



Date: 28/08/2024

Ref. No. Dfeet/MP/2024/199

NOTICE

Subject: Constitution of Board of Studies as per Deemed University norms

The Board of Studies (BoS) of the Computer Science and Engineering is constituted by the competent authority, according to the Deemed University norms, for a period of Three Years, as follows.

BoS COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

S.No	Name	Designation/Affiliation	Mobile No.
1	Dr. Manish Dixit (Head of the Department)	Chairperson	9425117866
Two experts nominated by the Vice chancellor, MITS-DU			
1	Dr. Deepak Singh Tomar	Professor and Head Department of CSE, MANIT, Bhopal	98275-25851
2	Dr. Sriparna Saha	Associate Professor Dept of CSE, IIT, Patna	88005-5979
All Professors			
1	Dr. R.S.		9425-22675
2	Dr. R.K.		9406501201
3	Dr. Anil		9425-22675
Associate Prof			
1	Not Available		
Assistant Professors of the Department (in order of seniority)			
1	Prof. Khushboo Agarwal		9981181018
2	Dr. Jaimala Jha		9967311413
3	Prof. Mahesh Parmar		9677825839

M. Pandey
(Dr. Mangaraj Pandey)

Dean

Faculty of Engineering & Technology



Date: 28/08/2024

Ref. No. Dfeot/MP/2024/ 189

NOTICE

Subject: Constitution of Board of Studies as per Deemed University norms

The Board of Studies (BoS) of the **Computer Science and Engineering** is constituted by the competent authority, according to the Deemed University norms, for a period of **Three Years**, as follows.

BoS COMPUTER SCIENCE AND ENIGNEERING DEPARTMENT

S.No	Name	Designation/Affiliation	Mobile No
1.	Dr. Manish Dixit (Head of the Department)	Chairperson	9425117866
Two experts nominated by the Vice chancellor, MITS-DU			
1.	Dr. Deepak Singh Tomar	Professor and Head Department of CSE, MANIT, Bhopal	deepaktomar@manit.ac.in 98272-25851
2.	Dr. Sriparna Saha	Associate Professor Dept of CSE, IIT, Patna	sriparna.saha@gmail.com 88095-59190
All Professors of the Department			
1.	Dr. R. S. Jadon		9425122675
2.	Dr. R. K. Gupta		9406503201
3.	Dr. Anshu Chaturvedi		9425337699
Associate Professors of the Department (in order of seniority)			
1.	Not Available		
Assistant Professors of the Department (in order of seniority)			
1.	Prof. Khushboo Agarwal		9981181018
2.	Dr. Jaimala Jha		9907313413
3.	Prof. Mahesh Parmar		9977825839


(Dr. Manjaree Pandit)
Dean

Faculty of Engineering & Technology



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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BoS Agenda Items	
Item 1	To propose the scheme structure for the Batch admitted in 2024-25 academic session under the Madhav Institute of Technology & Science-Deemed University (MITS-DU) (The total credits from I-VIII semester should not be less than 160 for this batch). The scheme structure for the Batch admitted in 2024-25 academic session under the Madhav Institute of Technology & Science-Deemed University (MITS-DU) (The total credits from I-VIII semester should not be less than 160 for this batch) were discussed and finalized. The Scheme of CSE is enclosed in <u>Annexure- 1</u>
Item 2	To review & finalize the syllabi for all courses of B. Tech I Semester (for batch admitted in 2024-25) under the flexible curriculum along with their COs. The syllabi for all courses of B. Tech I Semester (for batch admitted in 2024-25) under the flexible curriculum along with their Cos were discussed and finalized. The syllabi of CSE is enclosed in <u>Annexure- 2</u>
Item 3	To review and finalize the Experiment list/ Lab manual for all the Laboratory Courses and Micro Project-I to be offered in B.Tech. I semester along with their COs. <i>Experiment list/ Lab Manual for Departmental Laboratory Courses (DLC) Micro Project-I to be offered in B.Tech. I semester is discussed and finalized</i> <i>Same is being attached in <u>Annexure-3</u></i>
Item 4	To discuss and recommend the scheme structure for the Batch admitted in 2024-25 academic session & syllabi of I semester PG Programme under the Madhav Institute of Technology & Science-Deemed University (MITS-DU) (M.E./M.Tech./MCA/MBA/MUP) along with their Course Outcomes (COs) The scheme structure for the Batch admitted in 2024-25 academic session & syllabi of I semester PG Programme under the Madhav Institute of Technology & Science-Deemed University (MITS-DU) (M.E./M.Tech./MCA/MBA/MUP) along with their Course Outcomes (COs) were discussed and finalized. <i>Same is being attached in <u>Annexure-4</u></i>
Item 5	To review and finalize the syllabus/module of Classified Novel Engaging Course to be offered in I semester of PG programme. The syllabus/module of Classified Novel Engaging Course to be offered in I semester of PG programme were discussed and finalized. <i>Same is being attached in <u>Annexure-5</u></i>

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Item 6	To review and finalize the scheme structure for the Batch admitted in 2024-25 academic session syllabi of I Research Methodology and Ethics Ph.D. Programme under the Madhav Institute of Technology & Science-Deemed University (MITS-DU) The scheme structure for the Batch admitted in 2024-25 academic session syllabi of I Research Methodology and Ethics Ph.D. Programme under the Madhav Institute of Technology & Science-Deemed University (MITS-DU) were discussed and finalized. Same is being attached in <u>Annexure-6</u>
Item 7	Any other matter.

Present online

Dr. Deepak Singh Tomar
Professor MANIT, Bhopal

Present online

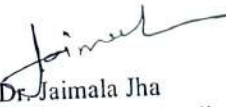
Dr. Sriparna Saha,
Associate Professor, IIT , Patna

Dr. R. K. Gupta
Professor, MITS-DU, Gwalior


Dr. R. S. Jadon
Professor, MITS-DU, Gwalior

Dr. Anshu Chaturvedi
Professor, MITS-DU, Gwalior


Ms. Khushboo Agarwal
Asst. Professor, MITS-DU, Gwalior


Dr. Jaimala Jha
Asst. Professor, MITS-DU, Gwalior


Mr. Mahesh Parmar
Asst. Professor, MITS-DU, Gwalior


Dr. Manish Dixit,
Professor & Head
Department of Computer Science and Engineering
MITS-DU, Gwalior



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Department of Computer Science and Engineering

Semester-Wise General Scheme Structure & Important Guidelines for Flexible Curriculum

(Batch admitted in Academic Session 2024-25 onwards)

Abbreviations Used

L	Lecture
T	Tutorial
P	Practical
HSMC	Humanities and Social Sciences including Management Courses
BSC	Basic Science Courses
ESC	Engineering Science Courses
DC	Departmental Core
DE	Departmental Elective
SPC	Specialization Courses
OC	Open Category
DLC	Departmental Laboratory Courses
MOOC	Massive Open Online Course
MWS	Mandatory Workshop
SP	Semester Proficiency
SIP	Skill Internship Program
SLP	Self-learning Presentation
PDC	Professional Development Component
PBL	Project Based Learning
PC	Professional Certification
MAC	Mandatory Audit Course
NEC	Novel Engaging Course

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Department of Computer Science and Engineering
Scheme of Evaluation

B. Tech. I Semester (Computer Science and Engineering) (for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Exam.	Duration of Major Exam.
				Theory Block			Practical Block										
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment	Major Evaluation	Continuous Evaluation	Lab Work & Sessional		Major Evaluation						
1.	15241101	DC	Emerging Technologies in Computer Science	20	20	30	30	-	-	100	3	-	-	3	Face to Face	MCQ	2 Hrs
2.	15241102	ESC	Computer Programming	20	20	30	30	-	-	100	2	-	-	2	Face to Face	MCQ	2 Hrs
3.	15241103	DC	Digital Electronics	20	20	30	30	-	-	100	2	1	-	3	Face to Face	pp	2 Hrs
4.	15241104	DC	Cyber World and Security Concern	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
5.	15241105	BSC	Engineering Mathematics-I	20	20	30	30	-	-	100	3	-	-	3	Face to Face	pp	2 Hrs
6.	15241106	DLC	Computer Programming Lab	20	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	15241107	DLC	Digital Electronics Lab	20	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
8.	15241108	SP	Semester Proficiency ¹	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
9.	15241109	PBL	Micro Project-I ²	-	-	-	-	70	30	100	-	-	2	1	Experimental	SO	-
10.	15241110	HSMC	Language Lab	-	-	-	-	70	30	100	-	-	2	1	Blended	AO	-
11.	NECXXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	-	50	50	-	1	-	1	Interactive	SO	-
Total				100	100	150	150	330	170	1000	12	03	10	20	-	-	-
12.	15241112	MAC	Universal Human Values & Professional Ethics (UHVPE)	20	20	30	30	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
13.	15241113	MWS	Mandatory Workshop on Indian Constitution and Traditional Knowledge at Department Level (Duration: Two Days)	-	-	-	-	-	-	-	-	-	-	GRADE	Interactive	MCQ	-

Induction programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.

Skill Internship Program (Soft Skill): Minimum 45 hours duration: To be Created in II Semester.

¹Semester Proficiency- includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

MCQ: Multiple Choice Question AO: Assignment + Oral PP: Pen Paper SO: Submission + Oral OB: Open Book

²Micro Project-I will be presented and evaluated through an interdisciplinary project evaluation committee.

