan K., Chawla *Composite Materials Science and Engineering*, India: Springer Private Limited, 2009.

[6] P.K. Mallick, *Fiber Reinforced Composite materials, Manufacturing and Design*, New York: CRC Press, Taylor and Francis Group, 2010.

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1: classify composite materials and explain their applications

CO2: outline properties and applications of reinforcements.

CO3: categorize manufacturing methods for metal matrix composite, ceramic matrix composite, carbon/carbon composite and their properties.

CO4: compare manufacturing methods of polymer matrix composites.

Course Articulation Matrix (CAM) P20OE302E : COMPOSITE MATERIALS						
CO		PO1	PO2	PO3	PSO1	PSO2
CO1	20OE302E.1	1	1	1		
CO2	20OE302E 2	1	1	1		
CO3	20OE302E.3	1	1	1		
CO4	20OE302E.4	1	1	1		
20OE302E		**1**	**1**	**1**		

P20OE302F: WASTE TO ENERGY

Class: M.Tech. III–Semester

Specialization(s): Common to all.

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: concept of waste to energy
LO2: production of energy form waste.
LO3: technologies for waste to energy.
LO4: standards for waste to energy plants and carbon credits.

UNIT – I (9)

Introduction: Principles of waste management and waste utilization, Waste management hierarchy and 3R principle of reduce, Reuse and recycle, Waste as a resource and alternate energy source.

Waste Sources & Characterization: Waste production in different sectors such as domestic, industry and agriculture, Classification of waste – agro based, forest residues, domestic waste, industrial waste (hazardous and non-hazardous), Characterization of waste for energy utilization.

UNIT – II (9)

Technologies for Waste to Energy: Biochemical Conversion – Energy production from organic waste through anaerobic digestion and fermentation, Thermo-chemical conversion – combustion, Incineration and heat recovery, Pyrolysis, Gasification, Plasma arc technology.

Waste to Energy Options: Landfill gas, Collection and recovery, Refuse Derived Fuel (RDF) – Fluff, Briquettes, Pellet, Alternate Fuel Resource (AFR) – Production and use in cement plants, Thermal power plants and Industrial boilers, Conversion of wastes to fuel resources for other useful energy applications, Energy from plastic wastes – Non-recyclable plastic waste for energy recovery, Energy recovery from wastes and optimization of its use, benchmarking and standardization, Energy analysis.

UNIT – III (9)

Energy production: Waste activities – Collection, Segregation, Transportation and Storage requirements, Location and Siting of 'Waste to Energy' plants, Industry specific applications – In-house use – Sugar, Distillery, Pharmaceuticals, Pulp and Paper, Refinery and Petrochemical industry.

Centralized and Decentralized Waste to Energy Plants: Centralized and decentralized energy production, distribution and use, Comparison of centralized and decentralized systems and its operations.

UNIT-IV (9)

Waste to Energy & Environmental Implications: Environmental standards for waste to energy plant operations and gas clean-up, Savings on non-renewable fuel resources.

Carbon Credits: Carbon foot print calculations and Carbon credits transfer mechanisms.

Text Book:

[1] *Waste to Resources: A Waste Management Handbook*, NewDelhi: TERI Press,2014. (Unit – I, III & IV)

[2] Sunil Pandey, *Industrial and Urban Waste Management in India*, New Delhi : TERI Press, 2015 (Unit –II)

Reference Books:

[1] Banwari Lal and Patwardhan ,*Wealth from Waste: Trends and Technologies*, New Delhi :TERI Press, 2014.

[2] S.N Mukhopadhyay, *Fundamentals of waste and Environmental Engineering*, New Delhi: TERI Press, 2016.

[3] Gazette Notification on Waste Management Rules 2016.

[4] CPCB Guidelines for Co-processing in Cement/Power/Steel Industry.

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1: outline the operations of waste sources and alternate energy sources
CO2: adopt waste to energy technologies
CO3: list the stages of waste to energy production
CO4: appraise environmental standards and estimate carbon foot print.

