



# RBU

RAMDEOBABA UNIVERSITY, NAGPUR  
Formerly Shri Ramdeobaba College of Engineering & Management (RCOEM) Est. 1984

**RAMDEOBABA UNIVERSITY**

**COMPUTER SCIENCE & ENGINEERING**

**PROGRAMME SCHEME & SYLLABUS**

**Session 2026-27**

**B. Tech. Computer Science and Engineering [2026-27]  
Teaching & Evaluation Scheme [B. Tech CSE]**

**RAMDEOBABA UNIVERSITY, NAGPUR-13**

**Semester: I (B. Tech in Computer Science and Engineering)**

S. No	Course Type	Course Code	Course Name	Hours/Week		Credits	Maximum Marks						Total	ESE Duration (Hrs)
				L	P		Mid Semester		End Semester		Teachers Assessment			
							45		75		30			
				TH	Lab		TH	Lab	TH	Lab				
1	ESC	26CS01TP0101	Fundamentals of Programming	4	2	5	30	15	50	25	20	10	150	3 hrs
2	PCC	26EE01TH0107	Computer Architecture and Organization	3	0	3	30		50		20		100	3 hrs
3	VSEC	26CS01PR0102	<b>Domain Elective: I</b>	0	2	1		15		25		10	50	
		26CS01PR0102-1	Computer Workshop-I											
		26CS01PR0102-2	Cloud ERP-I Lab											
4	ESC	26CS01PR0103	Fundamentals of Linux OS	0	2	1		15		25		10	50	
5	VEC	26CS01TH0104	<b>Domain Elective: II</b>	2	0	2	30		50		20		100	2 hrs
		26CS01TH0104-1	Cyber Laws & Ethics in AI											
		26CS01TH0104-2	Integrated Business Process in Cloud ERP-I											
6	BSC	26HS03TH0102	<b>Domain Elective: III</b>	3	0	3	30		50		20		100	3 hrs
		26HS03TH0102-1	Discrete Mathematics											
		26HS03TH0102-2	Calculus & Linear Algebra											
7	BSC	26HS05TP0101	Introduction to Quantum Computing	3	2	4	30	15	50	25	20	10	150	3 hrs
	VEC	26HS01TP0102	Environmental Science	1	2	2	30	15		25	20	10	100	
8	CCA	26HS04PR0101	Health-Fitness-Wellbeing	0	2	1		15		25		10	50	
9	IKC/ VEC	26HS02TH0103	Humanities Elective-I	1	0	1	30				20		50	
10	BSC/ CCA	26HS02PR0102+ 26HS02PR0102-2 to 25	Humanities Elective-II	0	2	1	15		25		10		50	

<b>Humanities Elective-I</b>		26HS02TH0103-1	Foundational Literature of Indian Civilization			
		26HS02TH0103-2	Foundational Course in Universal Human Values			
<b>Humanities Elective-II</b>		26HS02PR0102-1	Professional Communication Lab			
		26HS02PR0102-2 to 25	Liberal/Performing Arts			
<b>Total Courses</b>	<b>10</b>		<b>Total Credits</b>	<b>22/20</b>	<b>Total Marks</b>	<b>850</b>

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**Semester: II (B. Tech in Computer Science and Engineering)**

S. No	Course Type	Course Code	Course Name	Hours/Week		Credits	Maximum Marks						Total	ESE Duration (Hrs)
				L	P		Mid Semester		End Semester		Teachers Assessment			
							45		75		30			
							TH	Lab	TH	Lab	TH	Lab		
1	ESC	26CS01TP0201	Object Oriented Programming	3	2	4	30	15	50	25	20	10	150	3 hrs
2	PCC	26CS01TP0202	Data Structures	3	2	4	30	15	50	25	20	10	150	3 hrs
3	PCC	26CS01TP0203	Operating Systems	3	2	4	30	15	50	25	20	10	150	3 hrs
4	VSEC	26CS01PR0204	Computer Workshop-II Lab	0	2	1		15		25		10	50	
5	BSC		<b>Domain Elective: IV</b>											
		26HS03TP0212	Calculus and Linear Algebra	3	2	4	30	25	50	25	20	-	150	3 hrs
		26CS01TP0204	Integrated Business Process in Cloud ERP-II	3	2	4	30	15	50	25	20	10	150	3 hrs
6	VEC	26HS01TP0201	Environmental Science	1	2	2	30	15		25	20	10	100	
	BSC	26HS05TP0204	Introduction to Quantum Computing	3	2	4	30	15	50	25	20	10	150	3 hrs
7	IKC/ VEC	26HS02TH0203 + 26HS02TH0204	Humanities Elective-I	1	0	1	30				20		50	
8	BSC/ CCA	26HS02PR0202 + 26HS02PR0206-1 to 17	Humanities Elective-II	0	2	1		15		25		10	50	
<b>Humanities Elective-I</b>			26HS02TH0203-2	Foundational Course in Universal Human Values										
			26HS02TH0203-1	Foundational Literature of Indian Civilization										
<b>Humanities Elective-II</b>			26HS02PR0202-1	Professional Communication Lab										
			26HS02PR0202-2 to 25	Liberal/Performing Arts										
<b>Total Courses</b>	<b>8</b>			<b>Total Credits</b>			<b>21/23</b>		<b>Total Marks</b>				<b>850</b>	

**Liberal/ Performing Art Bucket**

<b>Sr. No.</b>	<b>Course Code</b>	<b>Course Title</b>	<b>L</b>	<b>P</b>	<b>Credits</b>	<b>Continuous Evaluation</b>	<b>End Sem Exam/ Internal Evaluation</b>	<b>Total</b>	<b>ESE Duration</b>
1	26HS02PR0102-2/ 26HS02PR0202-2	Fundamentals of Indian Classical Dance: Bharatnatayam	0	2	1	25	25	50	--
2	26HS02PR0102-3/ 26HS02PR0202-3	Fundamentals of Indian Classical Dance: Kathak	0	2	1	25	25	50	--
3	26HS02PR0102-4/ 26HS02PR0202-4	Introduction to Digital Photography	0	2	1	25	25	50	--
4	26HS02PR0102-5/ 26HS02PR0202-5	Introduction to Basic Japanese Language	0	2	1	25	25	50	--
5	26HS02PR0102-6/ 26HS02PR0202-6	Art of Theatre	0	2	1	25	25	50	--
6	26HS02PR0102-7/ 26HS02PR0202-7	Introduction to French Language	0	2	1	25	25	50	--
7	26HS02PR0102-8/ 26HS02PR0202-8	Introduction to Spanish Language	0	2	1	25	25	50	--
8	26HS02PR0102-9/ 26HS02PR0202-9	Art of Painting	0	2	1	25	25	50	--
9	26HS02PR0102-10/ 26HS02PR0202-10	Art of Drawing	0	2	1	25	25	50	--
10	26HS02PR0102-11/ 26HS02PR0202-11	Nature Camp	0	2	1	25	25	50	--
11	26HS02PR0102-12/ 26HS02PR0202-12	Developing Self-awareness	0	2	1	25	25	50	--
12	26HS02PR0102-13/ 26HS02PR0202-13	Art of Poetry	0	2	1	25	25	50	--
13	26HS02PR0102-14/ 26HS02PR0202-14	Creative and Content writing	0	2	1	25	25	50	--
14	26HS02PR0102-15/ 26HS02PR0202-15	Science of life through Bhagwad Gita	0	2	1	25	25	50	--
15	26HS02PR0102-16/ 26HS02PR0202-16	Sanskrit Sambhashan Spoken Sanskrit	0	2	1	25	25	50	--
16	26HS02PR0102-17/ 26HS02PR0202-17	Kirtan Kala	0	2	1	25	25	50	--
17	26HS02PR0102-18/ 26HS02PR0202-18	Introduction to German Language and culture	0	2	1	25	25	50	--
18	26HS02PR0102-19/ 26HS02PR0202-19	Adventure Sports	0	2	1	25	25	50	--
19	26HS02PR0102-20/ 26HS02PR0202-20	Introduction to Defense Forces & Obstacle Training	0	2	1	25	25	50	--
20	26HS02PR0102-21/ 26HS02PR0202-21	First Aid & Disaster Management	0	2	1	25	25	50	--
21	26HS02PR0102-22/ 26HS02PR0202-22	Basic Nutritional Course	0	2	1	25	25	50	--
22	26HS02PR0102-23/ 26HS02PR0202-23	Stress Management Through Yoga & Meditation	0	2	1	25	25	50	--
23	26HS02PR0102-24/ 26HS02PR0202-24	Audio Recording and Dubbing	0	2	1	25	25	50	--
24	26HS02PR0102-25/ 26HS02PR0202-25	Art of Basic Filmmaking	0	2	1	25	25	50	--
25	26HS02PR0102-26/ 26HS02PR0202-26	Digital Wellness and Thought	0	2	1	25	25	50	--

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**Semester: III (B. Tech in Computer Science and Engineering)**

S. No	Course Type	Course Code	Course Name	Hours/Week		Credits	Maximum Marks						Total	ESE Duration (Hrs)
				L	P		Mid Semester		End Semester		Teachers Assessment			
							45		75		30			
							TH	Lab	TH	Lab	TH	Lab		
1	PCC	26CS01TH0301	Theory of Computation	3	0	3	30		50		20		100	3 hrs
2	PCC	26CS01TP0302	Design and Analysis of Algorithms	3	2	4	30	15	50	25	20	10	150	3 hrs
3	PCC	26CS01TP0303	Computer Networks	3	2	4	30	15	50	25	20	10	150	3 hrs
4	VSEC	26CS01PR0304	Software Lab	0	4	2		15		25		10	50	
5	BSC		<b>Domain Elective: V</b>	3	0	3	30		50		20		100	3 hrs
		26HS03TH0301	Probability and Statistics											
		26CS01TH0302	Basic ABAP Programming											
6	PCC	26CS01PR0305	Data Analytics and Visualization lab	0	4	2		15		25		10	50	
7	OE	26CSOEC01TH0306	Open Elective-I	2	0	2	30		50		20		100	2 hrs
8	MDM	26CS01TH0307	<b>Domain Elective: VI</b>	3	0	3	30		50		20		100	3 hrs
		26CS01TH0307-1	MDM - I											
		26CS01TH0307-2	Intermediate ABAP Programming											
9			Self Defence [Audit Course]	-	-	-							0	
<b>Total Courses</b>		<b>9</b>		<b>Total Credits</b>			<b>23</b>	<b>Total Marks</b>					<b>800</b>	
Open Elective-I			26CSOEC01TH0306-1	Advanced Linux (Red Hat System Administrator) RH134										
			26CSOEC01TH0306-2	Frontend Technology: Meta Front-End Developer Professional Certificate										

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**Semester: IV (B. Tech in Computer Science and Engineering)**

S. No	Course Type	Course Code	Course Name	Hours/ Week		Credits	Maximum Marks						Total	ESE Duration (Hrs)
				L	P		Mid Semester		End Semester		Teachers Assessment			
							45		75		30			
							TH	Lab	TH	Lab	TH	Lab		
1	PCC	26CS01TP0401	Compiler Design	3	2	4	30	15	50	25	20	10	150	3 hrs
2	PCC	26CS01PR0402	<b>Domain Elective: VII</b>	0	4	2	15	25	10	50	150	3 hrs		
		26CS01PR0402-1	Advanced Data Structures											
		26CS01PR0402-2	ABAP Programming Lab											
3	PCC	26CS01TP0403	Artificial Intelligence	4	2	5	30	15	50	25	20	10	150	3 hrs
4	PCC	26CS01TP0404	Database Management System	3	2	4	30	15	50	25	20	10	150	3 hrs
5	OE	26CSOEC01TH0405	Open Elective-II	2	0	2	30		50		20		100	2 hrs
6	CEP	26CS01PR0406	Community Engagement Project	0	2	1	15		25		10		50	
7	MDM	26CS01TH0407	<b>Domain Elective: VIII</b>	3	0	3	30	50	20	100	3 hrs			
		26CS01TH0407-1	MDM-II											
		26CS01TH0407-2	Advanced ABAP Programming											
<b>Total Courses</b>	<b>7</b>			<b>Total Credits</b>			<b>21</b>		<b>Total Marks</b>				<b>750</b>	
Open Elective-II		26CSOEC01TH0405-1			Mobile Development Application (Flutter)									
		26CSOEC01TH0405-2			Google Cloud Engineer									