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
1	1	1	3	0	0	0	2	1	1	0	0	0	1	1	1

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Department of Computer Science and Engineering

Department of Computer Science and Engineering														Total Credits		
Mode of Learning						Mode of Examination										
Theory		Lab				NEC		Theory				Lab		NEC	SO	Credits %
Face to Face	Online	Face to Face	Blended	Experiential	Experimental	Interactive	PP	AO	MCQ	OB	SO	AO	SO			
14		1	1	1	2	1	6		8		2	3	1			20
70		5	5	5	10	5	30		40		10	15	5			Credits %

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Department of Computer Science and Engineering

Scheme of Evaluation

B. Tech. II Semester (Computer Science and Engineering) (for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted										Total Marks	Contact Hours per week			Total Credits	Mode of Learning	of Major Exam.	of Major Exam.
				Theory Block					Practical Block						L	T	P				
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment	Major Evaluation	Continuous Evaluation	Continuous Lab Work & Sessional	Major Evaluation	Continuous Evaluation										
1.	15241201	DC	Computer Graphics	20	20	30	30	-	-	-	-	100	3	-	-	3	Face to Face	MCQ	2 Hrs		
2.	15241202	DC	Object oriented Programming & Methodology	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs		
3.	15241203	DC	Computer System and Organization	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	pp	2 Hrs		
4.	15241204	DC	Operating Systems	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	pp	2 Hrs		
5.	15241205	ESC	Basic Electrical & Electronics Engineering	20	20	30	30	-	-	-	-	100	2	-	-	2	Face to Face	MCQ	2 Hrs		
6.	15241206	DLC	Computer Graphics & Modelling Lab	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	AO	-		
7.	15241207	DLC	Object oriented Programming & Methodology Lab	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	AO	-		
8.	15241208	DLC	Electrical & Electronics Engineering Lab	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	AO	-		
9.	15241209	SP	Semester Proficiency ⁵	-	-	-	-	50	-	-	-	50	-	-	2	1	Face to Face	SO	-		
10.	15241210	PBL	Micro Project-II ⁶	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	NO	-		
11.	NECXXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	-	50	-	-	50	-	1	-	1	Interactive	SO	-		
12.	SIPIXXXX	SIP	Skill Internship Program (Soft Skill)	100	100	150	150	372	188	188	188	1060	11	04	10	22	-	-	-	-	
Total				20	20	30	30	-	-	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs		
13.	15241211	MAC	Sustainability & Environmental Science	-	-	-	-	-	-	-	-	-	-	-	-	GRADE	Interactive	MCQ	-		
14.	15241212	MWS	Mandatory Workshop on Indian Knowledge System at Department Level (Duration: Two Days)	-	-	-	-	-	-	-	-	-	-	-	-	GRADE	Interactive	MCQ	-		

Summer Semester of six-eight week duration will be conducted for makeup of I & II semester examination.

Summer Semester of six-eight week duration will be conducted for makeup of I & II semester examination.

⁵Semester Proficiency- includes the weightage towards ability/skill/ competency /knowledge level /expertise attained etc. in the semester courses

MCQ: Multiple Choice Question AO: Assignment + Oral

PP: Pen Paper SO: Submission + Oral OB: Open Book

These credits will be transferred from Skill Internship Program (Soft Skill).

⁶Micro Project-II will be presented and evaluated through an interdisciplinary project evaluation committee.

HSMC	BSC	ESC	DC	DE	OC	DUC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	1	4	0	0	3	1	1	0	0	0	1	1	1

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Department of Computer Science and Engineering

Theory		Mode of Learning					Mode of Examination					Total Credits	
		Face to Face	Blended	Experiential	Experiential	Interactive	NEC	SIP	Theory	Lab	NEC		
Face to Face	Online	1	-	1	3	1	1	2	AO	SO	SO	22	
14		4.5		4.5	14	4.5	9	27.2	36.3	9	4.5	9	Credits
63.5													%

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Department of Computer Science and Engineering

Scheme of Evaluation

B. Tech. III Semester (Computer Science and Engineering) (for batch admitted in academic session 2024-25)

B. Tech. III Semester (Computer Science and Engineering)				Maximum Marks Allotted										Contact Hours per week			Mode of Learning	Mode of Major Exam.	Duration of Major Exam.		
S. No.	Course Code	Category Code	Course Name	Theory Block				Continuous Evaluation		Major Evaluation	Practical Block		Total Marks	L	T	P				Total Credits	
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment	Major Evaluation	Continuous Evaluation Lab Work & Sessional	Major Evaluation												
1.	15242101	BSC	Engineering Mathematics-II	20	20	30	30	30	-	-	-	-	100	3	-	-	3	Face to Face	pp	2 Hrs	
2.	15242102	DC	Data Structures	20	20	30	30	30	-	30	-	-	100	2	1	-	3	Face to Face	pp	2 Hrs	
3.	15242103	DC	Database Management System	20	20	30	30	30	-	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs	
4.	15242104	DC	Software Engineering	20	20	30	30	30	-	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs	
5.	15242105	DC	Computer Networks	20	20	30	30	30	-	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs	
6.	15242106	DLC	Data Structures Lab	-	-	-	-	-	-	70	30	-	100	-	-	2	1	Experimental	AO	-	
7.	15242107	DLC	Database Management System Lab	-	-	-	-	-	-	70	30	-	100	-	-	2	1	Experimental	AO	-	
8.	15242108	DLC	Problem Solving through Python Programming	-	-	-	-	-	-	70	30	-	100	-	-	2	1	Experimental	AO	-	
9.	15242109	SP	Semester Proficiency ⁵	-	-	-	-	-	-	50	-	-	50	-	-	2	1	Face to Face	SO	-	
10.	15242110	PBL	Macro Project-I*	-	-	-	-	-	-	70	30	-	100	-	-	2	1	Experimental	SO	-	
11.	15242111	SLP	Self-learning/Presentation ^{3,5} (SWAYAM/NPTEL/MOOC)	-	-	-	-	-	-	40	-	-	40	-	-	2	1	Mentoring	SO	-	
12.	NECXXXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	-	-	-	-	-	-	-	-	1	1	Interactive	SO	-	
Total				100	100	150	150	370	150	30	30	170	1040	11	05	12	22	GRADE	Blended	MCQ	1.5 Hrs
13.	15242112	MAC	Cyber Security	20	20	30	30	-	-	-	-	-	100	2	-	-	-	GRADE	Interactive	MCQ	-
14.	15242113	MWS	Mandatory Workshop on Internet of Things (IoT) at Department Level (Duration: Two Days)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	GRADE	Interactive	MCQ	-
Skill Internship Program (Institute Level) (Qualifier): Minimum 30 hours duration: To be Created in IV Semester																					

³Semester Proficiency- includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

MCQ: Multiple Choice Question

AO: Assignment + Oral

PP: Pen Paper SO: Submission + Oral

OB: Open Book

* Macro Project-I will be presented and evaluated through an interdisciplinary project evaluation committee.

⁵Compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance and presentation.

HSMC	BSC	ESC	DC	DE	SFC	OC	D/C	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	1	0	4	0	0	0	3	1	1	1	1	0	1	1	1

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Department of Computer Science and Engineering

Theory		Mode of Learning				Mode of Examination				Total Credits	
		Lab		Theory		Lab		Theory		Total Credits	
Face to Face	Online	Face to Face	Mentoring	Experimental	Interactive	PP	AO	MCO	OB	AO	SO
15		1	1	1	1	6		9		3	1
68.5		4.5	4.5	4.5	4.5	27.7		40.8		13.5	4.5

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2. A signature below it, to the right.
3. A signature below that, further right.
4. A signature at the bottom right.



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Department of Computer Science and Engineering

Scheme of Evaluation

B. Tech. IV Semester (Computer Science and Engineering) (for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted										Contact Hours per week			Mode of Learning	Mode of Major Exam.	Duration of Major Exam.	
				Theory Block					Practical Block					Total Marks	L	T				P
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation	Total Credits										
				Minor Evaluation-I	Minor Evaluation-II	Quiz/Assignment					Lab Work & Sessional									
1.	15242201	DC	Artificial Intelligence & Machine Learning	20	20	30	30	-	-		-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
2.	15242202	DC	Design and Analysis of Algorithms	20	20	30	30	30	-	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs	
3.	15242203	DC	Automata Theory	20	20	30	30	30	-	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs	
4.	15242204	DC	Networking with TCP/IP	20	20	30	30	30	-	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs	
5.	15242205	DC	Discrete Structure	20	20	30	30	30	-	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs	
6.	15242206	DLC	Artificial Intelligence & Machine Learning Lab	-	-	-	-	70	30	-	30	100	-	2	-	1	Experimental	AO	-	
7.	15242207	DLC	Design and Analysis of Algorithms	-	-	-	-	70	30	-	30	100	-	2	-	1	Experimental	AO	-	
8.	15242208	DLC	Competitive Programming	-	-	-	-	70	30	-	30	100	-	2	-	1	Experimental	AO	-	
9.	15242209	SP	Semester Proficiency ⁵	-	-	-	-	50	50	-	-	50	-	2	-	1	Face to Face	SO	-	
10.	15242210	PBL	Macro Project-II ⁶	-	-	-	-	70	30	-	30	100	-	2	-	1	Experimental	SO	-	
11.	15242211	PC	Professional Certification	-	-	-	-	50	50	-	-	50	-	2	-	1	Blended	SO	-	
12.	NECXXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	-	-	-	50	50	-	1	-	1	Interactive	SO	-	
13.	SIP2XXXX	SIP	Skill Internship Program	-	-	-	-	42	18	-	-	60	-	-	-	2**	Experiential	SO	-	
			Total	100	100	150	150	422	188	-	1110	11	05	12	24	-	-	-	-	
14.	15242212	MAC	Project Management, Economics & Financing	20	20	30	30	-	-	-	100	2	-	-	-	GRADE	Blended	MCQ	1.5 Hrs	
15.	15242213	MWS	Mandatory Workshop on Computer Vision at Department Level (Duration: Two Days)	-	-	-	-	-	-	-	-	-	-	-	-	GRADE	Interactive	MCQ	-	
16.	15242214	MWS	Mandatory Workshop on Life Skills at Department Level (Duration: Two Days)	-	-	-	-	-	-	-	-	-	-	-	-	GRADE	Interactive	MCQ	-	

Summer Semester of six-eight week duration will be conducted for makeup of previous semester examination.

Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree

⁵Semester Proficiency- includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

MCQ: Multiple Choice Question AO: Assignment + Oral PP: Pen Paper SO: Submission + Oral OB: Open Book

⁶ Macro Project-II will be presented and evaluated through an interdisciplinary project evaluation committee.

^{**}These credits will be transferred from Skill Internship Project.

PC	BSC	ESC	DC	DE	SFC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
1	0	0	5	0	0	0	3	1	1	1	0	0	1	1	2

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Department of Computer Science and Engineering

Theory		Mode of Learning					Mode of Examination							Total Credits	
		Lab			NEC		SIP		Theory			Lab		SIP	
Face to Face	Online	Face to Face	Blended	Experimental	Experimental	Interactive	Experiential	PP	AO	MCQ	OB	SO	AO	SO	
15		1	1	1	3	1	2	6		9		3	3	1	2
62.5		4.1	4.1	4.1	12.5	4.1	8.6	25		37.5		12.5	12.5	4.1	8.4
															Credits %

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Department of Computer Science and Engineering
Scheme of Evaluation

B. Tech. V Semester (Computer Science and Engineering) (for batch admitted in academic session 2024-25)

S. No.		Course Code	Category Code	Course Name	Maximum Marks Allotted										Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Exam.	Duration of Major Exam.
					Theory Block				Practical Block		MOOCs					L	T	P				
					Continuous Evaluation		Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam											
					Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment				Lab Work & Sessional											
1.	15243101	DC	Compiler Design		20	20	30		30						100	2	1	-	3	Face to Face	pp	2 Hrs
2.	15243102	DC	Soft Computing Techniques		20	20	30		30						100	2	1	-	3	Face to Face	MCQ	2 Hrs
3.	15243103	DC	Data Science		20	20	30		30						100	2	1	-	3	Face to Face	MCQ	2 Hrs
4.	15243104	DE	Departmental Elective* (DE-1)		-	-	-		-		-	25	75		100	3	-	-	3	Online	MCQ	3 Hrs
5.	15243105	SPC	Specialization Course (SPC-1)		20	20	30		30						100	2	1	-	3	Face to Face	pp	2 Hrs
6.	15243106	DLC	Augmented & Virtual Reality Lab								70	30			100	-	-	2	1	Experimental	AO	
7.	15243107	DLC	Data Science Lab								70	30			100	-	-	2	1	Experimental	AO	
8.	15243108	SP	Semester Proficiency ³								50				50	-	-	2	1	Face to Face	SO	
9.	15243109	PBL	Cornerstone Project								70	30			100	-	-	4	2	Experimental	SO	
Total					80	80	120		120		260	90			850	11	04	10	20			
10.	15243110	MAC	Supply Chain Management		20	20	30		30						100	2	-	-		Blended	MCQ	1.5 Hrs
11.	15243111	MWS	Mandatory Workshop on Blockchain at Department Level (Duration: Two Days)																	Interactive	MCQ	

Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree

³Semester Proficiency- includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

MCQ: Multiple Choice Question AO: Assignment + Oral PP: Pen Paper SO: Submission + Oral OB: Open Book

* Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	0	3	1	1	0	2	0	1	0	0	0	1	1	1

Theory				Lab				Mode of Learning				Mode of Examination				Total Credits
Face to Face	Online	Face to Face	Blended	Experimental	Experimental	Interactive	Experimental	Interactive	Experimental	PP	AO	MCQ	OB	SO	AO	SO
12	3	1	-	2	2	-	6	6	9	3	2	3	2	2	2	20
60	15	5	-	10	10	-	30	30	45	15	10	15	10	10	10	Credits %

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Department of Computer Science and Engineering
Scheme of Evaluation

B. Tech. VI Semester (Computer Science and Engineering) (for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted										Total Marks	Contact Hours per week			Mode of Learning	Mode of Major Exam.	Duration of Major Exam.
				Theory Block				Practical Block		MOOCs										
				Continuous Evaluation			Major Evaluation	Continuous Evaluation Lab Work & Sessional	Major Evaluation	Assignment	Exam									
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment														
1.	15243201	DC	Cloud Computing and Virtualization	20	20	30	30	-	-	-	-	100	2	1	-	Face to Face	MCQ	2 Hrs		
2.	15243202	DC	Ad-hoc Networks	20	20	30	30	-	-	-	-	100	2	1	-	Face to Face	MCQ	2 Hrs		
3.	15243203	DE	Departmental Elective* (DE-2)	-	-	-	-	-	-	-	25	75	3	-	-	Online	MCQ	3 Hrs		
4.	15243204	OC	Open Category Course (OC-1)	20	20	30	30	-	-	-	-	100	2	1	-	Face to Face	PP	2 Hrs		
5.	15243205	SPC	Specialization Course (SPC-2)	20	20	30	30	-	-	-	-	100	3	-	-	Face to Face	PP	2 Hrs		
6.	15243206	DLC	IoT & Embedded System Lab	-	-	-	-	-	30	-	-	100	-	-	2	Experimental	AO	-		
7.	15243207	DLC	Java Programming Lab	-	-	-	-	-	30	-	-	100	-	-	2	Experimental	AO	-		
8.	15243208	SP	Semester Proficiency ⁵	-	-	-	-	-	-	50	-	50	-	-	2	Face to Face	AO	-		
9.	15243209	PBL	Capstone Project	-	-	-	-	-	30	-	-	100	-	-	4	Experientia	AO	-		
Total				80	80	120	120	260	90	25	75	850	12	03	10	20	-	-	-	
10.	15243210	MAC	Disaster Management	20	20	30	30	-	-	-	-	100	2	-	-	Blended	MCQ	2 Hrs		
11.	15243211	MWS	Mandatory Workshop on Intellectual Property Rights at Department Level (Duration: Two Days)	-	-	-	-	-	-	-	-	GRADE	-	-	-	Interactive	MCQ	-		

Skill Enhancement Program/Research Internship/On Job Training for Four weeks duration (Optional)

Summer Semester of six-eight week duration will be conducted for makeup of previous semester examination.

Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree

*Semester Proficiency- includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

MCQ: Multiple Choice Question AO: Assignment + Oral PP: Pen Paper SO: Submission + Oral OB: Open Book

* Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PRL	MAC	MWS
0	0	0	2	1	1	1	2	0	1	0	0	0	1	1	1

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Mode of Learning										Mode of Examination					Total Credits
Theory			Lab			NEC	Theory			Lab		NEC			
Face to Face	Online	Face to Face	Blended	Experiential	Experiential	Interactive	PP	AO	MCQ	OB	SO	AO	SO		
12	3	1		2	2		6		9		3	2		20	
60	15	5		10	10		30		45		15	10		Credits %	

Open Category Course (OC-I)	
1	Computer Graphics
2	Software Engineering

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Department of Computer Science and Engineering

Scheme of Evaluation

B. Tech. VII Semester (Computer Science and Engineering)

(for batch admitted in academic session 2024-25)

Maximum Marks Allotted																								
S. No.	Course Code	Category Code	Course Name	Theory Block					Practical Block		MOOCs			Contact Hours per week			Total Marks	Mode of Learning	Mode of Major Exam.	Duration of Major Exam.				
				Continuous Evaluation			Major Evaluation	Continuous Evaluation Lab Work & Sessional	Major Evaluation	Assignment	Exam	L	T	P										
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment																		
1.	15244101	DE	Departmental Elective (DE-3) 1 Deep Learning 2 Distributed Computing 3 Advance Computer Architecture	20	20	30	30	30							3	-	-	3	Face to Face	pp	2 Hrs			
2.	15244102	DE	Departmental Elective* (DE-4)	-	-	-	-	-	-	-	-	-	-	-	3	-	-	3	Online	MCQ	3 Hrs			
3.	15244103	OC	Open Category Course (OC-2) 1 Database Management System 2 Computer Networks	20	20	30	30	30							2	1	-	3	Face to Face	pp	2 Hrs			
4.	15244104	SPC	Specialization Course (SPC-3)*	20	20	30	30	30							2	1	-	3	Face to Face	MCQ	2 Hrs			
5.	15244105	SP	Semester Proficiency ⁵	-	-	-	-	-	50						-	-	2	1	Face to Face	SO	-			
6.	15244106	DLC	Creative Problem Solving	-	-	-	-	-	70	30					-	-	2	1	Experiential	SO	-			
Total				60	60	90	90	90	120	30	25	75			10	02	04	14	-	-	-			
7.	15244107	MWS	Mandatory Workshop on Advanced Intellectual Property Rights at Department Level (Duration: Two Days)																GRADE				MCQ	-

Semester Proficiency– includes the weightage towards ability/ skill/ competency /knowledge level (assessment)

⁵Semester Proficiency- includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

MCQ: Multiple Choice Question AO: Assignment + Oral PP: Pen Paper SO: Submission + Oral OB: Open Book

*Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	0	0	2	1	1	1	0	1	0	0	0	0	0	1

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Department of Computer Science and Engineering

Theory		Mode of Learning				NEC	Mode of Examination				Total Credits	
		Lab		Theory			Lab		Theory			
Face to Face	Online	Face to Face	Blended	Experimental	Interactive	PP	AO	MCQ	OB	SO	AO	SO
9	3	1		1		6		6		2		
64.2	21.4	7.2		7.2		42.8		42.8		14.4		
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**Department of Computer Science and Engineering
Scheme of Evaluation**

B. Tech. VIII Semester (Computer Science and Engineering)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted										Contact Hours per week			Total Marks	Mode of Learning	Mode of Major Exam.	Duration of Major Exam.	
				Theory Block				Practical Block			MOOCs										
				Continuous Evaluation		Minor Evaluation II	Quiz/ Assignment	Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam	L	T	P						
				Minor Evaluation I																	
1.	15244201	DE	Departmental Elective* (DE-5)	-	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs	
2.	15244202	OC	Open Category Course* (OC-3)	-	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs	
3.	15244203	PBL	Industry Internship/ Research Internship/ Innovation & Start-up	-	-	-	-	-	-	280	120	-	400	-	-	20	10	Experiential	SO	-	
4.	15244204	PDC	Professional Development**	-	-	-	-	-	-	-	50	-	50	-	-	4	2	Interactive	SO	-	
Total				-	-	-	-	-	-	280	170	50	150	650	06	-	24	18	-	-	-

Summer Semester of six-eight week duration will be conducted to complete any backlog courses.

Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree

MCQ: Multiple Choice Question AO: Assignment + Oral PP: Pen Paper SO: Submission + Oral OB: Open Book

^aCourse run through SWAYAM/NPTEL/ MOOC Learning Based Platform

Evaluation will be based on participation/laurels brought by the students to the institution in national/state level technical and other events during the complete tenure of the UG programme (participation in professional chapter activities, club activities, cultural events, sports, personality development activities, collaborative events, MOOCs, technical events, institute/departement committees, etc.)

	HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SLP	PDC	PBL	MAC	MWS
0	0	0	0	0	1	0	1	0	0	0	0	1	1	0	0

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Specialization in Visual Information Processing						
Description	This module will help in					
Courses and Credits required	3 courses and 9 credits					
Course Category	Course ID	Course Title	Contact Hours per week			
			L	T	P	
SPC-1		Information Extraction and Retrieval	2	1		
SPC-2		Image Processing	2	1	2	
SPC-3	Elective-1	Pattern Recognition	2	1		
	Elective-2	Human Computer Interaction	2	1		

Specialization in Information Security						
Description	This module will help in					
Courses and Credits required	3 courses and 9 credits					
Course Category	Course ID	Course Title	Contact Hours per week			
			L	T	P	
SPC-1		Cryptography	2	1		
SPC-2		Network Security	2	1		
SPC-3	Elective-1	IoT and its Security	2	1		
	Elective-2	Digital Forensics	2	1		

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Emerging Technologies in Computer Science
15241101

Course Objectives:

1. To acquire knowledge of trending and emerging technologies along with their principles, issues, challenges, and mechanisms.
2. To provide a conceptual understanding of modern tools and techniques for Big data Analytics, Artificial intelligence, Cyber Security, and IoT.

Unit I – Artificial Intelligence:

Introduction: Need and Scope of AI, History, Definition of AI, Techniques of AI, Characteristics of AI applications, Basic Search Techniques, General problem solving, Speech Recognition, Natural Language Processing, Computer Vision, Introduction of expert systems

Unit II – Cloud Computing:

Introduction to cloud computing, Software as a service, platform as a service, and infrastructure as a service. Cloud deployment model: Public cloud, Private clouds, Community clouds and Hybrid clouds. Virtualization: Compute virtualization, Storage virtualization, Full and paravirtualization.

Unit III – Block Chain:

Growth of blockchain technology, Distributed systems, History of blockchain and Bitcoin, Types of blockchain. Block chain Architecture, Versions, Variants, Use cases, Life use cases of blockchain, Blockchain vs shared Database.

Unit IV – Internet of Things:

IoT definition, Characteristics, IoT conceptual and architectural framework, Components of IoT ecosystems, Review of Basic Microcontrollers and interfacing, Basic components and challenges of a sensor, Sensor features, RFID: Features & working principle.

Unit V - Big Data Analytics:

Introduction to Big data, Big data characteristics, Traditional data versus Big data, Evolution of Big data, challenges with Big Data, Technologies available for Big Data, Use of Data Analytics, Hadoop Ecosystem, Core Hadoop components, ETL Processing

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COURSE OUTCOMES:

After successful completion of the course, the learners would be able to:

CO1 **Illustrate** concepts & applications of Artificial Intelligence.

CO2 **Describe** the fundamental ideas behind Cloud Computing, the evolution of the paradigm, its applicability benefits, as well as current and future challenges;

CO3 **Understand** the basics of block chain Technology

CO4 **Describe** the Internet of Things and its hardware and software components.

CO5 **Define** the concept and challenges of Big Data, along with the basic understanding of Big Data Solutions using the Hadoop Eco System

Reference Books:-

- RadhaShankarmani, M. Vijaylakshmi, " Big Data Analytics", Wiley, Second edition
- Rich & Knight - Artificial Intelligence
- Kai Hawang, Geofrey C Fox, "Distributed and Cloud Computing"
- Cryptography and Network Security Principles and Practice Fourth Edition, William Stallings, Pearson Education
- Cuno Pfister, "Getting Started with the Internet of Things", O Reilly Media

Course Articulation Matrix

CO	PO													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2		3	3	2									2
CO2	3					2	2				1	1	2	
CO3	3	2					2					1	1	
CO4			3		3	1						1	2	
CO5	3	2		1			2			1		2		2

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COMPUTER PROGRAMMING

15241102

COURSE OBJECTIVES

- To develop the understanding of algorithms, programming approaches and program documentation techniques.
- To design and implement programming solutions for problem solving.

Unit I

Introduction to Programming, Machine Level Languages, Assembly Level Languages, High Level Languages, Program Execution and Translation Process, Problem solving using Algorithms and Flowcharts. Introduction to C Programming: Data Types, Constants, Keywords, Operators & Expressions, Precedence of operators and input/output functions.

Unit II

Control Statements and Decision Making: The goto statement, The if statement, The if- else statement, Nesting of if statements, The conditional expression, The switch statement, The while loop, The do...while loop, The for loop, The nesting of for loops, The break and continue statement.

Unit III

Arrays, Strings & Pointers: One dimensional Arrays, Passing Arrays to Functions, Multidimensional Arrays, Strings, Basics of Pointers & Addresses, Pointer to Pointer, Pointer to Array, Array of Pointers, Types of pointers, Pointer to Strings.

Unit IV

Functions & Structures: Function Basics, Function Prototypes, Passing Parameter by value and by reference, Passing string to function, Passing array to function, Function returning address, Recursion, Structures & Union, Pointer to Structure, Self-Referential Structures, Dynamic memory allocation by malloc/calloc function, Storage Classes.

Unit V

File Handling: Defining and Opening a file, Closing Files, Input/output Operations on Files, Predefined Streams, Error Handling during I/O Operations, Command Line Arguments.

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RECOMMENDED BOOKS

- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
- Paul Deitel and Harvey M. Deitel, How to Program, Pearson Publication.
- Yashavant Kanetkar, Let Us C, BPB publication.
- E. Balagurusamy, Programming in ANSI C, Tata McGraw-Hill.
- Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

COURSE OUTCOMES

After completion of the course students will be able to:

CO1: Identify situations where computational methods and computers would be useful.

CO2: Describe the basic principles of procedural programming.

CO3: Develop algorithms and flowchart for a given problem.

CO4: Analyze the problems and choose suitable programming techniques to develop solutions.

CO5: Design computer programs to solve real world problems.

Course Articulation Matrix

CO	PO													
	PO 1	PO 2	PO 3	PO 4	PO5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2
CO1		3	3			1	2					2	2	
CO2	3	1	2									1	1	
CO3		3	3	2					2		1	1		2
CO4		3	3						2	1	1			3
CO5		2	3	2		3	2		1		1		2	

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Digital Electronics

15241103

Course Objectives:

- To perform the analysis and design of various digital electronic circuits.
- To learn various number systems, boolean algebra, and logic gates.
- To understand the concept of counters, latches, flip-flops and memories.

Unit I:

Introduction to Digital Electronics, Needs and Significance, Different Number Systems: Binary Numbers, Octal and Hexadecimal Numbers, Conversions, Complement's, Signed Binary Numbers, Binary Arithmetic, Binary Codes: BCD, ASCII Codes.

Unit II:

Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Boolean Relations, Digital Logic Gates, De Morgan's Theorem, Karnaugh Maps and **simplification/minimization**, Prime Implicants **and its types**.

Unit III:

Combinational Circuits, Half Adder, Half Subtractor, Full Adder and Full Subtractor, Binary Adder-Subtractor, Binary Multiplier, Comparator, Decoders, Encoders, Multiplexers, Demultiplexer.

Unit IV:

Sequential Circuits, **Level Clocking, Latches, Flip-Flops: RS Latches, RS Flip-flop, D Latches, Edge-triggered D Flip-flop, Edge-triggered JK Flip-flop, JK Master-slave Flip-flop, T Flip-flop**; Registers, Shift Registers, Counters, Ripple Counters, Synchronous Counters.

Unit V:

Introduction to Memory, Memory Decoding, **Error Detection and Correction methods**, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices, RTL and DTL Circuits, TTL, ECL, MOS, CMOS, Application Specific Integrated Circuits.

Reference Books:

- Digital Design, Morris Mano M. and Michael D. Ciletti, IV Edition, Pearson Education.
- Digital Electronics: Principles, Devices and Applications, Anil K. Maini, Wiley.
- Modern Digital Electronics, V Edition, R.P. Jain, Kishore Sarawadekar, McGraw Hill.

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Course Outcomes:

CO1: Explain the computer architecture for defining basic component and functional unit.

CO2: Recall different number system and solve the basic arithmetic operations and Boolean functions.

CO3: Develop the understanding of combinational circuits.

CO4: Analyze the basic concept of sequential circuits.

CO5: Compare various memories.

Course Articulation Matrix

CO	PO													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		1		1		1						2	
CO2	3	2	2				1							1
CO3	2	3	2				1			1			2	
CO4	3	3	2				1			1			2	
CO5		3	1			1			1		2		1	

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Cyber World and Security Concern
15241104

COURSE OBJECTIVES

- To understand the cyber security threat landscape.
- To analyse and evaluate existing legal framework and laws on cyber security.
- To analyse and evaluate the digital payment system security and remedial measures against digital payment frauds.