Course Articulation Matrix: P20OE302F WASTE TO ENERGY						
CO		**PO1**	**PO2**	**PO3**	**PSO1**	**PSO2**
CO1	P20OE302F.1	1	1	1	-	-
CO2	P20OE302F.2	1	1	1	-	-
CO3	P20OE302F.3	1	1	1	-	-
CO4	P20OE302F.4	1	1	1	-	-
P20OE302F		1	1	1		-

P20OE302G : RENEWABLE ENERGY SOURCES

Class: M.Tech. III – Semester

Specialization(s): SCE, DE, VE, SE, DS, DC & CSP

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):

This course will develop student's knowledge in/on

LO1: different types of renewable energy sources and principles of solar energy systems
LO2: principles of wind energy and geothermal energy systems
LO3: harnessing energy from oceans and biomass
LO4: working of fuel cells and different types of energy storage systems

UNIT-I (9)

Introduction: Conventional and non-conventional sources of energy – brief description of different renewable energy sources

Solar energy: Introduction to prospects of solar PV systems: photovoltaic effect and electrical equivalent circuit of a PV cell, dependence of a PV cell characteristic on temperature, Solar cell output characteristics, flat plate and concentrating collectors, solar applications-solar heating/cooling technique, solar distillation, drying, street lighting, domestic lighting, solar PV pumping systems

UNIT-II (9)

Wind energy: Principles of wind power, evaluation of wind intensity, operation of a wind turbine and wind power curve, different types of wind turbine generators, topography and classification of wind turbines and its applications

Geothermal Energy: Origin and types of geothermal energy, operational difficulties, liquid dominated systems

UNIT-III (9)

Energy from Oceans: Ocean temperature differences, ocean waves, energy from the waves. Introduction of tidal power, basic principle of tidal power, components of tidal power plants

Bioenergy: Introduction, bio-mass conversion technologies, photo synthesis, biogas generation, biogas from power plant wastes, methods of maintaining biogas production, utilization of biogas, biogas gasification

UNIT-IV (9)

Chemical energy sources: Introduction to fuel cells, principle of operation of fuel cell, classification of fuel cells, advantages, disadvantages and applications of fuel cells

Types of energy storage systems: Introduction, mechanical energy storage systems, batteries, ultra-capacitors, super conducting magnetic storage, applications

Case study on present scenario of energy generation in India

Textbooks:

[1] Rai G.D, *Non-Conventional Energy Sources*, 4th ed., New Delhi: Khanna Publishers, 2010.

Reference books:

[1] B.H. Khan, *Non-conventional Energy Resources*, 2nd ed., New Delhi: McGraw Hill Publishers, 2006.

[2] Felix A. Farret, M. Godoy Simoes, *Integration of Alternative Sources of Energy*, New York: John Wiley & Sons, 2006.

[3] Bansal N. K. Kaleeman and M. Miller, *Renewable Energy Sources and Conversion Technology*, New Delhi: Mc Graw-Hill Publishers, 2006.

[4] Duffie and Beckman, *Solar Energy Thermal Process*, New York: John Wiley & Sons, 2006.

Course Learning Outcomes (COs):

Upon completion of this course, the student will be able to...

CO1: compare conventional and non-conventional energy resources; describe solar cell characteristics and discuss applications of solar energy

CO2: compute power output of wind and describe principle of geothermal energy system

CO3: describe harnessing of electric power from oceans and biomass

CO4: describe principle of operation of fuel cells and list different types of energy storage systems

Course Articulation Matrix: P20OE302G RENEWABLE ENERGY SOURCES

CO		PO 1	PO 2	PO 3	PSO1	PSO2
CO1	P20OE302G.1	2	1	1	-	-
CO2	P20OE302G.2	2	1	1	-	-
CO3	P20OE302G.3	2	1	1	-	-
CO4	P20OE302G.4	2	1	1	-	-
P20OE302G		**2**	**1**	**1**	**-**	**-**

P20SE303 : DISSERTATION PHASE-I /INDUSTRIAL PROJECT

Class: **M.Tech. III - Semester** Branch: **Software Engineering**

Teaching Scheme:

L	T	P	C
-	-	18	9

Examination Scheme:

Continuous Internal Evaluation	100 marks
End Semester Examination	--

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in...

LO1: selecting problem based Dissertation title in one of the areas of specialization
LO2: literature review and well-documented report writing
LO3: effective technical presentation skills with creating PPTs and speaking with techinical knowledge
LO4: creating video pitch

Registration Presentation: The Registration Dissertation Presentation shall include a brief report and presentation focusing the identified topic, literature review, time schedule indicating the main tasks, and expected outcome.

Progress Presentation-I: At the end of first stage (third semester), student shall be required to submit a preliminary report of work done for evaluation to the project coordinator and present the same before the *Department Post Graduate Review Committee* (DPGRC).

Evaluation for Dissertation / Industrial Project:

Dissertation work shall be normally conducted in two stages: Dissertation *Phase-I* in third semester and Dissertation *Phase-II* in fourth semester.

Dissertation *Phase-I*:

(i) The Department *Post Graduate Review Committee (DPGRC)* shall be constituted with HoD as a Chairman, M.Tech. Coordinator as a Convener and three to five other faculty members representing various specializations in that particular programme as members.