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**Semester: V (B. Tech in Computer Science and Engineering)**

S. No	Course Type	Course Code	Course Name	Hours/ Week		Credits	Maximum Marks						Total	ESE Duration (Hrs)
				L	P		Mid Semester		End Semester		Teachers Assessment			
							45		75		30			
							TH	Lab	TH	Lab	TH	Lab		
1	PCC	26CS01TP0501	Machine Learning	3	2	4	30	15	50	25	20	10	150	3 hrs
2	PCC	26CS01TP0502	Software Engineering	3	2	4	30	15	50	25	20	10	150	3 hrs
3	PCC	26CS01TP0503	Cloud Computing	3	2	4	30	15	50	25	20	10	150	3 hrs
4	PCC	26CS01TP0504	Network Security	3	2	4	30	15	50	25	20	10	150	3 hrs
5	PEC		<b>Domain Elective: IX</b>											
		26CS01PR0505-1	Capstone Project-I	0	4	2	15	25	10	50				
		26CS01PR0505-2	Fiori Programming-I Lab											
6	OE	26CSOEC01TH0506	Open Elective-III	2	0	2	30		50		20		100	2 hrs
7	MDM	26CS01TH0507	<b>Domain Elective: X</b>	3	0	3	30	50	20	100	3 hrs			
		26CS01TH0507-1	MDM-III											
		26CS01TH0507-2	Fiori Programming-I											
<b>Total Courses</b>		<b>7</b>		<b>Total Credits</b>			<b>23</b>	<b>Total Marks</b>				<b>850</b>		
Open Elective-III		26CSOEC01TH0506-1				AWS Practitioner								
		26CSOEC01TH0506-2				Databricks Certification								

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**Semester: VI (B. Tech in Computer Science and Engineering)**

S. No	Course Type	Course Code	Course Name	Hours/Week		Credits	Maximum Marks						Total	ESE Duration (Hrs)
				L	P		Mid Semester		End Semester		Teachers Assessment			
							45		75		30			
							TH	Lab	TH	Lab	TH	Lab		
1	PCC	26CS01TP0601	Deep Learning-I	3	2	4	30	15	50	25	20	10	150	3 hrs
2	PEC	26CS01PR0602	Design Pattern	0	4	2		15		25		10	50	
3	PEC	26CS01TP0603	Program Elective –I	3	2	4	30	15	50	25	20	10	150	3 hrs
4	PEC	26CS01TP0604	Program Elective –II	3	2	4	30	15	50	25	20	10	150	3 hrs
5	PEC	26CS01TH0605	Program Elective –III	3	0	3	30		50		20		100	3 hrs
6	AEC	26HS02TP0601	Business Communication	1	2	2	30	25		25	20	-	100	-
7	VSEC	26CS01PR0606	Capstone Project-2	0	4	2		15		25		10	50	
8	MDM	26CS01TH0607	<b>Domain Elective: XI</b>	3	0	3	30		50		20		100	3 hrs
		26CS01TH0607-1	MDM-IV											
		26CS01TH0607-2	Fiori Programming-II											
<b>Total Courses</b>		<b>8</b>		<b>Total Credits</b>			<b>24</b>	<b>Total Marks</b>				<b>850</b>		

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**Semester: VII (B. Tech in Computer Science and Engineering)**

S. No	Course Type	Course Code	Course Name	Hours/Week		Credits	Maximum Marks						Total	ESE Duration (Hrs)	
				L	P		Mid Semester		End Semester		Teachers Assessment				
							45		75		30				
							TH	Lab	TH	Lab	TH	Lab			
1	PEC	26CS01TP0701	Program Elective-IV	3	2	4	30	15	50	25	20	10	150	3 hrs	
2	PEC	26CS01TP0702	Program Elective-V	3	2	4	30	15	50	25	20	10	150	3 hrs	
3	PEC	26CS01TP0703	Program Elective-VI	3	2	4	30	15	50	25	20	10	150	3 hrs	
5	VEC	26CS01PRP0705	Participative Learning	0	2	1		30				20	50		
6	PRJ	26CS01PR0706	Project – 1	0	6	3		30		50		20	100		
7	Internship	26CS01PR0707	Internship Evaluation [Min 6 Weeks]	-	-	-							0		
<b>Total Courses</b>		<b>7</b>		<b>Total Credits</b>			<b>16</b>		<b>Total Marks</b>				<b>600</b>		
<b>OR</b>															
1	PEC	26CS01TH0708	NPTEL/SWAYAM/MOOC Course	4		4	30		50		20		100	3 hrs	
2	PEC	26CS01TH0710	NPTEL/SWAYAM/MOOC Course	4		4	30		50		20		100	3 hrs	
3	Internship	26CS01PR0709	Internship-I		24	8		30		50		20	100	3 hrs	
<b>Total Courses</b>		<b>3</b>		<b>Total Credits</b>			<b>16</b>		<b>Total Marks</b>				<b>200</b>		

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**Semester: VIII (B. Tech in Computer Science and Engineering)**

S. No	Course Type	Course Code	Course Name	Hours/Week		Credits	Maximum Marks						Total	ESE Duration (Hrs)
				L	P		Mid Semester		End Semester		Teachers Assessment			
							45		75		30			
							TH	Lab	TH	Lab	TH	Lab		
1	PEC	26CS01TH0801	Program Elective-VII/NPTEL/ SWAYAM/MOOC	3	0	3	30		50		20		100	3 hrs
2	PEC	26CS01TH0802	Program Elective-VIII/ NPTEL/ SWAYAM/MOOC	3	0	3	30		50		20		100	3 hrs
3	PRJ	26CS01PR0803	Project-2	0	12	6		30		50		20	100	
<b>Total Courses</b>		<b>3</b>		<b>Total Credits</b>			<b>12</b>	<b>Total Marks</b>				<b>300</b>		
<b>OR</b>														
1	Internship		Internship-II		24	12		30		50		20	100	3 hrs
<b>Total Courses</b>		<b>3</b>		<b>Total Credits</b>			<b>12</b>	<b>Total Marks</b>				<b>100</b>		

## Elective Basket

### VI SEM:

	<b>Program Elective –I (TP)</b>	<b>Program Elective –II (TP)</b>	<b>Program Elective –III (T)</b>
<b>Course Name</b>	Basics of Ethical Hacking	Cloud Security	Incident Handling and Response
<b>Pre-requisites</b>	<i>Computer Networks</i>	<i>Computer Networks</i>	<i>Computer Networks</i>
<b>Course Name</b>	Next Generation Databases	Customer Relationship Management	Information Retrieval
<b>Pre-requisites</b>	<i>Database Management System</i>	-	<i>Data Structures</i>
<b>Course Name</b>	Computer Vision	Distributed Systems	Natural Language Processing
<b>Pre-requisites</b>	<i>Probability and Statistics, Machine Learning</i>	<i>Operating Systems, Computer Networks</i>	<i>Artificial Intelligence</i>
<b>Course Name</b>	UI/UX Design (Adobe)	Game Programming (Unity certified user Programmer)	Human-Computer Interaction
<b>Pre-requisites</b>	<i>Front End Technologies</i>	<i>Computer Vision</i>	-

## Elective Basket

### VII SEM:

	<b>Program Elective –IV (TP)</b>	<b>Program Elective –V (TP)</b>	<b>Program Elective –VI (TP)</b>
<b>Course Name</b>	Vulnerability Assessment and Penetration Testing	Auditing IT Infrastructure for Compliance Theory	Digital Forensics
<b>Pre-requisites</b>	<i>Basics of Ethical Hacking</i>	<i>Incident Handling and Response</i>	<i>Incident Handling and Response</i>
<b>Course Name</b>	System Design	Big Data Analytics	Financial Analytics
<b>Pre-requisites</b>	<i>Software Engineering</i>	<i>Database Management System</i>	<i>Probability and Statistics</i>
<b>Course Name</b>	Data Warehousing and Mining	Agentic AI	Deep Learning-II [including NVIDIA DLI Certification (i) Rapid Application Development with LLMs (ii) Introduction to Transformer-Based NLP]
<b>Pre-requisites</b>	<i>Database Management System</i>	<i>Artificial Intelligence</i>	<i>Artificial Intelligence, Deep Learning-I</i>
	Augmented and Virtual Reality (Unity certified user VR Developer)	GPU Programming (CUDA/OpenGL)	Computer Vision for AR/VR
	-	-	-
	NPTEL-I* [ADP]	NPTEL-II* [ADP]	NPTEL-III* [ADP]

## Elective Basket

### VIII SEM:

	<b>Program Elective –VII (T)</b>	<b>Program Elective –VIII (T)</b>
<b>Course Name</b>	Secure Coding	Executive Governance and Management in IT Security
<i>Pre-requisites</i>	<i>Basics of Ethical Hacking</i>	<i>Auditing IT Infrastructure for Compliance</i>
<b>Course Name</b>	Time Series Analysis & Forecasting	Multimodal Data Analysis
<i>Pre-requisites</i>	<i>Computer Networks</i>	<i>Machine Learning, Deep Learning</i>
<b>Course Name</b>	Trustworthy and Explainable AI	Reinforcement Learning
<i>Pre-requisites</i>	<i>Artificial Intelligence</i>	<i>Machine Learning</i>
<b>Course Name</b>	Real-Time Rendering & Simulation	Multiplayer Game Development
<i>Pre-requisites</i>	-	-

## Multidisciplinary Minor [MDM] Courses for CSE Students

### List of Multidisciplinary Minor [MDM] Courses offered by Department of Management Technology

#### MDM in Project Management

Sr. No.	Sem	Course Code	Name of Course	Hours per week		Credits	Maximum Marks			ESE Duration Hrs
				L	P		Continuous Evaluation	End Sem Exam	Total	
1	III	25SM05TH0301	Introduction to Engineering Project Management	3	-	3	50	50	100	3
2	IV	25SM05TH0401	Project Planning, Scheduling, and Cost Control	3	-	3	50	50	100	3
3	V	25SM05TH0501	Engineering Project Risk, Quality, and Leadership	3	-	3	50	50	100	3
4	VI	25SM05TH0601	Advanced Project Management & Capstone for Engineers	3	-	3	50	50	100	3
			<b>TOTAL</b>	<b>12</b>	<b>-</b>	<b>12</b>	<b>200</b>	<b>200</b>	<b>400</b>	

#### MDM in Human Resource Management [HRM]

Sr. No.	Sem	Course Code	Name of Course	Hours per week		Credits	Maximum Marks			ESE Duration Hrs
				L	P		Continuous Evaluation	End Sem Exam	Total	
1	III	25SM04TH0301	Organizational Behaviour	3	-	3	50	50	100	3
2	IV	25SM04TH0401	Introduction to HRM	3	-	3	50	50	100	3
3	V	25SM04TH0501	Talent Management	3	-	3	50	50	100	3
4	VI	25SM04TH0601	Strategic HR Analytics	3	-	3	50	50	100	3
			<b>TOTAL</b>	<b>12</b>	<b>-</b>	<b>12</b>	<b>200</b>	<b>200</b>	<b>400</b>	

### MDM in Banking, Financial Services and Insurance [BFSI]

Sr. No.	Sem	Course Code	Name of Course	Hours per week		Credits	Maximum Marks			ESE Duration Hrs
				L	P		Continuous Evaluation	End Sem Exam	Total	
1	III	25SM02TH0301	Financial Reporting, Statements, and Analysis	3	-	3	50	50	100	3
2	IV	25SM02TH0401	Banking and Financial Services	3	-	3	50	50	100	3
3	V	25SM02TH0501	Insurance Management	3	-	3	50	50	100	3
4	VI	25SM02TH0601	Fintech	3	-	3	50	50	100	3
			<b>TOTAL</b>	<b>12</b>	<b>-</b>	<b>12</b>	<b>200</b>	<b>200</b>	<b>400</b>	