Unit-I

Introduction to Cyber security: Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security

Unit-II

Cyber crime and Cyber law: Classification of cyber crimes, Common cyber crimes- cyber crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Cybercriminals modus-operandi, Reporting of cyber crimes, Remedial and mitigation measures, Legal perspective of cyber crime, IT Act 2000 and its amendments, Cyber crime and offences, Organizations dealing with Cyber crime and Cyber security in India, Case studies.

Unit-III

Social Media Overview and Security: Introduction to Social networks. Types of Social media, Social media platforms, Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media, Case studies.

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Unit-IV

E-Commerce and Digital Payments: Definition of E- Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorised banking transactions. Relevant provisions of Payment Settlement Act, 2007

Unit-V

Digital Devices Security, Tools and Technologies for Cyber Security: End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third party software, Device security policy, Cyber Security best practices, Significance of host firewall and Anti-virus, Management of host firewall and Anti-virus, Wi-Fi security, Configuration of basic security policy and permissions.

Reference Books:

- Cyber Crime Impact in the New Millennium, by R. C Mishra , Author Press. Edition 2010.
- Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011)
- Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson , 13th November, 2001)
- Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd.



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Department of Computer Science and Engineering

- Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers
- Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd.
- Fundamentals of Network Security by E. Maiwald, McGraw Hill.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Understand** the concept of Cyber security and issues and challenges associated with it.

CO2. **Understand** the cyber crimes, their nature, legal remedies and as to how report the crimes through available platforms and procedures.

CO3. **Identify** various privacy and security concerns on online Social media.

CO4. **Analyze** the basic concepts related to E-Commerce and digital payments..

CO5. **Evaluate** security aspects related to Computer and Mobiles. S

Course Articulation Matrix

CO	PO													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		2			3				1	2			2
CO2	2	3		3					1			2	3	
CO3		3			2	2			1			1	2	
CO4	3		2								1	1	2	
CO5		3		2			1		1			2		1

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Department of Engineering Mathematics and Computing

**B. Tech. (First Semesters)
Engineering Mathematics-I (CSE I SEM)**

Course Objective

- To understand the techniques of differential and integral calculus in engineering problems
- To expose the concept of ordinary differentiation equations and its various methods
- To explore matrix and its applications

Unit1:

Maclaurin's and Taylor's theorem, Partial differentiation, Euler's theorem, Jacobian, Maxima and Minima of one and two variables.

Unit2:

Concept of Beta and Gamma function and its properties, transformation of Beta function, Gamma functions, transformation of Gamma function, relation between Beta and Gamma function, Legendre's duplication formula, double & triple integral, Change of order of integration.

Unit3:

Ordinary differential equations of first and higher order, Linear higher order differential equation with constant coefficients, Homogeneous linear differential equation.

Unit4:

Second order differential equations with variable coefficients, Methods: one integral is known, Removable of first derivative, changing of independent variable and variation of parameters.

Unit5:

Matrix, Rank of Matrix, Echelon form, Normal form of matrix, Solution of simultaneous equation by elementary transformation, Consistency of equation, Eigen values and Eigen vectors, Cayley Hamilton theorem and its application to find inverse of matrix.

Course Outcomes

After completing this course, student will be able to:

CO's	Description of CO's
CO1	Apply differential calculus in basic engineering problems
CO2	Acquire the knowledge integration techniques to determine the solution of various complex problems
CO3	Solve the differential equations by various methods
CO4	Examine the ordinary differential equation of Second Order
CO5	Interpret the solution of matrix

Recommended Books:

1. E.Kreyszig: AdvanceEngineeringMathematics, JohnWiley&Sons, 10th Edition(2011).
2. R.K.Jain, S.R.K.Iyengar: AdvanceEngineeringMathematics, NarosaPublishingHousePvt.Ltd, 5th Edition(2016).
3. F.B .Hildebrand: Advanced Calculus forapplication, Englewood Cliffs, N.J. Prentice-Hall, 2nd Edition(1980).
4. B.S.Grewal: HigherEngineeringMathematics, KhannaPublishers, 43rd Edition(2015)..
5. B.V.Ramanna: HigherEngineeringMathematics, McGrawHillEducation, 1st Edition(2017).

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Computer Programming Lab
15241106

1. Write a program to find area of circle, square and rectangle.
2. Write a program to calculate simple interest.
3. Write a program to find ASCII code for a character entered by a user.
4. Write a program to check whether a number entered by user is even or odd.
5. Write a program to find the largest among three numbers entered by user.
6. Write a program to check whether a year entered by a user is Leap year or not.
7. Write a program which will calculate the roots of a quadratic equation entered by user.
8. Write a program in to create a calculator which is able to perform +, -, *, / using a switch case.
9. Write a program which generates a multiplicative table of a number entered by user.
10. Write a program which calculates sum of N natural numbers.
11. Write a program to find factors of a number entered by user.
12. Write a program which will display the reverse a number entered by user.
13. Write a program to generate Fibonacci series.
14. Write a program to check whether a three-digit number entered by user is an Armstrong number or not?
15. Write a program to check whether a number entered by user is Prime or not.
16. Write a program to generate prime numbers between 1 to n (where 'n' is an integer entered by user).
17. Write a program to search an element in an Array.
18. Write a program to sort the elements of an Array in ascending order using Bubble sort.
19. Write a program to find addition of two matrices.
20. Write a program to find factorial of number using a recursive function.
21. Write a program to add two complex numbers (use structure variable to store a complex number).







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Department of Computer Science and Engineering

Digital Electronics Lab

15241107

1. Study of basic logic gates (AND, OR, NOT, NAND, NOR, XOR, XNOR)
2. Implementation of Boolean functions using logic gates.
3. Verification of De Morgan's theorems.
4. Design and implementation of half adder and full adder circuits
5. Design and implementation of half subtractor and full subtractor circuits
6. 4-bit binary adder/subtractor circuit.
7. BCD to 7-segment display decoder
8. 4-to-1 multiplexer and 1-to-4 demultiplexer
9. To realize One & Two Bit Comparator and study of 7485 magnitude comparator
10. To study and verify Truth Table of RS Flip Flop
11. To study and verify Truth Table of D type Flip Flop.
12. To study and verify Truth Table of JK type Flip Flop.
13. To study and verify Truth Table of T Flip Flop.
14. To study and verify Truth Table of JK Master Slave Flip Flop

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Department of Computer Science and Engineering

Micro Project-I

15241109

SNO	Project Title
1	Normal Calculator
2	Store Student Information in a File using OOP
3	Store Vehicle Information in a File using OOP
4	Word Count Program
5	Find Most Frequent Item on a File
6	Encrypt data from a given File
7	Decrypt using a key
8	Perform operation using stack
9	Assign task allocation using Queue
10	Prepare a DFA
11	Convert NFA to DFA
12	Validate Keywords, identifiers using DFA
13	Store records based on Linked List
14	WebApp to Display SQL Commands
15	Break a File into Lexemes
16	Count Number of Tokens
17	Sorting of Tokens
18	Search a Token in a file
19	Design a 4-bit comparator
20	Design a parity checker
21	Design a 4-bit Ripple counter
22	Design a Synchronous counter

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Department of CSE

Scheme of Evaluation

M. Tech. I Semester (CSE)

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted										Contact Hours per week			Total Credits	Mode of Learning	Mode of Exam.	Duration of Exam.
				Theory Block					Practical Block											
				Continuous Evaluation			Major Evaluation	Continuous Evaluation Lab Work & Sessional	Major Evaluation	Total Marks	L	T	P							
				Minor Evaluation I	Minor Evaluation II	Quiz Assignment														
1.	63241101	DC	Database Systems	20	20	30	30	30	-	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs.	
2.	63241102	DC	Distributed Computing	20	20	30	30	30	-	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs.	
3.	63241103	DC	Image Processing & Computer Vision	20	20	30	30	30	-	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs.	
4.		DE	Departmental Elective (DE-1)	20	20	30	30	30	-	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs.	
5.		SC	Specialization Course (SC-1)	20	20	30	30	30	-	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs.	
6.	63241104	DLC	Lab-I [†]						70	30	30	100	-	-	4	2	Experiential	SO	-	
7.	63241105	DLC	Seminar/Presentation [‡]						70	30	30	100	-	-	4	2	Blended	SO	-	
8.	63241106	NEC	Classified Novel Engaging Course (Activity Based Learning)								50	50	-	1	-	1	Interactive	SO	-	
Total				100	100	150	150	140	110	750	13	03	08	20	-	-	-	-		

MCQ: Multiple Choice Question PP: Pen Paper SO: Submission + Oral OB: Open Book

During lab, students have to perform practical/assignments/minor projects related to the courses of respective semester using recent technologies / languages / tools etc.

Seminar/Presentation through SWAYAM / NPTEL (Registration in a course will be compulsory for students but assessment will be based on internal seminar presentation).