(ii) (a) Student shall take up independent Dissertation Phase-I on innovative ideas, innovative solutions to common problems using their knowledge relevant to courses offered in their programme of study, which would supplement and complement the program assigned to each student

(or)

(b) Student shall take up industrial project (in any industry) relevant to the courses offered in their programme of study, which would supplement and complement the program assigned to each student

(iii) DPGRC shall allot a faculty supervisor to each student for guiding on
(a) Selection of topic
(b) Literature survey and 50% work to be carried out during phase-I
(c) Preparing a report in proper format
(d) Effective oral presentation on dissertation phase-I before the DPGRC
(e) Right conduct of research and academic activity to promote academic integrity
(f) Use of anti-plagiarism software to detect plagiarism in the report and submission of dissertation report within acceptable plagiarism levels

(iv) In case of students with industrial projects, internal guide shall be there to track the progress from time to time

(v) There shall be only Continuous Internal Evaluation (CIE) for Dissertation Phase-I

(vi) CIE for the Dissertation Phase-I in third semester is as follows:

Assessment	Weightage
Dissertation Phase-I Supervisor Assessment	50%
DPGRC Assessment: *(i) Registration Presentation (10%)* *(ii) Progress Report on Phase-I (10%)* *(iii) Video pitch on Phase-I (10%)* *(iv) Progress Presentation -I and viva voce (20%)*	50%
Total Weightage:	100%

Note: It is mandatory for the student to
(i) appear for progress presentation -I and viva voce to qualify for course evaluation
(ii) create a good video pitch on dissertation phase-I

(a) **Dissertation Topic:** The topic should be interesting and conducive to discussion. Topics may be found by looking through recent issues of peer reviewed Journals/Technical Magazines on the topics of potential interest
(b) **Working Model:** Each student is required to develop a working model/ process/software package/system, on the chosen work and demonstrate before the DPGRC as per the dates specified by DPGRC at the end of dissertation phase- II
(c) **Progress Report:** Each student is required to submit a well-documented progress report on dissertation phase-I as per format specified by DPGRC

(vii) The student has to register for the Dissertation Phase-I as supplementary examination in the following cases:
(a) he/she is absent for oral presentation and viva-voce
(b) he/she fails to submit the report in prescribed format
(c) he/she fails to fulfill the requirements of Dissertation Phase-I evaluation as per specified guidelines

(viii) (a) The CoE shall send a list of students registered for supplementary to the HoD concerned
(b) The DPGRC, duly constituted by the HoD, shall conduct Dissertation Phase-I evaluation and send the award list to the CoE within the stipulated time

Course Learning Outcomes (COs):
On completion of this course, students will be able to...

CO1: select current topics in their specialization and allied areas from peer reviewed journals / technical magazines/ conference proceedings
CO2: demonstrate the skills for performing literature survey, identify gaps, analyze the technical content and prepare a well-documented Dissertation report
CO3: create informative PPTs with effective oral presentation, showing knowledge on the subject and sensitivity towards social impact of the Dissertation
CO4: demonstrate Dissertation through effective video pitch

Course Articulation Matrix (CAM): P20SE303 DISSERTATION PHASE-I /INDUSTRIAL PROJECT

CO		PO 1	PO 2	PO 3	PSO 1	PSO 2
CO1	P20SE303.1	2	-	2	2	2
CO2	P20SE303.2	2	-	2	2	2
CO3	P20SE303.3	-	2	-	1	1
CO4	P20SE303.4	-	2	-	1	1
P20SE303		2	2	2	1.5	1.5

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE:: WARANGAL – 15

(An Autonomous Institute under Kakatiya University, Warangal)

PRR-20

SCHEME OF INSTRUCTION & EVALUATION OF M.Tech. (SOFTWARE ENGINEERING)

IV-SEMESTER OF 2-YEAR M.TECH DEGREE PROGRAMME

[1 Dissertation]

S. No.	Course Category	Course Code	Course Title	Hours per Week			Credits	Evaluation Scheme								
								CIE							ESE	Total Marks
								I²RE - TA				TA	MSE	Total		
				L	T	P		ATLP	CRP	CP	PPT					
1	PROJ	P20SE401	Dissertation *Phase-II*	-	-	30	15	-	-	-	-	-	-	60	40	100
Total				-	-	**30**	**15**	-	-	-	-	-	-	**60**	**40**	**100**

[L= [Lecture, T = Tutorials, P = Practicals, C = Credits, ATLP = Assignments, CRP = Course Research Paper, CP = Course Patent, PPT = Course Presentation, Minor=Minor Examination, MSE=Mid Semester Examination and ESE=End Semester Examination]

Total Contact Periods/Week: 30 **Total Credits: 15**

P20SE401 : DISSERTATION PHASE-II

Class: **M.Tech. IV - Semester** Branch: **Software Engineering**

Teaching Scheme:

L	T	P	C
-	-	30	15

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in...