### MDM in Entrepreneurship and Venture Development

Sr. No.	Sem	Course Code	Name of Course	Hours per week		Credits	Maximum Marks			ESE Duration Hrs
				L	P		Continuous Evaluation	End Sem Exam	Total	
1	III	25SM03TH0301	Foundations of Entrepreneurship and Venture Development	3	-	3	50	50	100	3
2	IV	25SM03TH0401	Innovation and Product Development	3	-	3	50	50	100	3
3	V	25SM03TH0501	Startup Finance & Business Strategy	3	-	3	50	50	100	3
4	VI	25SM03TH0601	Startup Sandbox		6	3	100	-	100	-
			<b>TOTAL</b>	<b>12</b>	<b>-</b>	<b>12</b>	<b>200</b>	<b>200</b>	<b>400</b>	

**List of Multidisciplinary Minor [MDM] Courses offered by  
Department of Electronics Engineering  
MDM in IoT for Environmental Sustainability**

Sr. No.	Sem	Course Code	Name of Course	Hours per week		Credits	Maximum Marks			ESE Duration Hrs
				L	P		Continuous Evaluation	End Sem Exam	Total	
1	III	26EE01TH0305-1	Introduction to IoT system Design	3	-	3	50	50	100	3
2	IV	26EE01TH0405-1	Programming for Environmental IoT	3	-	3	50	50	100	3
3	V	26EE01TH0505-1	IoT Privacy and Security	3	-	3	50	50	100	3
4	VI	26EE01TH0605-1	Use cases of Environmental IoT		6	3	100	-	100	-
			<b>TOTAL</b>	<b>12</b>	<b>-</b>	<b>12</b>	<b>200</b>	<b>200</b>	<b>400</b>	

**MDM in Integrated Circuit Design (IC design)**

Sr. No.	Sem	Course Code	Name of Course	Hours per week		Credits	Maximum Marks			ESE Duration Hrs
				L	P		Continuous Evaluation	End Sem Exam	Total	
1	III	26EE01TH0305-2	Basics of Chip Design using Verilog HDL	3	-	3	50	50	100	3
2	IV	26EE01TH0405-2	MIPS Processor Design and Testing	3	-	3	50	50	100	3
3	V	26EE01TH0505-2	Chip Verification using System Verilog	3	-	3	50	50	100	3
4	VI	26EE01TH0605-2	VLSI Physical Design		6	3	100	-	100	-
			<b>TOTAL</b>	<b>12</b>	<b>-</b>	<b>12</b>	<b>200</b>	<b>200</b>	<b>400</b>	

**Multidisciplinary Minor [MDM] Course offered by  
Department of Civil Engineering  
MDM in Civil Engineering for Sustainable Development**

Sr. No.	Sem	Course Code	Course Title	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)
				L	T	P		Contin	ouse	End Sem Exam	
1	III	24ES01TH0305	Fundamentals of Civil Infrastructure and Construction	3	0	0	3	50	50	100	3
2	IV	24ES01TH0404	Construction Materials and Technology	3	0	0	3	50	50	100	3
3	V	24ES01TH0506	Green Building Construction and Environmental Systems	3	0	0	3	50	50	100	3
4	VI	24ES01TH0607	Building Construction Methods and Management	3	0	0	3	50	50	100	3
<b>TOTAL</b>				<b>12</b>	<b>0</b>	<b>0</b>	<b>12</b>				

**List of Multidisciplinary Minor [MDM] Courses offered by  
Department of Electrical Engineering  
MDM in Renewable Energy and E-mobility**

S. No	Sem	Course Code	Course Name	L	P	C	Continuous Assessment	End Semester/ Internal Evaluation	Total	Duration of End Semester (Hrs)
1	III	26EE07TH0309	Introduction to Renewable Energy Sources	3	0	3	50	50	100	3
2	IV	26EE07TH0409	EV Architecture and Components	3	0	3	50	50	100	3
3	V	26EE07TH0509	Energy Storage Systems in E-Mobility	3	0	3	50	50	100	3
4	VI	26EE07TH0609	Autonomous Vehicle	3	0	3	50	50	100	3
<b>TOTAL</b>				<b>12</b>	<b>00</b>	<b>12</b>	200	200	400	

## MDM in Nuclear Systems

Sem	Department	Course Name	L	P	C	Continuous Assessment	End Semester/ Internal evaluation	Total	Duration of End Semester (Hrs)
III	Chemistry	Nuclear Concepts-I	3	0	3	50	50	100	3
IV	Physics	Nuclear Concepts-II	3	0	3	50	50	100	3
V	Electrical	Basics of Nuclear Measurements	3	0	3	50	50	100	3
VI	Physics	Nuclear Security and Safeguards	3	0	3	50	50	100	3
<b>TOTAL</b>			<b>12</b>	<b>00</b>	<b>12</b>	<b>200</b>	<b>200</b>	<b>400</b>	

### List of Multidisciplinary Minor [MDM] Courses offered by Department of Electronics & Communication Engineering MDM in Embedded systems and IoT

S. No	Sem	Course Code	Course Name	L	P	C	Continuous Assessment	End Semester/ Internal Evaluation	Total	Duration of End Semester (Hrs)
1	III	26EE05TH0306-1	Sensors for IoT	3	0	3	50	50	100	3
2	IV	26EE05TH0408-1	Microcontrollers and IoT Applications	3	0	3	50	50	100	3
3	V	26EE05TH0507-1	IoT System Architecture	3	0	3	50	50	100	3
4	VI	26EE05TH0608-1	Use Cases of IoT	3	0	3	50	50	100	3
<b>TOTAL</b>				<b>12</b>	<b>00</b>	<b>12</b>	<b>200</b>	<b>200</b>	<b>400</b>	

### MDM in Mobile Communication

S. No	Sem	Course Code	Course Name	L	P	C	Continuous Assessment	End Semester/ Internal Evaluation	Total	Duration of End Semester (Hrs)
1	III	26EE05TH0306-2	Fundamentals of Communication	3	0	3	50	50	100	3
2	IV	26EE05TH0408-2	Cellular Communication	3	0	3	50	50	100	3
3	V	26EE05TH0507-2	LTE Technologies	3	0	3	50	50	100	3
4	VI	26EE05TH0608-2	5G and 6G Systems	3	0	3	50	50	100	3
<b>TOTAL</b>				<b>12</b>	<b>00</b>	<b>12</b>	<b>200</b>	<b>200</b>	<b>400</b>	

**List of Multidisciplinary Minor [MDM] Courses offered by  
Department of Mechanical Engineering  
MDM in AI Modelling & Simulation**

**MDM in Defense Technology**

S. No	Se m	Course Code	Course Name	L	P	C	Continuous Assessment	End Semester/ Internal Evaluation	Total	Duration of End Semester (Hrs)
1	III	26ES03TH0307-01	Defense Platform	3	0	3	50	50	100	3
2	IV	26ES03TH0407-01	Warfare System	3	0	3	50	50	100	3
3	V	26ES03TH0507-01	Weapon System	3	0	3	50	50	100	3
4	VI	26ES03TH0607-01	Self-Defense & Protection System	3	0	3	50	50	100	3
<b>TOTAL</b>				<b>12</b>	<b>00</b>	<b>12</b>	200	200	400	

**MDM in Robotics**

S. No	Se m	Course Code	Course Name	L	P	C	Continuous Assessment	End Semester/ Internal Evaluation	Total	Duration of End Semester (Hrs)
1	III	26ES03TH0307-02	Fundamentals of Robotics	3	0	3	50	50	100	3
2	IV	26ES03TH0407-02	Kinematics of Robotics	3	0	3	50	50	100	3
3	V	26ES03TH0507-02	Mobile Robotics	3	0	3	50	50	100	3
4	VI	26ES03TH0607-02	Drone Technology	3	0	3	50	50	100	3
<b>TOTAL</b>				<b>12</b>	<b>00</b>	<b>12</b>	200	200	400	

### **MDM in AI Modelling & Simulation**

S. No	Sem	Course Code	Course Name	L	P	C	Continuous Assessment	End Semester/ Internal Evaluation	Total	Duration of End Semester (Hrs)
1	III	26ES03TH0307-03	Foundations of AI Modelling	3	0	3	50	50	100	3
2	IV	26ES03TH0407-03	Machine Learning for Simulation	3	0	3	50	50	100	3
3	V	26ES03TH0507-03	Advanced Simulation Techniques	3	0	3	50	50	100	3
4	VI	26ES03TH0607-03	AI-Driven Simulation in Practice	3	0	3	50	50	100	3
<b>TOTAL</b>				<b>12</b>	<b>00</b>	<b>12</b>	200	200	400	

### **Additional courses offered by School of CSE**

#### **Honors Programs**

##### **Honors in Full Stack Development**

Sr No	Sem	Course Code	Course Name	Hours/Week			Maximum Marks			ESE Durations on
				L	P	Credits	Continuous Evaluation	End Sem Exam	Total	
1	III	26CS01HT0301	Web Development	3	0	3	100	-	100	-
2	IV	26CS01HT0401	Full Stack-I	3	0	3	100	-	100	-
3	V	26CS01HT0501	Full Stack-II	4	0	4	100	-	100	-
4	VI	26CS01HT0601	Software Development Automation	4	0	4	100	-	100	-
5	VII	26CS01HP0701	Project	0	8	4	50	50	100	-

##### **Honors With Research**

Sr No	Sem	Course Code	Course Name	Hours/Week			Maximum Marks			ESE Durations on
				L	P	Credits	Continuous Evaluation	End Sem Exam	Total	
1	VII	26CS01HT0701	Research Methodology/ NPTEL	4	0	4	50	50	100	-
2	VII	26CS01HP0702	Project -I	0	8	4	100	100	200	-
3	VIII	26CS01HP0801	Project -II	0	20	10	200	200	400	-

## Minor Program offered by CSE Department

Sr. No.	Sem	Course Code	Name of Course	Hours per week		Credits	Maximum Marks			ESE Duration Hrs
				L	P		Continous Evaluation	End Sem Exam	Total	
1	III	26CS01MT0301	Programming and Computational Thinking	3	0	3	50	50	100	3
2	IV	26CS01MT0401	Tools & Techniques of Artificial Intelligence	3	0	3	50	50	100	3
3	V	26CS01MT0501	Exploratory Data Analysis	3	0	4	50	50	100	3
4	VI	26CS01MT0601	Basics of Ethical Hacking	3	0	4	50	50	100	3
5	VII	26CS01MP0701	Project	0	8	4	50	50	100	-
<b>TOTAL</b>				<b>12</b>	<b>8</b>	<b>18</b>	<b>250</b>	<b>250</b>	<b>500</b>	

## Multidisciplinary Minor [MDM] Track [For Students other than School of Computer Science & Engineering]

Sr. No.	Sem	Course Code	Name of Course	Hours per week		Credits	Maximum Marks			ESE Duration Hrs
				L	P		Continous Evaluation	End Sem Exam	Total	
1	III	24CS01TH0305-1	Introduction to Web Development	3	0	3	50	50	100	3
2	IV	24CS01TH0407-1	Front End Development	3	0	3	50	50	100	3
3	V	24CS01TH0507-1	Backend Technologies	3	0	3	50	50	100	3
4	VI	24CS01TH0605-1	Cloud Technologies	3	0	3	50	50	100	3
<b>TOTAL</b>				<b>12</b>	<b>0</b>	<b>12</b>	<b>200</b>	<b>200</b>	<b>400</b>	

Sr. No.	Sem	Course Code	Name of Course	Hours per week		Credits	Maximum Marks			ESE Duration Hrs
				L	P		Continous Evaluation	End Sem Exam	Total	

							ion			
1	III	26CS01TH0305-3	Introduction to Cloud Computing + Google Cloud Foundation Certificate	3	0	3	50	50	100	3
2	IV	26CS01TH0407-3	Data Analytics + Google Cloud Data Analytics Certificate	3	0	3	50	50	100	3
3	V	26CS01TH0507-3	Cloud Engineering + Google Cloud Engineer Certificate	3	0	3	50	50	100	3
4	VI	26CS01TH0605-3	Cloud Security Fundamentals + Google Cloud Cyber Security Certificate	3	0	3	50	50	100	3
			<b>TOTAL</b>	<b>12</b>	<b>0</b>	<b>12</b>	<b>200</b>	<b>200</b>	<b>400</b>	