DE-1			Course Name	
S. No.	Course Code	Course Name		
1.	63241107	Mobile Computing & M-Commerce		
2.	63241108	Adhoc & Sensor Based Networks		
3.	63241109	Network Security		
4.	63241110	High-speed Networks		

Mode of Learning				Mode of Examination				Total Credits	
Theory		Lab		CNEC		Theory		Lab	
Face to Face	Online	Blended	Experimental	Experimental	Interactive	PP	OB	SO	
15	2	2	2	1	1	15		5	20
75	10	10	10	5	5	75		25	Credits [°]

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Department of CSE

Scheme of Evaluation

M. Tech. II Semester (CSE)

(for batch admitted in academic session 2024-25)

S. No.		Course Code	Category Code	Course Name	Maximum Marks Allotted										Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Exam.	Duration of Exam.
					Theory Block				Practical Block			MOOCs										
					Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment	Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam	L	T		P						
1.	63241201	DC	Algorithm Design Techniques & Analysis	20	20	30	30							100	3	-	-	3	Face to Face	PP	2 Hrs.	
2.	63241202	DC	Digital Watermarking & Steganalysis	20	20	30	30							100	2	1	-	3	Face to Face	PP	2 Hrs.	
3.	63241203	DC	Natural Language Processing	20	20	30	30							100	2	1	-	3	Face to Face	PP	2 Hrs.	
4.		DE	Departmental Elective (DE-2)	-	-	-	-					25	75	100	3	-	-	3	Online	MCQ	3 Hrs	
5.		SC	Specialization Course (SC-2)	20	20	30	30							100	2	1	-	3	Face to Face	PP	2 Hrs.	
6.	63241204	DLC	Lab-II	-	-	-	-		70	30				100	-	-	4	2	Experiential	SO	-	
7.	63241205	DLC	Seminar/Presentation	-	-	-	-		70	30				100	-	-	4	2	Mentoring	SO	-	
8.	63241206	NEC	Classified Novel Engaging Course (Activity Based Learning)	-	-	-	-			50				50	-	1	-	1	Interactive	SO	-	
Total				80	80	120	120	140	110	25	75	750	12	04	08	20	-	-	-	-	-	

MCO: Multiple Choice Question	pp: Pen Paper	SO: Submission + Oral	OB: Open Book

MCQ: Multiple Choice Question
PP: Pen Paper
SO: Submission + Oral
OB: Open Book

This course will run through SWAYAM/ NPTEL/ MOOC based learning platform (with circuit trainer facility). The course content related to the following topics will be covered during the semester. During job, students have to perform practical/ assignments/minor projects related to the courses of respective semester using recent technologies / languages / tools etc.

Seminar/Presentation through SWAYAM: NPTEL (Registration in a course will be compulsory for students but assessment will be based on internal seminar presentation). During lab, students have to perform practical/assignments/minor projects related to the courses of respective semester using recent technologies. (An-Engel, 2018)

DE-2* (through SWAYAM / NPTEL / MOOC)

DE-2' (through SWAYAM / NPTEL / MOOC)		
S. No.	Course Code	Course Name
1.		
2.		

Mode of Learning										Mode of Examination				Lab	Total Credits
Theory		Lab				CNEC		Theory							
Face to Face	Online	Face to Face	Blended	Experimental	Mentoring	Interactive	PP	MCQ	OB						
9	3	3		2	2	1	12	3		5	20				
45	15	15		10	10	5	60	15		25	Credits o/g				



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Department of CSE

Scheme of Evaluation

M. Tech. III Semester (CSE)

(for batch admitted in academic session 2024-25)

		Maximum Marks Allotted										Contact Hours per week			Total Credits	Mode of Learning	Mode of Exam.	Duration of Exam.
S. No.	Course Code	Category Code	Course Name	Theory Block				Practical Block		Total Marks	L	T	P					
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment	Major Evaluation	Continuous Evaluation	Major Evaluation									
1.	63242101	DLC	Preliminary Dissertation (Literature Review/ Problem Foundation/ Synopsis/ survey paper, etc.)	-	-	-	-	-	-	175	75	-	-	28	14	Interactive	SO	-
Total				-	-	-	-	-	-	175	75	-	-	28	14	-	-	-

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Scheme of Evaluation
M. Tech. IV Semester (CSE)

(for batch admitted in academic session 2024-25)

		Maximum Marks Allotted										Contact Hours per week			Total Credits	Mode of Learning	Mode of Exam.	Duration of Exam.
S. No.	Course Code	Category Code	Course Name	Theory Block			Practical Block				Total Marks	L	T	P				
				Continuous Evaluation		Major Evaluation	Continuous Evaluation	Major Evaluation										
				Minor Evaluation I	Minor Evaluation II				Quiz/ Assignment	Lab Work & Sessional								
1.	63242201	DLC	Dissertation								500	-	-	32	16	Interactive	SO	-
Total											500	-	-	32	16	-	-	-

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Scheme of Evaluation
M. Tech. IV Semester (CSE)

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted										Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Exam.	Duration of Exam.
				Theory Block					Practical Block						L	T	P				
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Lab Work & Sessional	Major Evaluation											
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment															
1.	63242201	DLC	Dissertation	-	-	-	-	-	-	-	350	150	500	-	-	32	16	Interactive	SO	-	
Total				-	-	-	-	-	-	-	350	150	500	-	-	32	16	-	-	-	

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Specialization in AI and ML					
Description	This module will help in Employability & Real-world problem solving				
Courses and Credits required	2 courses and 6 credits				
Course Category	Course ID	Course Title	Contact Hours per week		
			L	T	P
SPC-1	63241111	Pattern Recognition & Machine learning	2	1	
SPC-2	63241207	Deep Learning	2	1	

Specialization in Computing and Data Science					
Description	This module will help in Skill Enhancement				
Courses and Credits required	2 courses and 6 credits				
Course Category	Course ID	Course Title	Contact Hours per week		
			L	T	P
SPC-1	63241112	Big Data and Cloud Computing	2	1	
SPC-2	63241208	Data Analytics	2	1	



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Classified Novel Engaging Course (Activity Based Learning)

- Applied IoT
- Probability and Statistics



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DATABASE SYSTEMS

63241101

COURSE OBJECTIVES

- To understand database concepts and architecture.
- To explore transaction management and concurrency control.
- To analyze different types of distributed database systems.

UNIT I:

Review of Databases Characteristics & Implications of Database Approach. Data Models, Architectures, Database Languages & Interfaces. Classification of DBMS. Data Independence. ER-Models, High Level Conceptual Data Models. Relationships. ER-Diagrams, Design Issues

UNIT II:

Object Oriented and Extended Relational Databases: Concepts of Object-Oriented Databases, Object Identity, Object Structure and Type Constructors. Encapsulation of Operations. Methods & Persistence. Type Hierarchies and Inheritance. Object Database Standards. Object Definition Language. Object Query Language and Object Database Conceptual Design

UNIT III:

Distributed Databases Concepts Fragmentation, Replication, Allocation Techniques for Distributed Database Design. Types of Distributed Database Systems. Query Processing. Concurrency Control and Recovery. Distributed Databases in Oracle

UNIT IV:

Transaction Processing Introduction. Transaction and System Concepts. Properties of Transactions. Schedules & Recoverability, Serializability of Schedules. Transaction Support in SQL, Concurrency Control Techniques, Locking Techniques, Time Stamp Ordering. Multi Version Concurrency, Validation Concurrency, Locks for Concurrency Control

UNIT V:

Image and Multimedia Databases: Modeling and Storage of Image and Multimedia Data. Data Structures- R-Tree k-d Tree. Quad Trees. Content Based Retrieval Color Histograms, Textures etc. Image Features. Spatial and Topological Relationships. WEB Database Accessing Databases through WEB. WEB Servers XML Databases. Commercial Systems. Mobile Databases. Case Study: Oracle Xi

Recommended Books:

1. Elmars. Navathe, Somayajulu, Gupta, "Fundamental of Database Systems", 4th Edition, Pearson Education, 2007
2. R Ramakrishnan, "Database Management Systems", McGraw Hill International Editions, 1998
3. Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007.
4. Silberschatz, Korth, Sudarshan, "Database System Concepts", McGraw Hill 6th Edition. 2006

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COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1: recall the fundamental of DBMS, RDBMS, and data models.

CO2: illustrate the basic concepts of Object-Oriented data model, Extended Relational Databases, and Object Query Language

CO3: describe the Distributed Databases Concepts and Concurrency Control and Recovery

CO4: apply the Transaction Processing concepts, Concurrency Control Techniques in database system

CO5: use the Image and Multimedia Databases, Commercial Systems, Mobile Databases

Course Articulation Matrix

CO	PO													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	3						3	2	3	1
CO2	3	3	2	3	1						2	2	3	1
CO3	3	3	2	2	2						2	2	3	2
CO4	3	3	2	3	3						2	2	3	2
CO5	3	3	2	1	3						2	2	3	2

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Distributed Computing

63241102

COURSE OBJECTIVES

- To provide students contemporary knowledge of distributed systems.
- To equip students with skills to analyze and design distributed applications.
- To gain experience in the design and testing of a large software system, and to be able to communicate that design to others.

UNIT I:

Introduction To Distributed System, Communication Layered Protocols. Client Server Protocols, RPC. Group Communication Coordination, Synchronization & Consistency: Logical Clocks, Physical Clocks. Mutual Exclusion, Election Algorithms, Atomic Broadcast. Sequential Consistency Transaction Distributed Consensus. Threads, Thread Synchronization, Implementation Issues and Threads Vs RPC

UNIT II:

Models Of Distributed Computing Client Server and RPC. RPC Architecture. Exceptions. Underlying Protocols. IDL, Marshalling Etc. Group Models and Peer to Peer Groups for Service Replication/ Reliability. Groups For Parallelism/ Performance, Client Server Vs Peer-To-Peer, Multicast, Atomic Broadcast

UNIT III:

Distributed File System Security, Naming/ Location Transparency, R/W Semantics, Cache Coherence, Replication Distributed Shared Memory DSM Architecture. Consistency Models and Relation to Caching. Release Consistency. Comparison with Message Passing and RPC.

UNIT IV:

Fault Tolerant Distributed Systems Introduction, Dependability, Faults Vs Errors Vs Failure, Space Time and Value Redundancy, Fault Tolerant Architecture. Failure Detection Algorithms Partitioning, FT Consensus

UNIT V:

Distributed Multimedia System. Introduction, Characteristics. And Resource Management Stream Adaptation, Security. Introduction, Security Techniques. Cryptographic Algorithms. Authentication and Access Control, Case Study: CORBA, MACH.

Recommended Books:

1. Andrew S Tanenbaum, Distributed Systems Principles and Paradigms. Pearson
2. Pradeep K. Sinha, Distributed Operating Systems, PHI





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COURSE OUTCOMES

After completion of this course, the students would be able to:

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. **Tell** the basic elements and concepts related to distributed system Technologies.
- CO2. **Demonstrate** knowledge of the core architectural aspects of distributed systems.
- CO3. **Identify** how the resources in a distributed system are managed by algorithm.
- CO4. **Examine** the concept of distributed file system and distributed shared memory.
- CO5. **Compare** various distributed system algorithms for solving real world problems.