LO9: recognize and formulate a problem to analyze, synthesize, evaluate, simulate and create a their project

LO10: design an innovative product by applying current knowledge and adopt to emerging applications of engineering and technology

LO11: creating PPTs and effective technical presentation and knowledge skills

LO12: writing technical paper in scientific journal style & format

Progress Presentation -II shall be conducted during the 5th /6th week of IV semester.

Progress Presentation -III shall be conducted during the 12th /13th week of IV semester.

Evaluation for Dissertation Work:

Dissertation *Phase-II*:

(i) Student has to continue the Dissertation work in 4th semester as Dissertation Phase-II

(ii) There shall be Continuous Internal Evaluation (CIE) for 60 marks and End Semester Examination for 40 marks.

(iii) The evaluation for Dissertation Phase-II is as follows:

Assessment	Weightage
Dissertation Supervisor Assessment (10%) *DPGRC* Assessment: *(i) Progress Presentation -II (10%)* *(ii) Progress Presentation -III (10%)* *(iii) Working model/process/software package/system developed (10%)* *(iv) Dissertation Video pitch (10%)* *(v) Dissertation Paper (10%)*	**60%**
End Semester Examination: *(i) Dissertation Report (20%)* *(ii) Oral presentation with PPT and viva-voce (20%)*	**40%**
Total Weightage	**100%**

Note: It is mandatory for the student to

(i) appear for oral presentation (with PPT) and viva-voce to qualify for course evaluation

(ii) write dissertation paper in given journal format

(ii) create a good video pitch on dissertation phase-I & II

(a) **Working Model:** Each student is required to develop a working model/ process/system on the chosen work and demonstrate before the DPGRC as per the dates specified by DPGRC at the end of dissertation phase-II

(b) **Dissertation Report:** Each student is required to submit a well-documented dissertation report as per the format specified by DPGRC

(c) **Anti-Plagiarism Check:** The dissertation report should clear plagiarism check as per the Anti-Plagiarism policy of the institute

(d) **Presentation:** Each student should prepare PPT with informative slides and make an effective oral presentation before the DPGRC as per the schedule notified by the department

(e) **Video Pitch:** Each student should create a pitch video, which is a video presentation on his / her dissertation Phase-I & II. Video pitch should be no longer than 5 minutes by keeping the pitch concise and to the point, which shall also include key points about his / her business idea / plan (if any) and social impact

(iv) **Dissertation Synopsis Presentation (DSP):**

(a) Students, with the consent of supervisor, shall apply to the DPGRC for conduct of dissertation synopsis presentation (DSP). This shall normally happen when the supervisor feels that the student has done significant work to qualify for M.Tech. dissertation.

(b) Those students who clear DSP shall only be allowed to submit the dissertationreport for end semester examination

(v) **Dissertation Report:**

After clearing DSP, student shall be required to submit two bound copies of dissertation report, one for the department and other for the Dissertation Supervisor.The Dissertation report shall be evaluated by the DPGRC and external examination shall be conducted on a pre-notified date.

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO5: apply knowledge to practice to design & conduct experiments and utilize modern tools for developing working models / process / system leading to innovation and entrepreneurship

CO6: design the hardware/software to demonstrate the principle of working to correlate the analytical simulation and experimental results

CO7: create informative PPT and demonstrate communication skills through effective oral presentation showing knowledge on the subject and sensitivity towards social impact of the Dissertation

CO8: write a "Dissertation paper" in scientific journal style and format from the prepared Dissertation report and create a video pitch on Dissertation

Course Articulation Matrix (CAM): P20SE401 DISSERTATION PHASE-II

CO		PO 1	PO 2	PO 3	PSO 1	PSO 2
CO1	P20SE401.1	2	-	2	2	2
CO2	P20SE401.2	2	-	2	2	2
CO3	P20SE401.3	-	2	-	1	1
CO4	P20SE401.4	-	2	-	1	1
P20SE401		2	2	2	1.5	1.5

Estd: 1980
KITSW

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE

(An Autonomous Institute under Kakatiya University, Warangal)

(Sponsored by EKASILA EDUCATION SOCIETY)

(Approved by AICTE, New Delhi; Recognised by UGC under 2(f) & 12(B)

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