Sr. No.	Sem	Course Code	Name of Course	Hours per week		Credits	Maximum Marks			ESE Duration Hrs
				L	P		Contin uous Evaluat ion	End Sem Exam	Total	
1	III	26CS01TH0305-4	Fundamentals of Network Security	3	0	3	50	50	100	3
2	IV	26CS01TH0407-4	Applied Cyber Defence	3	0	3	50	50	100	3
3	V	26CS01TH0507-4	Modern Cloud Security Architecture	3	0	3	50	50	100	3
4	VI	26CS01TH0605-4	Digital Forensics	3	0	3	50	50	100	3
			<b>TOTAL</b>	<b>12</b>	<b>0</b>	<b>12</b>	<b>200</b>	<b>200</b>	<b>400</b>	

**[For Electrical Engineering Students]**

Sr. No.	Sem	Course Code	Name of Course	Hours per week		Credits	Maximum Marks			ESE Duration Hrs
				L	P		Contin uous Evaluat ion	End Sem Exam	Total	
1	III	24CS01TH0305-2	Object Oriented Programming	3	0	3	50	50	100	3
2	IV	24CS01TH0407-2	Programming for Machine Learning	3	0	3	50	50	100	3
3	V	24CS01TH0507-2	Database Management System	3	0	3	50	50	100	3
4	VI	24CS01TH0605-2	Internet of Things	3	0	3	50	50	100	3
			<b>TOTAL</b>	<b>12</b>	<b>0</b>	<b>12</b>	<b>200</b>	<b>200</b>	<b>400</b>	

**[For Electronics Communication Engineering Students]**

Sr. No.	Sem	Course Code	Name of Course	Hours per week		Credits	Maximum Marks			ESE Duration Hrs
				L	P		Continu- ous Evaluat- ion	End Sem Exam	Total	
1	III	26CS01TH0305- 5	Design and Analysis of Algorithms	3	0	3	50	50	100	3
2	IV	26CS01TH0407- 5	Artificial Intelligence	3	0	3	50	50	100	3
3	V	26CS01TH0507- 5	Machine Learning	3	0	3	50	50	100	3
4	VI	26CS01TH0605- 5	Deep Learning	3	0	3	50	50	100	3
			<b>TOTAL</b>	<b>12</b>	<b>0</b>	<b>12</b>	<b>200</b>	<b>200</b>	<b>400</b>	

## Exit Program Options-B.Tech. Computer Science and Engineering [2026-27]

[As per NEP 2020 (GR dated 4 July 2023, Govt. of Maharashtra)]

### Four-Year Multidisciplinary B.Tech. Programme with Exit Options

Sr. No.	Year	Semesters Completed	Min. Credits Required	Qualification Awarded	Exit Program Options (CSE)
1	<b>First Year Exit</b> UG Certificate in Engineering / Technology	Sem I & II	40 – 44	<b>Certificate Course in Basic Programming Skills</b>	<ul style="list-style-type: none"> <li>➤ Computer Hardware and Networking</li> <li>➤ Advanced Java Programming</li> <li>➤ Python Programming</li> <li>➤ Web Designing</li> </ul> <p><i>Note: Must earn 8 additional credits in work-based vocational/internship courses.</i></p>
2	<b>Second Year Exit</b> UG Diploma in Engineering / Technology	Sem I – IV	80 – 88	<b>Diploma in Respective Discipline</b>	<ul style="list-style-type: none"> <li>➤ Web Development</li> <li>➤ Mobile Development</li> <li>➤ Data Analytics</li> <li>➤ Ethical Hacking</li> <li>➤ IT Certified Data Engineer</li> <li>➤ Blockchain and its Applications</li> </ul> <p><i>Note: Must earn 8 additional credits in skill-based vocational courses (skills, internship, mini projects) after Sem IV.</i></p>
3	<b>Third Year Exit</b> Bachelor of Vocation (B.Voc.) / B.Sc. (Engg./Tech.)	Sem I – VI	120 – 132	<b>B.Voc. in Respective Discipline</b>	<p>Industry Project / Capstone Project</p> <p><i>Note: Must earn 8 additional credits in skill-based vocational courses (internship, mini projects) after Sem VI. Min CGPA 7.5 / 75% required for Honours / Double Minor options.</i></p>
4	<b>Full Four-Year Degree</b> B.E. / B.Tech. in CSE	Sem I – VIII	160 – 194	<b>B.E. / B.Tech. in CSE</b>	<ul style="list-style-type: none"> <li>➤ Option A: B.E./B.Tech. with Multidisciplinary Minor (160–176 credits)</li> <li>➤ Option B: B.E./B.Tech. with Honours + Multidisciplinary Minor (180–194 credits)</li> <li>➤ Option C: B.E./B.Tech. with Honours (Research) + Multidisciplinary Minor — 18-credit research project (180–194 credits)</li> <li>➤ Option D: B.E./B.Tech. with Double Minor — Multidisciplinary + Specialization (180–194 credits)</li> </ul>

**Syllabus for Semester I, B. Tech. Computer Science & Engineering**

**Course Code: 26CS01TP0101**

**Course: Fundamentals of Programming**

**L: 4Hrs, P: 2Hr, Per Week**

**Total Credits: 5**

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**Syllabus**

**UNIT 1: Fundamentals of C Programming:**

Introduction to Programming and C Language: Evolution and features of C language, Structure of a C program, Compilation and execution process, Writing, compiling, and running a simple C program

Data Types and Variables: Basic data types: int, float, double, char, Type modifiers: signed, unsigned, short, long, Variable declaration and initialization, Constants and literals, Input/output functions: printf(), scanf()

Operators and Expressions: Arithmetic operators, Relational and logical operators, Assignment operators, Increment and decrement operators, Bitwise operators, Conditional (ternary) operator, Operator precedence and associativity

Control Structures: Decision making: if, if-else, nested if-else, else-if ladder, Switch-case statement, Looping constructs: for, while, do-while, Nested loops, Break, continue, and goto statements

**UNIT 2: Functions and Storage Classes**

Functions: Introduction to functions and modular programming, Function declaration, definition, and calling, Function arguments and return values, /Call by value and call by reference, Function prototypes, Library functions vs. user-defined functions

Recursion: Concept of recursion, Recursive vs. iterative approach, Applications: factorial, Fibonacci series, Tower of Hanoi, Advantages and limitations of recursion,

Storage Classes: Automatic (auto) storage class, External (extern) storage class, Static storage class, Register storage class, Scope and lifetime of variables

Arrays: Introduction to arrays, One-dimensional arrays: declaration, initialization, and accessing, Basic array operations

**UNIT 3: Advanced Topics**

Multidimensional Arrays: Two-dimensional arrays, Matrix operations: addition, multiplication, transpose, Multidimensional arrays. Passing arrays to functions

Strings: String declaration and initialization, String input/output functions, String manipulation functions: strlen(), strcpy(), strcat(), strcmp(), Array of strings

Pointers: Introduction to pointers and memory addressing, Pointer declaration and initialization, Pointer operators: \* (indirection) and & (address-of), Pointer arithmetic, Pointers and arrays, Pointers and functions, Pointer to pointer,

Structures: Introduction to structures, Structure declaration and initialization, Accessing structure members, Array of structures, Structures and functions, Nested structures, Pointers to structures.

**UNIT 4: Introduction to C++ and Object-Oriented Programming**

Basics of C++: Evolution of C++ and comparison with C, Object-oriented programming concepts: encapsulation, abstraction, polymorphism, inheritance, Structure of a C++ program,

Basic input/output: cin, cout, cerr, Namespace and scope resolution operator, Reference variables and const keyword, Inline functions and function overloading.

Classes and Objects: Introduction to classes and objects, Class declaration and definition, Access specifiers: private, public, protected, Member functions and data members, Creating and accessing objects, Constructors: default, parameterized, copy constructor, Destructors, Static members and friend functions, this pointer

Operator Overloading: Concept of operator overloading, Overloading unary operators, Overloading binary operators, Rules and restrictions for operator overloading, Type conversion in C++.

Inheritance: Concept of inheritance and code reusability, Types of inheritance: single, multiple, multilevel, hierarchical, hybrid, Base class and derived class, Access control in inheritance, Constructor and destructor in derived classes, Virtual base classes and Function overriding.

### **UNIT 5: Problem-Solving and Practice**

This unit focuses on applying the concepts learned in Units 1-4 through hands-on problem-solving on the LeetCode platform. Students will work through 20 carefully selected problems that progressively build problem-solving skills and reinforce programming concepts.

#### **Course Outcomes**

On successful completion of the course, student shall be able to

1. Design logical solutions for problem statements using flowcharts and algorithms.
2. Develop solution for problem statements involving decision-making and loops.
3. Apply the concept of functions for modular programming.
4. Implement solutions for problem statements using arrays and structures.
5. Perform file operations.

#### **Textbooks:**

1. The C Programming Language: B. W. Kernighan and D. M. Ritchie, Second Edition, Pearson, June 2015
2. Programming in ANSI C: E. Balguruswamy McGraw Hill
3. C++ Programming Language by Bjarne Stroustrup
4. Object Oriented Programming with C++ by E. Balagurusamy

#### **Reference Books**

1. Mastering C: K. R. Venugopal and S. R. Prasad, Tata McGraw Hill



## Syllabus for Semester I, B. Tech. Computer Science & Engineering

Course Code: 26CS01PR0102-1

Course: Computer Workshop-I Lab

L: 0 Hrs, P: 2 Hrs, Per Week

Total Credits: 1

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**HTML:** Basics of HTML, Elements, Attributes, Headings, Paragraphs, Formatting Tags, Lists, Hyperlinks, Images, Table, HTML Forms, Navigation in Web page, Multimedia based tags i.e. audio, video, iframe tag.

**CSS:** Introduction to Cascading Style Sheets (CSS), Benefits, Syntax, Types: Inline, Internal and External Style Sheet, CSS Selectors, Backgrounds, Borders, Text, Fonts, Tables, Box Model and Display Positioning.

**Bootstrap:** Features and Benefits of Bootstrap, Bootstrap Grid Basic, Typography, Tables, Components, Forms & Input Elements, Navigation & Menus, Flexbox, Modals, Tooltips & Popovers.

**User Experience (UX) Design:** Figma Basics, Wireframe and Prototype, Digital Storytelling.

### Course Outcomes

On successful completion of the course, students will be able to:

1. Design static web pages using HTML.
2. Demonstrate proficiency in web page styling using CSS.
3. Develop modern, responsive web applications using Bootstrap.
4. Develop high-fidelity designs and prototypes in Figma.

### Text Books

1. HTML & CSS: The Complete Reference, Thomas Powell, MGH, 5th edition, 2017.
2. Bootstrap 5 Foundations, Daniel Charles Foreman, Independently published, 2021.
3. Mastering HTML, CSS & Javascript Web Publishing, Laura Lemay, Rafe Colburn and Jennifer Kyrnin, BPB Publications, 1st edition, 2016.

### Reference Books

1. HTML and CSS: Design and Build Webs, Jon Duckett, Wiley, 1st edition, 2011.
2. Web Design: A Beginner's Guide, Wendy Willard, MGH, 2nd edition, 2010.

## Syllabus for Semester I, B. Tech. Computer Science & Engineering

Course Code: 26CS01PR0103

Course: Fundamentals of Linux OS

L: 0 Hrs, P: 2 Hr, Per Week

Total Credits: 1

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### Course Content:

- Introduce Linux and the Red Hat Enterprise Linux ecosystem.
- Run commands and view shell environments.
- Manage, organize, and secure files.
- Manage users, groups, and user security policies.
- Control and monitor systemd services.
- Configure remote access by using the web console and SSH.
- Configure network interfaces and settings.
- Manage software by using DNF.