Course Articulation Matrix

CO	PO													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1			1							3	1
CO2	3	2	2	1									3	2
CO3	3	3	2	1			1						3	2
CO4	3	2	3	2	2	1	1		2	1		2	3	2
CO5	3	2	2			1							3	2

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HIGH-SPEED NETWORKS
63241110

Course Objectives:

- **Master Networking Models and Protocols:** Understand the TCP/IP and OSI models, Internet protocols, and addressing in high-speed networks.
- **Analyze Network-Layer Functions:** Learn routing, internetworking, congestion control, and IPv4/IPv6 addressing with multicasting protocols.
- **Understand Transport Layer Protocols:** Explore TCP, UDP, mobile transport protocols, congestion control, and network applications.
- **Explore Optical Networks and WDM Systems:** Study optical networking technologies, including WDM, optical switches, routers, and wavelength allocation.
- **Examine ATM and Wireless Networks:** Investigate ATM services, wireless/mobile ATM, VPNs, and routing in mobile ad-hoc and wireless sensor networks.

UNIT I:

Networking Fundamentals and Protocols: Review of Networking and Core Networking Protocols, TCP/IP Model, OSI Model, and Internet Protocols with Addressing. In-depth study of Routing and Internetworking, Network-Layer Routing, and Congestion Control at the Network Layer. Logical Addressing: IPv4 Addresses, IPv6, and Multicasting Techniques with relevant Protocols.

UNIT II:

Transport Layer and Application Protocols: Comprehensive overview of Transport and End-to-End Protocols, including the Transport Layer. Detailed exploration of Transmission Control Protocol (TCP) and User Datagram Protocol (UDP). Focus on Mobile Transport Protocols and TCP Congestion Control. Application Layer with emphasis on Principles of Network Applications: Web and HTTP, and File Transfer Protocol (FTP). Study Electronic Mail in the Internet, and Domain Name System (DNS).

UNIT III:

Optical Networks and WDM Systems: Detailed examination of Optical Networks, including Basic Optical Networking Devices. Study of Large-Scale Optical Switches and Optical Routers. Understanding Wavelength Allocation in Networks, WDM Network elements, and Optical Line Terminals with Amplifiers.





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UNIT IV:

ATM-based Services and Advanced Networking: In-depth study of ATM-based Services and Applications, ATM Switching, and ATM Transmission. Exploration of Wireless ATM and Mobile ATM, including Security in ATM Networks. Introduction to VPNs with Tunneling Concepts and Overlay Networks. Examination of Virtual Private Networks (VPNs) and Overlay Networks including VoIP.

UNIT V:

Mobile Ad-Hoc and Sensor Networks: Thorough understanding of Mobile Ad-Hoc Networks. Overview and study of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks, and Routing Protocols for Ad-Hoc Networks. Exploration of Wireless Sensor Networks, including Sensor Networks and Protocol Structures.

Recommended Books:

1. Data Communications and Networking, Behrouz A. Forouzan, Fourth Edition, Tata McGraw Hill, 2007
2. Computer Networks. Andrew S. Tanenbaum, Fourth Edition. Prentice Hall
3. Adhoc Wireless Networks Architecture & protocols. Sivaram Murthy PHI
4. Optical Networks. Third Generation Transport Systems. Uyless Black, Pearson
5. Optical Networks A Practical Perspective. Rajeev Ramaswami and N. Sivarajan, Morgan Kaufmann
6. ATM Networks: Concepts, Protocols, Applications, Rainer Handel, Huber and Schroder, Pearson

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1: Recall the principles of network engineering necessary for managing network systems and services.
- CO2: Classify theoretical and practical concepts involved in designing multi-constrained applications and understanding the need for service integration.
- CO3: Apply knowledge of advanced network engineering, including design, routing, management, security, and performance, with the ability to utilize industry-standard tools.
- CO4: Solve problems related to network design, routing, management, security, and performance.
- CO5: Analyze the concepts underlying various protocols, QoS architectures, mechanisms, and their key characteristics and functionalities.

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Department of Computer Science and Engineering

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	2	3	2	3	1	1	1	1	1	1	1	3	-
C02	2	3	3	3	2	1	1	1	1	1	1	1	3	3
C03	3	2	3	3	2	1	1	1	1	1	1	2	3	3
C04	2	3	2	2	3	1	1	1	1	1	1	2	3	3
C05	3	2	2	2	3	1	1	1	1	1	1	3	3	3

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Department of Computer Science and Engineering

Image Processing & Computer Vision

63241103

UNIT I:

Introduction to Image Processing Systems, Digital Image Fundamentals, Imaging Geometry, Image model, Types of Image, Image representation, Image Digitization, Digital Image Properties, 2D Convolution and correlation, Histogram.

UNIT II:

Image Preprocessing, Images Transformations, Geometric Transformations, Brightness Transformation Image Smoothing, Contrast Stretching, Basic Gray Level Function Neighborhood Averaging, Median Filtering, Low Pass Filters, Average of Multiple Images, Image Sharpening, Histogram Specification, Histogram Equalization

UNIT III:

Image Restoration and Denoising, Image Degradation, Types of Image Blur, Image Denosing, Classification of Noise in Images, Classification of Image Restoration Techniques, Image Restoration Models, Gray Level Interpolation, Inverse & Wiener Filter, Performance Metrics in Image Restoration Image Segmentation, Region Representation, Region Growing, Region Splitting and Merging, Detection of Discontinuation, Point Detection, Line Detection. Edge Detection, Lines, curves, Shape Representation, Hough transform

UNIT IV:

Object Recognition, Pattern Recognition, Knowledge Representation, Statistical Pattern Recognition, Classification Principles, Classifier Learning, Neural Nets, Syntactic Pattern Recognition, Recognition as Graph Matching.

UNIT V:

Mathematical Morphology Basic Morphological Concepts, Morphological Principles, Binary Dilation and Erosion, Opening, Closing, Properties of Morphological Operation, Boundary Detection, Region Filling, Thinning, Thickening and homotopic Skeleton

Recommended Books:

1. "Digital Image Processing" by Gonzalez & Wood
2. "Digital Image Processing" by A. K. Jain.
3. "Digital Image Processing and Computer Vision" by Sonka, Hlavac, Boyle
4. "Digital Image Processing" by S Jayaraman

COURSE OUTCOMES

After completion of this course the students would be able to:



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Department of Computer Science and Engineering

- CO1: recall the fundamental concepts Digital Image Processing system.
CO2: evaluate the techniques for image enhancement and restoration
CO3: analyzing the techniques for image segmentation
CO4: interpret object detection and pattern recognition techniques.
CO5: develop application using computer vision techniques

Course Articulation Matrix

CO	PO													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3		1	1									
CO2			2	2	2	3				2				1
CO3				2	2	3	1			2		2	1	
CO4				3	3	3	2	1		2				
CO5				3	3	3	3	2	1	3		1	3	2

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Department of Computer Science and Engineering

Pattern Recognition & Machine learning

SP-1 63241111

COURSE OBJECTIVES

- To provide a comprehensive introduction to the fundamental concepts of machine learning and pattern recognition, including supervised, unsupervised, and reinforcement learning techniques.
- To equip students with the skills to implement and apply various supervised learning algorithms, neural networks, and unsupervised learning methods for real-world problems.
- To explore advanced topics such as deep learning, Bayesian methods, hidden Markov models, and their applications in various domains like speech recognition and bioinformatics.

Unit 1: Introduction to Machine Learning and Pattern Recognition

Fundamental concepts of machine learning, Types of machine learning: supervised, unsupervised, reinforcement learning, Pattern recognition problem formulation,

Unit 2: Supervised Learning Algorithms and Bayesian Methods

Linear regression and logistic regression, Decision trees and random forests, Support vector machines (SVMs), Naive Bayes, K-Nearest Neighbors (KNN), Bayesian learning and probabilistic graphical models

Unit 3: Neural Networks and Deep Learning

Introduction to artificial neural networks, Feedforward neural networks and backpropagation, Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), Autoencoders and generative models, Bayesian deep learning (optional)

Unit 4: Unsupervised Learning, Clustering, and Dimensionality Reduction

Clustering algorithms (k-means, hierarchical clustering), Dimensionality reduction (PCA, t-SNE), Association rule mining, Anomaly detection

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Department of Computer Science and Engineering

Unit 5: Pattern Recognition and Applications Sequential Data, HMMs, and Advanced Topics
Hidden Markov Models (HMMs): structure, inference, and learning, Machine learning for HMM training (EM algorithm), Approximate inference techniques (variational Bayes), Applications of HMMs in speech, bioinformatics, and other domains, Reinforcement learning (optional)

RECOMMENDED BOOKS

- C.M.Bishop, Pattern Recognition and Machine Learning, Springer, 2006
- R.O.Duda, P.E.Hart and D.G.Stork, Pattern Classification, John Wiley, 2001
- S. Theodoridis and K. Koutroumbas, Pattern Recognition, Academic Press, 2009
- E. Alpaydin, Introduction to Machine Learning, Prentice-Hall of India, 2010

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1: Differentiate between various types of machine learning and formulate pattern recognition problems.

CO2: Implement and evaluate supervised learning algorithms.

CO3: Understand and apply artificial neural networks to solve complex problems.

CO4: Apply unsupervised learning methods to solve real world problems.

CO5: Implement and utilize various models in various domains engineering.