### Course Outcome:

CO1: Navigate the Red Hat Enterprise Linux ecosystem and execute essential shell commands to manipulate the user environment and command-line interface.

CO2: Implement file system hierarchies and security protocols by managing permissions, user accounts, and group policies to ensure data integrity.

CO3: Analyze and control system operations by monitoring systemd services and configuring secure remote access through SSH and web consoles.

CO4: Administer system configurations by managing network interfaces and deploying software packages using the DNF package manager.

### Textbook

1. Linux Pocket guide- Daniel J. Barrett, O'Reilly Media
2. Linux: The Complete Reference, Sixth Edition- Richard Petersen, McGraw Hill Education

### Reference Books

1. Linux Administration: A Beginner's Guide – Wale Soyinka , McGraw Hill Publication
2. Linux Command Line and Shell Scripting Bible- Richard Blum, Wiley

## Syllabus for Semester I, B. Tech. Computer Science & Engineering

Course Code: 26CS01TH0104-1

Course: Cyber Laws & Ethics in AI

L: 2 Hrs, P: 0 Hr, Per Week

Total Credits: 2

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### Syllabus

#### UNIT I: Foundations of Ethics & IT Security (The Basics)

Introduction to Ethics: Importance of ethics in the business world and the IT profession.

Common IT professional malpractices. Security Fundamentals: Introduction to Firewalls and Intrusion Detection Systems (IDS) as ethical safeguards. Data Integrity: Understanding the distortion and fabrication of information and its consequences.

#### UNIT II: Organizational Ethics & Digital Society

Ethics within IT Organizations: Managing contingent workers and H-1B workers.

Whistleblowing: The role of a whistleblower, legal protections for whistleblowers, and handling whistleblowing situations ethically. The Digital Divide: Social and ethical implications of unequal access to technology and information.

#### UNIT III: AI Ethics, Bias & Privacy (The AI Shift)

Introduction to AI Ethics: Why AI needs a different ethical framework. Algorithmic Bias:

How AI can be "unfair" (discrimination in hiring, lending, and policing). Generative AI

Ethics: The rise of Deepfakes, misinformation, and the ethics of "creating" content. Privacy in the AI Age: Consumer profiling, data harvesting for AI training, and the right to be forgotten.

#### UNIT IV: AI Jurisprudence & The Law

Cyber Laws in the Digital Age: Emergence of Cyberspace and Cyber Jurisprudence. Legal

Liability of AI: Who is responsible when an AI makes a mistake? (Self-driving cars, medical

AI). AI & Intellectual Property: Copyright and Plagiarism issues in AI-generated art and

code. Cyber Crimes 2.0: AI-powered hacking, identity theft, and stalking. Overview of the

Indian IT Act 2000 in the context of emerging AI technologies.

### Course Outcomes

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

1. Understand the fundamental principles of ethics in the IT profession and basic security mechanisms.
2. Identify organizational ethical issues including whistleblowing and the challenges of the digital divide.
3. Analyze the unique ethical dilemmas posed by AI, including algorithmic bias and the impact of Generative AI.
4. Interpret how existing cyber laws and the IT Act 2000 apply to AI-driven crimes and intellectual property.

### Textbooks

1. George Reynolds, *Ethics in Information Technology*, 5th/6th Edition, Cengage Learning.

2. Mark Coeckelbergh, *AI Ethics*, MIT Press Essential Knowledge Series.
3. Pramod Kr. Singh, *Laws on Cyber Crimes [Along with IT Act and Relevant Rules]*, Book Enclave.

### **Reference Books**

1. Michael Cross, et al., *Security*, Shroff Publishers and Distributors Ltd.
2. Virginia Dignum, *Responsible Artificial Intelligence*, Springer.
3. Sara Baase, *A Gift of Fire: Social, Legal and Ethical Issues for Computing and the Internet*, PHI Publications.
4. NITI Aayog, *National Strategy for Artificial Intelligence* (Discussion papers on Responsible AI).

## Syllabus for Semester I, B. Tech. Computer Science & Engineering

Course Code: 26HS03TH0102-1

Course: Discrete Mathematics

L: 3 Hrs, P: 0 Hrs, Per Week

Total Credits: 3

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### Syllabus

#### Module 1: (9 Lectures)

Combinatorics: Addition and multiplication rule in combinatorics, Linear and Circular permutation, Combination, Binomial Identities, Inclusion and Exclusion Principle, distribution Principle, recurrence relations, generating function, examples using ordinary power series and exponential generating functions.

#### Module 2: (8 Lectures)

Modular Arithmetic: Modular Arithmetic, Euclid's Algorithm, primes, Fermat's theorem, Euler's theorem, Diophantine equations, Linear congruences, Chinese Remainder theorem, application to Cryptography.

#### Module 3: (7 Lectures)

Mathematical Logic: Statement and notations, connectives, Negation, conjunction, disjunction, conditional & bi-conditional statement. Tautologies, equivalence of formulas, Duality law, Tautological implications, Theory of inference for statement calculus.

#### Module 4: (9 Lectures)

Groups and Fields: Group definitions and examples, cyclic group, permutation groups, subgroups and homomorphism, co-sets, Lagrange's theorem and Normal subgroup, Error correcting codes, Hamming codes. Finite field, Galois field.

#### Module 5: (7 Lectures)

Lattice theory: Lattices as partially ordered set, Properties of Lattice, Lattices as algebraic system, sub lattices, direct product, homomorphism, some special Lattices.

### Course Outcomes

On successful completion of the course, student shall be able to

1. Formulate problems and solve recurrence relations
2. Apply techniques of number theory to solve problems from linear congruences, coding theory etc. in cryptography.
3. Internalize logical notations to define and reason about fundamental mathematical concepts and use it derive logical inference.
4. Apply groups and fields in coding theory.
5. Understand the Lattice as algebraic structure and use it for pattern recognition and in cryptography.

### Text Books:

1. Discrete Mathematical Structures with Applications to Computer Science: J. P. Tremblay and R. Manohar , Tata McGraw-hill.
2. Discrete Mathematics: Babu Ram, Pearson Publication.
3. Combinatorial Mathematics: C. L. Liu & D. P. Mohapatra, 3rd edition, Tata McGraw-hill.
4. David M Burton, 'Elementary Number Theory' , McGraw Hill, Seventh edition 2014.

### Reference Books:

1. Foundations of Discrete Mathematics: K. D. Joshi, New age international Publication.

Discrete Mathematics: Kolman, Busby & Ross, Pearson Publication

**Syllabus for Semester I/II, B. Tech. Computer Science & Engineering**

**Course Code: 26HS05TP0101/**

**Course: Introduction to Quantum Computing**

**26HS05TP0204**

**L: 3 Hrs, P: 2Hrs, Per Week**

**Total Credits: 4**

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**Module 1: Basic Quantum Theory**

Brief introduction about Quantum Computers and Quantum mechanics, Wave nature of Particles, Bohr's quantization condition, Heisenberg's Uncertainty principle, Wave function, probability, Schrodinger's wave equation, Operators, Electron in an infinite potential well, Eigen value and Eigen functions.

**Module 2: Complex Vector Spaces and Linear Algebra in Quantum Computing**

Algebra and Geometry of Complex numbers, Real and Complex Vector Spaces, definitions, properties, Abelian group, Euler's formula, Dr Moivre's formula, Matrix properties. Basis and Dimensions, Inner products, Hilbert Spaces, Eigenvalues and Eigenvectors, Hermitian and Unitary Matrices, Tensor Product, Applications of linear algebra in computer graphics.

**Module 3: Classical and Quantum Systems**

Deterministic and Probabilistic Systems, Quantum Systems, Stochastic billiard ball, Probabilistic double slit experiment with bullet and photon, Superposition of states, assembling systems, Entangled states.

**Module 4: Quantum representation of systems**

Dirac notations, Stern-Gerlach experiment, transition amplitude, norm of the ket, Bloch Sphere, Observables, Spin matrices, commutator operator, expectation values, variance, standard deviation, Heisenberg's uncertainty principle in matrix mechanics, measuring, dynamics, observations.

**Module 5: Architecture and Algorithms**

Bits and Qubits, Classical Gates and their equivalent quantum representation, Reversible Gates: CNOT, Toffoli, Fredkin, gates, outline of Pauli X,Y,Z gates, Hadamard gates, Deutsch Gate. Quantum Algorithms: Deutsch's algorithm, Grover's search algorithm. Applications of quantum computing in Cryptography, Quantum teleportation, Cybersecurity, banking, finance, advance manufacturing and artificial intelligence.

**Course Outcomes**

After successful completion of the course, the students will be able to -

1. Use the basic quantum theory relating to the probabilistic behaviour of an electron in an atom.
2. Apply complex vector space to eigenvalues and eigenfunctions, inner products, tensor products in the domain of quantum theory
3. Classify deterministic and probabilistic systems and analyse quantum observations and quantum measurements.
4. Build the foundational concepts of quantum states, quantum measurements as

- applicable to the qubit spin systems using mathematical and conceptual frameworks.
5. Use quantum gates in building architecture and quantum algorithms.
  6. Utilize Mathematica software for graph plotting and for least squares fitting of the experimental data.

### **Text Book**

1. Quantum computing for computer scientists, Noson S. Yanofsky, Mirco A. Mannucci, Cambridge University Press 2008
2. Introduction to Quantum Mechanics, 2nd Edition, David J. Griffiths, Prentice Hall New Jersey 1995

### **Reference Books**

1. Quantum computing explained, David McMahon, Wiley-interscience, John Wiley & Sons, Inc. Publication 2008
2. Quantum computation and quantum information, Michael A. Nielsen and Isaac Chuang, Cambridge University Press 2010

**Syllabus for Semester I, B. Tech. Computer Science & Engineering**  
**Course Code: 26HS04PR0101                      Course: Health-Fitness-Wellbeing**  
**L: 0 Hr, P: 2Hrs, Per Week                      Total Credits: 1**

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**Unit 1:**

- Health & Wellness: Meaning, Definition and Importance, Dimensions, Influencing Factors & Enhancing Factors.
- Concept of Health-related Fitness & Body Types.
- Importance and Assessment of BMI & Pulse Rate.
- Healthy Dietary Habits and prevention from Sedentary Lifestyle.
- Yoga: Suryanamaskar, Types of Asana, Pranayama & Meditation
- Causes of Stress & Stress relief through Exercise and Yoga

**Unit 2:**

- Current Trends in Sports Science through audio-visual learning.
- Competitions & Tournament records.
- Sports Current Affairs.
- Importance of Warm up & Cool Down.
- Safety Measures in Sports and Essential Equipment required for Football, Volleyball, Basketball, Table Tennis & Chess.
- Recreational Activities: Types, Importance and benefits.

**Course Outcomes:**

On completion of the course, students will be able to:

1. Understand fundamental skills, basic principle and practices of sports and Yoga.
2. To have a theoretical knowledge of the principles of implementing general and specific conditioning of physical exercises and yoga.
3. Develop Health-related fitness and Body-mind co-ordination through a better understanding of the subject.
4. To understand Healthy & active living with reducing Sedentary Lifestyle.

**Syllabus for Semester I/II, B. Tech. Computer Science & Engineering**  
**Course Code: 26HS02TH0103-1/ Course: Foundational Literature of Indian**  
**26HS02TH0203-2 Civilization**  
**L: 1 Hrs, P: 0 Hrs, Per Week Total Credits: 1**

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**Unit 1: Overview of Indian Knowledge System:** Importance of ancient knowledge, defining IKS, Historicity of IKS, Some unique aspects of IKS.

**Unit 2: The Vedic corpus:** Introduction of Vedas, four Vedas, divisions of four Vedas, six Vedangas, Distinct features of Vedic life.

**Unit 3: Indian Philosophical systems:** Development and unique features, Vedic schools of philosophy, *Samkhya* and *Yoga* School of philosophy, *Nayay* and *Vaisesika* school of philosophy, *Purva-mimamsa* and *Vedanta* schools of Philosophy, Non-vedic philosophies: Jainism, Buddhism, and other approaches

**Unit 4: Vedic Maths -1:** Introduction of Vedic Mathematics, Bodhyan geometry, circular functions, inverse circular functions.

**Unit -5: Vedic Maths –2:** Multiplication of polynomials by *nikhilam* and *urdhvatiryagbhyam* sutra. Verification by *Gunitasamuccayah*. Division of two polynomials using *parāvartya yojayet*. HCF and LCM of two polynomials using *ādyamādyenāntyamantyena* and *ānurūpyeṇa*. Factorization of polynomials up-to degree 3 using *ānurūpyeṇa*, *Lopansthāpanābhyām*, *ādyamādyenāntyamantyena*.

**Course outcome:**

**At the end of the course the students will be able to achieve the following:**

**CO1:** Understand the Indian knowledge system and its scientific approach

**CO2:** Get introduced to the Vedic corpus and recognize the multi-faceted nature of the knowledge contained in the Vedic corpus

**CO3:** Understand the salient features of the philosophical systems of the Vedic and non-Vedic schools

**CO4:** Develop an understanding about the foundation of Vedic Mathematics

**Reference material**

1. B. Mahadevan, Vinayak Rajat Bhar, Nagendra Pavana R. N., “*Introduction to Indian Knowledge System: Concepts and Applications*” PHI, 2022
2. S.C. Chatterjee and D.M. Datta, *An introduction to Indian Philosophy*, University of Calcutta, 1984

**Syllabus for Semester I/II, B. TECH Computer Science & Engineering**  
**Course Code: 26HS02PR0102-2/ 26HS02PR0202-2      Course: Fundamentals of Indian Classical Dance: Bharatnatayam**  
**L: 00 Hrs, P: 2 Hrs, Per Week      Total Credits: 01**

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**Practical -1:** Orientation in Bharatnatayam

**Practical-2:** Tattu Adavu till 8, Naatta Adavu 4 Steps, Pakka Adavu 1 step, Metta Adavu 1 Step, Kuditta Metta Adavu 4 Steps,

**Practical -3:** Practice sessions

**Practical-4:** Tatta Kuditta Adavu (Metta), Tatta Kuditta Adavu (Metta) 2 Steps, Tirmanam Adavu 3 Steps, Kattu Adav - 3 Steps, Kattu Adav - 3 Steps

**Practical-5:** Practice sessions

**Practical-6:** Tiramanam (front) 3 Steps, Repeat of Tiramanam (Overhead) 3 Steps,

**Practical-7:** practice sessions

**Practical – 8:** final practice sessions and performances.

### **Course Outcomes**

**On completion of the course, students will be able to achieve the following:**

CO1: Understand the importance of dance and Bharatnataym as an Indian dance form

CO2: Develop skills to perform the dance form at its basic level.

CO3: Evaluate their strengths and interest to take bridge course to give *Pratham* (1<sup>st</sup> level formal exam of Bharatnatayam).

### **Recommended reading**

1. *Introduction to Bharata's Natyasastra*, Adya Rangacharya, 2011
2. *The Natyasastra and the Body in Performance: Essays on the Ancient Text*, edited by Sreenath Nair, 2015
3. *Bharatanatyam How to ... : A Step-by-step Approach to Learn the Classical Form*, Eshwar Jayalakshmi, 2011

**Syllabus for Semester I/II, B. TECH Computer Science & Engineering**  
**Course Code: 26HS02PR0102-3/ 26HS02PR0202-3    Course: Fundamentals of Indian Classical Dance: Kathak**  
**L: 00 Hrs, P: 2 Hrs, Per Week    Total Credits: 01**

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**Practical -1:** Orientation in Kathak. Correct posture of kathak, Basic Movements and exercise Stepping, Chakkar of 5 count (Bhramari),

**Practical -2:** practice sessions of practical 1

**Practical -3:** Hastaks, Hastaks and Steppings, Reciting asamyukta Mudra shloka, Hastak and steppings

**Practical -4:** practice sessions of practical 3

**Practical -5:** Todas and Asamyukta hasta mudra shlok, Vandana of Shlok, 2 Todas and Vandana, Ghante Ki Tihai,

**Practical -6:** practice sessions of practical 5

**Practical -7:** 2 1 Chakkardar Toda and Ginnti Ki Tihai, 2 Todas and 1 Chakkardar Toda, practice sessions

**Practical -8:** Final performances.

#### **Course Outcomes**

**On completion of the course, students will be able to achieve the following:**

CO1: Understand the importance of dance and Kathak as an Indian dance form

CO2: Develop skills to perform the dance form at its basic level.

CO3: Evaluate their strengths and interest to take bridge course to give *Prarambhik* (1<sup>st</sup> level formal exam of Kathak).

#### **Recommended reading**

1. Kathak Volume1 A "Theoretical & Practical Guide" (Kathak Dance Book), Marami Medhi & Debasish Talukdar, 2022, Anshika Publication (13 September 2022)

**Syllabus for Semester I/II, B. TECH Computer Science & Engineering**

**Course Code: 26HS02PR0102-4/**

**Course: Introduction to Digital Photography**

**26HS02PR0202-4**

**L: 00 Hrs, P: 2 Hrs, Per Week**

**Total Credits: 01**

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Practical 1: **Orientation in digital photography:** Genres, camera handling and settings

Practical 2: **Rules of Composition**

Practical 3: **Rules of Composition:** practice sessions

Practical 4: **Understanding Exposure and Art of Pre-Visualization**

Practical 5: **Rules of Composition and Art of Pre-Visualization:** practice sessions

Practical 6: **Post Processing Photographs and Portfolio creation**

Practical 7: **Post Processing Photographs:** practice sessions

Practical 8: **Portfolio finalization and presentation in selected genre.**

**Course outcome:**

**At the end of the course the students will be able to achieve the following:**

CO1: Develop an understanding of the technical aspects and aesthetics of Photography.

CO2: Apply the rules of digital photography for creating photographs.

CO3: Develop skills to enhance photographs through post processing.

CO4: Create a portfolio of their photographs in selected genre.

**Reference material**

1. Scott Kelby (2020) *The Digital Photography Book: The Step-by-Step Secrets for how to Make Your Photos Look Like the Pros*, Rocky Nook, USA
2. Larry Hall (2014) *Digital Photography Guide: From Beginner to Intermediate: A Compilation of Important Information in Digital Photography*, Speedy Publishing LLC, Newark
3. J Miotke (2010) *Better Photo Basics: The Absolute Beginner's Guide to Taking Photos Like a Pro*, AMPHOTO Books, Crown Publishing Group, USA

**Syllabus for Semester I/II, B. TECH Computer Science & Engineering Course**

**Code: 26HS02PR0102-5/**

**Course: Introduction to Basic Japanese**

**26HS02PR0202-5**

**Language**

**L: 00 Hrs, P: 2 Hrs, Per Week**

**Total Credits: 01**

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**Practical-1:** Orientation about Japan, its language, and its culture

**Practical-2:** Communication Skills 1: Vocabulary for basic Japanese language

**Practical -3:** Practice sessions

**Practical-4:** Basic day to day greetings in Japanese language and their usage through role-play

**Practical-5:** Practice sessions

**Practical- 6:** Communication Skills 2: framing sentences

**Practical- 7:** Practice sessions

**Practical- 8:** Introduction of Japanese Culture, Arts, Traditions, Etiquettes and Manners etc.

**Course outcome**

After the completion of the course the students will be able to achieve the following:

CO1: Basic understanding about Japan as a country and Japanese culture.

CO2: Ability to use vocabulary required for basic level communication in Japanese language.

CO3: Able to frame simple sentences in Japanese for everyday conversations

**Recommended reading**

1. Marugoto Starter (A1) Rikai - Course Book for Communicative Language Competences, by The Japan

Foundation, Goyal Publishers & Distributors Pvt. Ltd (ISBN: 9788183078047)

2. Japanese Kana Script Practice Book – Vol. 1 Hiragana, by Ameya Patki, Daiichi Japanese Language

Solutions (ISBN: 9788194562900)

**Syllabus for Semester I/II, B. TECH Computer Science & Engineering**  
**Course Code: 26HS02PR0102-6/** **Course: Art of Theatre**  
**26HS02PR0202-6**  
**L: 00 Hrs, P: 2 Hrs, Per Week** **Total Credits: 01**

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Practical 1: **Orientation in theatre**  
Practical 2: **Voice and Speech training**  
Practical 3: **Voice and Speech training:** practice sessions  
Practical 4: **Art of acting**  
Practical 5: **Art of acting:** practice sessions  
Practical 6: **Art of script writing**  
Practical 7: **Art of script writing:** practice sessions  
Practical 8: **Final performances**

**Course Outcomes:**

**On completion of the course, students will be able to achieve the following:**

CO1: Understand and synthesize the working of the prominent genres of theatre across the world.

CO2: Apply the skill of voice and speech in theatre and public speaking

CO3: Apply the art of acting and also develop generic skills such as confidence, communication skills, self-responsibility, motivation, commitment, interpersonal skills, problem solving, and self-discipline.

CO4: Apply skills acquired related to technical/production aspects of theatre and also develop problem solving and interpersonal skills.

**Reference books:**

1. Boleslavsky, R. (2022). *Acting: The First Six Lessons* (1st ed., pp. 1-92). Delhi Open Books.
2. Shakthi, C. (2017). *No Drama Just Theatre* (1st ed., pp. 1-171). Partridge.
3. Bruder, M., Cohn, L. M., Olnek, M., Pollack, N., Previto, R., & Zigler, S. (1986). *A Practical Handbook for the Actor* (1st ed.). Vinatge Books New York.

**Syllabus for Semester I/II, B. TECH Computer Science & Engineering**  
**Course Code: 26HS02PR0102-7/**                      **Course: Introduction to French Language**  
**26HS02PR0202-7**  
**L: 00 Hrs, P: 2 Hrs, Per Week**                      **Total Credits: 01**

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**List of Practicals**

- Practical-1:** Orientation about France, the language, and culture  
**Practical-2:** Communication Skills 1: Vocabulary building for everyday conversations  
**Practical-3:** Practice sessions  
**Practical-4:** Reading and writing Skills : Reading and writing simple text in French  
**Practical-5:** Practice sessions  
**Practical-6:** Communication Skills 2: listening comprehension  
**Practical-7:** Practice sessions  
**Practical-8:** Writing Skills: Write basic French and practice

**Course outcomes:**

On successful completion of the course the students will be able to achieve the following:

1. Demonstrate basic knowledge about France, the culture and similarities/differences between India and France
2. Learn to use simple language structures in everyday communication.
3. Develop ability to write in basic French about themselves and others.
4. Develop ability to understand beginner level texts in French

**Recommended reading**

1. 15-minute French by Caroline Lemoine
2. Cours de Langue et de Civilisation Françaises by G. Mauger Vol. 1.1
3. Cosmopolite I by Natalie Hirschsprung, Tony Tricot

**Syllabus for Semester I/II, B. TECH Computer Science & Engineering**  
**Course Code: 26HS02PR0102-9/** **Course: Art of Painting**  
**26HS02PR0202-9**  
**L: 00 Hrs, P: 2 Hrs, Per Week** **Total Credits: 01**

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**Practical 1: Orientation in Painting tools & basics of lines, shapes, light, shadows and textures**

**Practical 2: The art of observation** - how to see shapes in drawing

**Practical 3: Introduction Water color** - how to handle water paints

**Practical 4: Introduction to acrylic colors** - how to handle acrylic paints

**Practical 5: Explore layering paint and capturing the quality of light with paint.**

**Practical 6: Create landscape painting**

**Practical 7: Create Abstract painting**

**Practical 8: Paint on Canvas** (try to recreate any famous painting)

**Course outcome:**

**At the end of the course the students will be able to achieve the following:**

CO1: Become familiar with the basic methods, techniques & tools of painting.

CO2: Train the eye and hand to develop sense of balance, proportion and rhythm.

CO3: Develop the ability to observe and render simple natural forms.

CO4: Enjoy the challenging and nuanced process of painting.