Course Articulation Matrix

CO	PO													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3		1	1									
CO2			2			2								1
CO3					2							2	1	
CO4				1		1		1						
CO5					2	1	1		2	1		1	3	2

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Department of Computer Science and Engineering

Big Data and Cloud Computing

SP-1 63241112

COURSE OBJECTIVES

- Develop a comprehensive understanding of big data concepts and cloud computing technologies.
 - Familiarize students with big data processing frameworks and cloud service models.
 - Introduce advanced data analytics and machine learning concepts for big data.
 - Prepare students for designing and implementing big data solutions in cloud environments.
-

Unit-I

Introduction to Big Data and Cloud Computing: Definition of Big Data, 3 V's of Big Data (Volume, Velocity, Variety), Additional V's (Veracity, Value), Big Data challenges, Introduction to Cloud Computing, Cloud service models (IaaS, PaaS, SaaS), Cloud deployment models (Public, Private, Hybrid, Community), Advantages and challenges of cloud computing.

Unit-II

Big Data Processing Frameworks: Hadoop ecosystem, HDFS architecture, MapReduce programming model, YARN, Apache Spark - RDDs, Spark SQL, Spark Streaming, GraphX, Introduction to NoSQL databases - MongoDB, Cassandra, HBase.

Unit-III

Cloud Platforms and Services: Amazon Web Services (AWS) - EC2, S3, RDS, Google Cloud Platform (GCP) - Compute Engine, Cloud Storage, BigQuery, Microsoft Azure - Virtual Machines, Blob Storage, Azure SQL Database, Comparison of cloud providers, Cloud security and privacy concerns.

Unit-IV

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Department of Computer Science and Engineering

Big Data Analytics and Machine Learning: Data preprocessing techniques for big data, Distributed machine learning algorithms, Apache Mahout, Spark MLlib, Deep learning frameworks for big data - TensorFlow, PyTorch, Big data visualization techniques and tools - Tableau, Apache Zeppelin.

Unit-V

Big Data and Cloud in Practice: Real-time big data processing with Apache Kafka and Storm, Containerization and orchestration with Docker and Kubernetes, Serverless computing for big data, Case studies of big data applications in various domains (e.g., healthcare, finance, social media), Ethical considerations in big data analytics.

RECOMMENDED BOOKS

- ☐ Tom White, "Hadoop: The Definitive Guide", O'Reilly Media.
- ☐ Matei Zaharia, Bill Chambers, "Spark: The Definitive Guide", O'Reilly Media.
- ☐ Arshdeep Bahga, Vijay Madisetti, "Big Data Science & Analytics: A Hands-On Approach", VPT.
- ☐ Rajkumar Buyya, Satish Narayana Srirama, "Fog and Edge Computing: Principles and Paradigms", Wiley.
- ☒ Dan C. Marinescu, "Cloud Computing: Theory and Practice", Morgan Kaufmann.

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. Explain** the fundamental concepts of big data and cloud computing, including their characteristics, challenges, and service models.
 - CO2. Describe** and use various big data processing frameworks and NoSQL databases for handling large-scale data.
 - CO3. Analyse** and **compare** different cloud platforms and their services for big data applications.
 - CO4. Apply** advanced data analytics and machine learning techniques to big data problems using cloud-based tools and frameworks.
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Department of Computer Science and Engineering

CO5. Design and implement big data solutions using cloud services, addressing real-world problems and ethical considerations.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1		2					1		2	3	2
CO2	3	3	2	2	3				2			2	3	3
CO3	3	3	2	2	3	1			2	2	1	2	3	3
CO4	3	3	3	3	3	2	1		2	2	2	2	3	3
CO5	3	3	3	3	3	3	2	1	3	2	2	3	3	3

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Department of CSE

Name of Faculty Mentor	Dr. Anshu Chaturvedi
Course Title	Applied IoT
Objectives of Course	1. To understand IoT concepts and architecture. 2. To design and deploy IoT systems. 3. To develop IoT applications on common platforms. 4. To analyze and visualize IoT data. 5. To collaborate on IoT projects. 6. To innovate IoT-based solutions.
Content	The course will cover a range of topics including an introduction to IoT, IoT architecture, sensors and actuators, and communication protocols. Students will learn about data collection and analysis, as well as IoT security and ethical considerations. The course will culminate in project development, where students apply their knowledge to create practical IoT solutions.
Contact Hrs	30
Outcomes of Course (As per OBE)	Students would be able to - CO1. Demonstrate an understanding of IoT concepts, architecture, and applications. - CO 2. Design IoT systems, - CO 3. Develop applications on platforms like Arduino and Raspberry Pi, - CO 4. Analyze and visualize IoT data. - CO 5. Collaborate effectively on projects, - CO 6. Innovative solutions to real-world problems.

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Department of CSE

Name of Faculty Mentor	Dr. Rohit Agrawal	
Course Title	Probability and Statistics	
Objectives of Course	1. Equip students with fundamental probability & statistics concepts and applications. 2. Develop skills to analyze and solve complex probability & statistics problems. 3. Enhance data visualization and interpretation skills.	
Content	This Course Covers Probability, conditional probability, independence, random variables, expected value, probability generating function, specific discrete and continuous distributions, covariance, correlation coefficient, central limit theorem, Central Limit Theorem, Use case on CLT, Monty Hall's Problem, Solving numerical problem solving, Data visualization and its interpretation.	
Contact Hrs	20	
Outcomes of Course (As per OBE)	Students would be able to CO 1. Interpret and apply probability, conditional probability, and independence. CO 2. Characterize and compute probabilities for discrete and continuous random variables. CO 3. Apply the Central Limit Theorem to real-world scenarios. CO 4. Solve advanced probability problems like the Monty Hall problem. CO 5. Use data visualization techniques to interpret and present statistical data.	




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ALL BRANCHES SYLLABUS FOR Ph.D COURSEWORK

RESEARCH METHODOLOGY
(Common for all the branches)

OBJECTIVE:

- To distinguish between the scientific method and general knowledge while laying the foundation for research.
- To identify and apply appropriate research methodology in order to plan, conduct and evaluate basic research.
- To explore the statistical methods and tools in research.
- To understand the philosophy of research and ethics, research integrity and publication ethics.
- To understand indexing and citation databases, open access publication, research metrics.

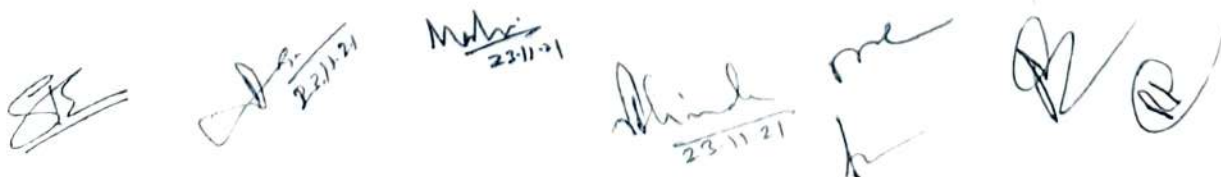
Introduction to Research Methodology: Meaning of Research, Objectives of Research, Motivations in Research, types of Research, Research Approaches, Significance of Research, Research Methods v/s Methodology, Scientific Methods, Research Process, Criteria of Good Research. **Define the Research Problem:** Concept and need of Research problem, Identification of Research problem, defining and delimiting Research problem.

Research Design: Problem Definition, variables, research design concepts, Literature survey and review, Research design process, Errors In research. **Data Collection and Representation:** Primary Data Secondary Data, Data Presentation. Processing and Analysis of Data.

Data Collection: Collections of Primary Data, Collection of Data through questionnaire and Schedules, other Observation Interview Methods, Collection of Secondary Data, Selection of appropriate method for data collection, Case Study, Focus Group Discussion, Techniques of developing research tools, viz. Questionnaire and rating scales etc. Reliability and validity of Research tools.

Descriptive Statistics: Measurement Scales, Sources of error in measurement. Measures of central Tendency (Mean, median, Mode), Measures of dispersion (range, mean deviation, standard deviation), Moments, Moments generating Function, Graphical representation of Data, Measures of Asymmetry (Skewness), Kurtosis, Correlation and Regression, Curve fitting.

Sampling Methods and Distributions: Sampling Methods, Sampling Distribution of mean, Sampling Distributions of Variance. Testing of Hypotheses-I : Basic Concepts Concerning Testing


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of Hypotheses, Procedure for Hypothesis Testing, Flow Diagram for Hypothesis Testing, Measuring the Power of a Hypothesis Test, Type I and Type II errors, Important Parametric Tests, Limitations of the Tests of Hypothesis, Chi-square Test, Non Parametric Tests, Analysis of Variance components (ANOVA) for fixed effect model; Total, treatment and error of squares, Degrees of freedom, Confidence interval, some special distribution.

Report Writing: Pre writing considerations, Thesis writing, Formats of report writing, Formats of publications in Research journals, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Report Format, Typing Instructions, Oral Presentation, Literature review software.

Philosophy and Theory of Ethics:

Nature, scope and Meaning of Ethics, Role of judgment in ethics, Ethics with respect to science and research - Intellectual honesty and research integrity - Scientific, Conduct and Plagiarism.

Redundant Publications: duplicate and overlapping publications.

Publication ethics: definition: introduction and importance - Best practices / standards setting initiatives and guidelines. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types - Violation of publication ethics, authorship and contributor ship - Identification of publication misconduct, complaints and appeals, Vanity Publications.

Reference Books:

1. C.R. Kothari: Research Methodology Methods and Techniques (Second Revised Edition), New Age, International Publication.
2. R.Panneerselvam, Research Methodology, PHI
3. Ranjit Kumar, Research methodology: a step-by-step guide for beginners, SAGE Publication, Ltd.
4. Douglas C Montgomery, Design and Analysis of Experiments, Wiley India, Fifth edition.
5. Douglas C. Montgomery and George C Runger: Applied Statistics & Probability for Engineers (Wiley India), Third edition.
6. KN Krishnswamy, Appalyer Sivakumar and M Mathirattian: Research Methodology; Integration of Principles, Methods and Techniques (Pearson Education, New Delhi)

May be Approved. *M. Q. Indic*

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