**Reference material**

1. Drawing made easy by Navneet Gala; 2015th edition
2. Alla Prima II Everything I Know about Painting--And More by Richard Schmid with Katie Swatland
3. Daily Painting: Paint Small and Often To Become a More Creative, Productive, and Successful Artist by Carol Marine

**Syllabus for Semester I/II, B. TECH Computer Science & Engineering**  
**Course Code: 26HS02PR0102-10/** **Course: Art of Drawing**  
**26HS02PR0202-10**  
**L: 00 Hrs, P: 2 Hrs, Per Week** **Total Credits: 01**

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Practical 1: **Orientation in Drawing tools & basics of lines, shapes, light, shadows and textures**

Practical 2: **The art of observation** how to see shapes in drawing

Practical 3: **One/two-point basic linear perspective**

Practical 4: **Nature drawing and landscapes**

Practical 5: **Gestalt principles of visual composition**

Practical 6: **Figure drawing:** structure and proportions of human body

Practical 7: **Gesture drawing:** expression and compositions of human figures

Practical 8: **Memory drawing:** an exercise to combine the techniques learnt

**Course outcome:**

**At the end of the course the students will be able to achieve the following:**

CO1: Become familiar with the basic methods, techniques & tools of drawing.

CO2: Train the eye and hand to develop sense of balance, proportion and rhythm.

CO3: Develop the ability to observe and render simple natural forms.

CO4: Enjoy the challenging and nuanced process of drawing.

**Reference material**

1. Drawing made easy by Navneet Gala; 2015th edition
2. Perspective Made Easy (Dover Art Instruction) by Ernest R. Norling



**Syllabus for Semester I/II, B. TECH Computer Science & Engineering**  
**Course Code: 26HS02PR0102-12/** **Course: Developing Self-awareness**  
**26HS02PR0202-12**  
**L: 00 Hrs, P: 2 Hrs, Per Week** **Total Credits: 01**

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Practical 1: **The Power of Handwriting (Handwriting is Brainwriting)**

Practical 2: **Know yourself through handwriting**

Practical 3: **The Role of Signature in your life**

Practical 4: **Graphotherapy to enhance yourself in all ways**

Practical 5: **Neurolinguistic Programming , S.M.A.R.T Goal**

Practical 6: **Effective Communication Model, Rapport Building and Anchor**

Practical 7: **Brain Directives & Linguistic Presuppositions**

Practical 8: **Neurobics**

**Course Outcomes:**

**On completion of the course, students will be able to achieve the following:**

CO1: Gain foundational understanding of graphology and through self-analysis will achieve greater awareness about their strengths and weaknesses & areas for personal growth

CO2: students will be equipped with tools and techniques for continuous self-improvement, using signature analysis and graphotherapy as part of their personal development journey

CO3: understand how to use Neuro Linguistic Programming (NLP) strategies to set and achieve goals effectively, overcoming mental blocks and limiting beliefs.

CO4: Enhance ability to absorb, retain, and recall information, which can benefit academic and professional performance.

**Syllabus for Semester I/II, B. TECH Computer Science & Engineering**  
**Course Code: 26HS02PR0102-13/** **Course: Art of Poetry**  
**26HS02PR0202-13**  
**L: 00 Hrs, P: 2 Hrs, Per Week** **Total Credits: 01**

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Practical 1: **Art of poetry – orientation**  
Practical 2: **Forms of poetry – orientation**  
Practical 3: **Forms of poetry – recitation**  
Practical 4: **Application of poetry – orientation**  
Practical 5: **Application of poetry – practical session**  
Practical 6: **Poetry and aesthetics**  
Practical 7: **Writing poetry – orientation**  
Practical 8: **Writing poetry – writing sessions**

**Course Outcomes:**

To familiarize the students with the art of poetry and develop a sense of appreciation for the art

**At the end of the course the student will be able to achieve the following:**

CO1: Understand the origin and development of poetry  
CO2: Appreciate the art of poetry in life  
CO3: Develop aesthetic sense  
CO4: Develop holistic perspective to their personality

**Reading material**

**I. The Art of Poetry**

1. Fry, S. (2005). The ode less travelled: Unlocking the poetic mind. HarperCollins.
2. Addonizio, K., & Laux, D. (1997). The poet's companion: A guide to the pleasures of writing poetry. W.W. Norton & Company.
3. Lucy, J. (Ed.). (2001). The art of poetry. Penguin Books.

**II. Understanding and Interpretation of Poetry**

1. Hirsch, E. (1999). How to read a poem: And fall in love with poetry. Harcourt Brace & Company.
2. Pinsky, R. (1998). The sounds of poetry: A brief history. Farrar, Straus and Giroux.
3. Meyer, M. (2005). Poetry: An introduction. Bedford/St. Martin's.

**III. Writing Poetry**

1. Hugo, R. (1979). The triggering town: Lectures and essays on poetry and writing. W.W. Norton & Company.
2. Bradbury, R. (1990). Zen in the art of writing: Releasing the creative genius within you. Bantam Books.
3. Behn, R., & Twichell, C. (Eds.). (1992). The practice of poetry: Writing exercises from poets who teach. HarperCollins.

**Syllabus for Semester I/II, B. TECH Computer Science & Engineering**  
**Course Code: 26HS02PR0102-14/** **Course: Creative and content writing**  
**26HS02PR0202-14**  
**L: 00 Hrs, P: 2 Hrs, Per Week** **Total Credits: 01**

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**Creative Writing**

Practical 1: **Introduction to Creative and Content Writing**

Practical 2: **Character and Story Development**

Practical 3: **Crafting Compelling Narratives**

**Content Writing**

Practical 4: **SEO and Digital Content Strategies**

Practical 5: **Writing for Media**

Practical 6: **Tools**

**Content Creation**

Practical 7: **Digital Storytelling**

Practical 8: **Creative Portfolio Launch**

**Course outcomes:**

On completion of the course, student will be able to achieve the following:

**CO1:** Understand and apply fundamental concepts and techniques of creative writing.

**CO2:** Apply storytelling techniques to create engaging narratives.

**CO3:** Develop and implement effective SEO and digital content strategies

**CO4:** Create and refine content using various tools and applying diverse writing styles and formats.

**CO5:** Utilize digital tools to craft multimedia narratives and create a professional portfolio.

**Syllabus for Semester I/II, B. TECH Computer Science & Engineering**  
**Course Code: 26HS02PR0102-15/**                      **Course: Science of life through Bhagwad Gita**  
**26HS02PR0202-15**  
**L: 00 Hrs, P: 2 Hrs, Per Week**                      **Total Credits: 01**

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**Practical 1: Introduction to Bhagwad Gita - methodology**

**Practical 2: Real life application of chapter 1-3**

**Practical 3: Real life application of chapter 4-6**

**Practical 4: Real life application of chapter 7-9**

**Practical 5: Real life application of chapter 10-12**

**Practical 6: Real life application of chapter 13-15**

**Practical 7: Real life application of chapter 16-18**

**Practical 8: Meditation and breathing techniques**

**Course Outcome**

CO1: To understand the methodology to correctly interpret and analysis the scripture

CO2: To understand the application of various teaching of the Bhagwad Gita

CO3: Use meditation and breathing techniques for healthy mind and body.

**Syllabus for Semester I/II, B. TECH Computer Science & Engineering**  
**Course Code: 26HS02PR0102-16/ 26HS02PR0202-16**      **Course: Sanskrit Sambhashan- Spoken Sanskrit**  
**L: 00 Hrs, P: 2 Hrs, Per Week**      **Total Credits: 01**

**संस्कृतसम्भाषणशिविरस्य पाठ्यक्रमः**

- प्रथमं दिनम्**
- ❖ गीतम् - पठत संस्कृतम्..... ।
  - ❖ मम नाम -भवतः नाम किम्? भवत्याः नाम किम्?
  - ❖ द्वयोः मध्ये परिचयः। परस्परं 5 जनान् ।
  - ❖ सः कः? सा का? तत् किम्?
  - ❖ एषः, एषा, एतत् ।
  - ❖ अहम्, भवान्, भवती..... अभिनयः ।
  - ❖ आम्, न, वा/किम्..... अभिनयः ।
  - ❖ अस्ति × नास्ति..... अभिनयः ।
  - ❖ अत्र, तत्र, कुत्र, सर्वत्र, अन्यत्र, एकत्र - अभिनयः ।
  - ❖ षष्ठी - तस्य, एतस्य, कस्य, तस्याः, एतस्याः, कस्याः, मम, भवतः, भवत्याः..... अभिनयः ।  
मम नासिका, भवतः नासिका, भवत्याः नासिका ।  
एतत् कस्य? अङ्गानि प्रदर्श्य प्रश्नः ।
  - ❖ दशरथस्य...., सीतायाः...., लेखन्याः...., पुस्तकस्य.... ।  
स्फोरकपत्रस्य (Flash Card) उपयोगः करणीयः ।  
'पुत्रः' 'पतिः' इत्यादीनां वाक्यपत्राणाम् (Charts) उपयोगः करणीयः ।
  - ❖ गीतम् - मनसा सततं स्मरणीयम् ।
  - ❖ आवश्यकम्, मास्तु, पर्याप्तम्, धन्यवादः, स्वागतम् ।
  - ❖ पूर्वनिश्चितसम्भाषणप्रदर्शनम् ।
  - ❖ क्रियापदानां पाठनम् -  
गच्छति । आगच्छति । पठति । लिखति । खादति । पिबति ।  
क्रीडति । वदति । उत्तिष्ठति । उपविशति ।
  - ❖ गच्छामि । आगच्छामि..... ।
  - ❖ गच्छतु । आगच्छतु..... ।
  - ❖ सङ्ख्याः - (अ) 1, 2, 3, 4,.....10 ।  
(आ) 10, 20, 30,.....100 ।
  - ❖ समयः - 5.00, 5.15, 5.30, 4.45 ।
  - ❖ कथा - गतानुगतिको लोकः । (काचित् कथा सरलया भाषया वक्तव्या) ।
  - ❖ रटनाभ्यासः (पूर्वमेव लिखितानि पठितानि च कानिचित् वाक्यानि वाचनीयानि) ।
  - ❖ एकं वाक्यम् (प्रत्येकं छात्रः एकं वाक्यं वदेत् ।)
  - ❖ सूचना ।
  - ❖ ऐक्यमन्त्रः ।

- द्वितीयं दिनम्**
- ❖ गीतम् ।
  - ❖ पुनस्स्मरणम् ।
  - ❖ शब्देषु लिङ्गभेदज्ञापनम् - यथा -सः सुधाखण्डः, सा कुञ्चिका, तत् पुष्पम् ।
  - ❖ बहुवचनपाठनम् -  
बालकाः...., बालिकाः...., लेखन्याः...., पुस्तकानि... ।
  - ❖ ते, के, ताः, काः, तानि, कानि, एते, एताः, एतानि, भवन्तः, भवत्यः, वयम् । (चित्राणि उपयोक्तव्यानि ।)
  - ❖ वचनपरिवर्तनाभ्यासः । यथा - सः बालकः - ते बालकाः ।
  - ❖ अस्ति - सन्ति ।
  - ❖ क्वति?
  - ❖ सप्तमी - हस्ते । उत्पीठिकायाम् । लेखन्याम् । पुस्तके ।  
(स्फोरकपत्रस्य प्रयोगः करणीयः ।)  
वाक्यपत्रस्य उपयोगेन वाक्यानि वाचनीयानि ।
  - ❖ कदा?
  - ❖ उत्तराणां प्रश्नाः । (शिक्षकः आरम्भे उत्तरं वदेत्, अनन्तरं छात्राः तस्य प्रश्नं पुच्छेयुः ।)  
यथा - रामः प्रातःकाले शालां गच्छति ।  
रामः कदा शालां गच्छति?
  - ❖ अद्य, ध्वः, परध्वः, प्रपरध्वः, ह्यः, परह्यः, प्रपरह्यः, इदानीम् ।
  - ❖ गीतम् ।
  - ❖ गच्छन्ति । गच्छामः । गच्छन्तु ।
  - ❖ शिष्टाचारः - सुप्रभातम्/नमस्कारः/शुभरात्रिः/हरिः  
ओम्/क्षम्यताम्/चिन्ता मास्तु ।
  - ❖ प्रातर्विधिः - दन्तधावनम् इत्यादयः शब्दाः पाठनीयाः ।
  - ❖ सङ्ख्या - 1-50 ।
  - ❖ समयः - 6.05, 6.10, 5.55, 5.50
  - ❖ स्वागतसम्भाषणम् । (शिक्षकः सहशिक्षकेण सह कृत्वा प्रदर्शयेत्)
  - ❖ कथा ।
  - ❖ रटनाभ्यासः ।
  - ❖ वाक्यद्वयम् (प्रत्येकम् अपि छात्रः वाक्यद्वयं वदेत् ।)
  - ❖ सूचनाः ।
  - ❖ ऐक्यमन्त्रः ।

**तृतीयं दिनम्**

- ❖ गीतम् ।
- ❖ पुनस्स्मारणम् ।
- ❖ क्रियापदानां बहुवचनरूपाणि ।  
गच्छन्ति - गच्छामः - गच्छन्तु (Chart दर्शनीयम्)  
पिबन्ति - पिबामः - पिबन्तु ।  
लिखन्ति - लिखामः - लिखन्तु ।  
इत्यादिपरिवर्तनाभ्यासः करणीयः ।
- ❖ द्वितीयाविभक्तिः - स्फोरकपत्राणाम् उपयोगः ।  
(वाक्यपत्राणि उपयुज्य वाक्यानि वाचनीयानि ।)
- ❖ कृपया ददातु - वस्तूनि प्रदर्श्य ।  
शिक्षकः एकैकं वस्तु प्रदर्शयति ।  
उदा. - ग्रन्थः, घटी,.....  
छात्राः - कृपया ग्रन्थं ददातु, कृपया घटी ददातु इत्यादि  
वदेयुः । (स्फोरकपत्रस्य उपयोगः)
- ❖ पुरतः, पृष्ठतः, वामतः, दक्षिणतः, उपरि, अधः ।  
(चित्रं दर्शनीयम्)
- ❖ इतः, ततः, .....तः, गृहतः, कुतः?  
(स्फोरकपत्राणाम् उपयोगः)  
वाक्यपत्राणि उपयुज्य वाक्यानि वाचनीयानि ।
- ❖ गीतम् ।
- ❖ कथम्? सम्यक् ।
- ❖ शीघ्रम् × मन्दम् । उच्चैः × शनैः ।
- ❖ पठनार्थम्, किमर्थम्?
- ❖ सप्तकाराः - किम्, कुत्र, कति, कदा, कुतः, कथम्,  
किमर्थम् (Chart प्रदर्शनीयम्) ।  
एकैकम् उपयुज्य परस्परं प्रश्नाः ।
- ❖ अपि ।
- ❖ अस्तु ।
- ❖ अहं न जानामि । - कानिचन वाक्यानि ।
- ❖ भूतकालीनक्रियापदानां पाठनम् ।  
गतवान् - पठितवान् - लिखितवान् ।  
गतवती - पठितवती - लिखितवती ।
- ❖ क्रियापदकोष्ठकस्य प्रथमपृष्ठस्य अभ्यासः ।
- ❖ द्वितीयपृष्ठस्य सर्वाणि क्रियापदानि उपयुज्य छात्राः  
वर्तमानकाले वाक्यानि वदन्ति । (ए.व - ब.व.)
- ❖ विशिष्टक्रियापदानाम् अभ्यासः -  
करोमि - कुर्मः । करोति - कुर्वन्ति ।  
ददामि - दद्यः । ददाति - ददति ।

शृणोमि - शृणुमः । शृणोति - शृण्वन्ति ।

जानामि - जानीमः । जानाति - जानन्ति ।

- ❖ सम्बोधनम् - भोः !, श्रीमन् !, मान्ये !, भगिनि!, मित्र !,  
.....महोदय!, राम !, सीते ! इत्यादि ।
- ❖ सङ्ख्या- 1-100 ।
- ❖ समयः - 1.00, 2.00, 3.00, 4.00 ।
- ❖ सम्भाषणप्रदर्शनम् (मित्रसंलापः) ।
- ❖ कथा ।
- ❖ वाक्यत्रयम् एकैकोऽपि छात्रः वदेत् ।
- ❖ सूचना ।
- ❖ ऐक्यमन्त्रः ।

### चतुर्थं दिनम्

- ❖ गीतम् ।
- ❖ पुनःस्मारणम् ।
- ❖ च
- ❖ अतः
- ❖ एव
- ❖ इति
- ❖ अस्मि
- ❖ यदि - तर्हि
- ❖ यथा - तथा
- ❖ तः - पर्यन्तम् (वाक्यपत्रस्य उपयोगेन वाक्यानि  
वाचनीयानि ।)
- ❖ अद्य आरभ्य
- ❖ कृते (वाक्यपत्रस्य उपयोगः करणीयः)
- ❖ ऋतुप्रत्ययान्तानाम् अभ्यासः  
गतवान् - पठितवान् - लिखितवान् (ए.व. पुलिङ्गे) ।  
गतवती - पठितवती - लिखितवती (ए.व. स्त्रीलिङ्गे) ।  
गतवन्तः - पठितवन्तः - लिखितवन्तः (ब.व. पुलिङ्गे) ।  
गतवत्यः - पठितवत्यः - लिखितवत्यः (ब.व. स्त्रीलिङ्गे) ।
- ❖ सः गतवान् - सा गतवती - लिङ्गपरिवर्तनाभ्यासः ।
- ❖ अहं गतवान् - अहं गतवती - लिङ्गपरिवर्तनाभ्यासः ।
- ❖ क्रियापदानां कालपरिवर्तनाभ्यासः ।  
यथा - गच्छति - गतवान्, गतवती ।
- ❖ गीतम् ।
- ❖ विशेषपाठनम् - आसीत्, आसन्, आसम् ।
- ❖ एकः, एका, एकम् - लिङ्गभेदः ज्ञापनीयः ।  
(स्फोरकपत्रस्य उपयोगः)

- ◆ भोजनसम्बन्धिशब्दाः यथा - सूः, शाकम्, इत्यदयः ।
- ◆ सङ्ख्या ।
- ◆ समयः ।
- ◆ ॐ - सङ्ख्याक्रीडा ।
- ◆ कथा ।
- ◆ सम्भाषणप्रदर्शनम् ।
- ◆ चत्वारि वाक्यानि ।
- ◆ सूचना ।
- ◆ ऐक्यमन्त्रः ।

### पञ्चमं दिनम्

- ◆ गीतम् ।
- ◆ पुनःस्मरणम् ।
- ◆ बाहनानां नामानि ।
- ◆ तृतीयशक्तिः - दण्डेन, मापिकया, लेखन्या, पुष्पेण ।  
(वाक्यपत्रस्य आधारेण वाक्यानि वाचनीयानि ।)
- ◆ सह, विना ।
- ◆ अद्यतन, ह्यस्तन, ध्वस्तन, पूर्वतन, इदानीतन
- ◆ भविष्यत्कालीनक्रियापदानां पाठनम् ।  
गमिष्यति, पठिष्यति, लेखिष्यति । (कोष्ठकस्य साहाय्येन)
- ◆ गत, आगतम् ।
- ◆ गीतम् ।
- ◆ स्म ।
- ◆ अभवात् ।
- ◆ कथाप्रयोगः (कोष्ठकस्य साहाय्येन) ।
- ◆ यदा - तदा ।
- ◆ बन्धुवाचकशब्दाः ।
- ◆ वेशभूषणानां नामानि ।
- ◆ वर्णाः ।
- ◆ रुचयः ।
- ◆ क्रीडा - एकधारेण सङ्ख्याकथनम् ।
- ◆ कथा ।
- ◆ पञ्च वाक्यानि ।
- ◆ सूचना ।
- ◆ ऐक्यमन्त्रः ।

### षष्ठं दिनम्

- ◆ गीतम् ।
- ◆ पुनःस्मरणम् ।
- ◆ नूतनम् x पुरातनम्,

- ◆ बहु x किञ्चित्,
- ◆ दीर्घः x इत्यः ।
- ◆ उन्नतः x वामनः ।
- ◆ स्थूलः x कृशः ।
- ◆ एतादृश, तादृश, कीदृश?
- ◆ तुमुन् (कोष्ठकस्य साहाय्येन) ।
- ◆ किन्तु ।
- ◆ निश्चयेन ।
- ◆ बहुशः / प्रायशः ।
- ◆ किल / खलु ।
- ◆ शक्नोति ।
- ◆ गीतम् ।
- ◆ विशेषणविशेष्यभावस्य अभ्यासः । (प्रथमाविभक्तौ)  
सः उत्तमः बालकः ।  
सा उत्तमा बालिका ।  
तत् उत्तमं पुस्तकम् ।
- ◆ इव । विनोदकणिका । (गतवान् 'इव' अभिनये कृतवान्!)
- ◆ अपेक्षया ।
- ◆ पशूनां नामानि ।
- ◆ अवयवानां नामानि ।
- ◆ वाक्यविस्तारणाभ्यासः ।  
(सः मम पुस्तकं प्रातःकाले पञ्चवादने पठितवान् ।)
- ◆ इतः पूर्वम् - इतः परम् ।
- ◆ 'रामकृष्ण' सङ्ख्याक्रीडा ।
- ◆ कथा ।
- ◆ षट् वाक्यानि ।
- ◆ सूचना ।
- ◆ ऐक्यमन्त्रः ।

### सप्तमं दिनम्

- ◆ गीतम् ।
- ◆ पुनःस्मरणम् ।
- ◆ कथा - तुमुन् - परिवर्तनाभ्यासः ।
- ◆ बहिः x अन्तः ।
- ◆ रिक्तम् x पूर्णम् ।
- ◆ इतोऽपि ।
- ◆ इत्युक्ते ।
- ◆ अन्ते ।
- ◆ चेत् - नो चेत् ।

- ❖ गीतम् ।
- ❖ आरोग्यसम्बन्धिशब्दाः – वैद्यरोगिसम्भाषणम् ।
- ❖ प्रश्नोत्तरस्पर्धा ।
- ❖ ऋषीणां नामानि ।
- ❖ कथा - शिक्षकः एकां कथां वदति । अनन्तरं छात्रेषु एकैकः तस्याः कथायाः एकैकं वाक्यम् उक्त्वा कथां सम्पूर्णां करोति ।
- ❖ सङ्ख्या - दीर्घसङ्ख्यापाठनम् ।
- ❖ प्रश्नोत्तरम् ।
- ❖ क्रीडा - (गणद्वये नामस्मरणक्रीडा)
- ❖ कथा ।
- ❖ पुस्तकानां परिचयः ।
- ❖ सप्त वाक्यानि ।
- ❖ सूचना ।
- ❖ ऐक्यमन्त्रः ।

### अष्टमं दिनम्

- ❖ गीतम् ।
- ❖ पुनःस्मरणम् ।
- ❖ वारम् ।
- ❖ अतः - यतः परिवर्तनाभ्यासः ।
- ❖ यद्यपि – तथापि ।
- ❖ यत्र – तत्र ।
- ❖ कति - कियत् - एतयोः भेदज्ञापनम् ।
- ❖ यावत् – तावत् ।
- ❖ यत् – तत् ।
- ❖ यः - सः ।
- ❖ या – सा ।
- ❖ गीतम् ।
- ❖ अस्माकम् ।
- ❖ चर्चा ।
- ❖ सङ्ख्या - 'शतायुः - गतायुः' क्रीडा ।
- ❖ विनोदकणिकाकथनम् ।
- ❖ कथा ।
- ❖ अष्ट वाक्यानि ।
- ❖ समाजनिधिविषये सूचना ।
- ❖ ऐक्यमन्त्रः ।

### नवमं दिनम्

- ❖ गीतम् ।
- ❖ पुनःस्मरणम् ।
- ❖ चित् ।
- ❖ ....द्वयम् ।
- ❖ सङ्ख्यासु लिङ्गभेदः ।  
एकः - एका - एकम्  
द्वयम् - द्वयम् - द्वयम्  
त्रयः - तिस्रः - त्रीणि  
चत्वारः - चतस्रः - चत्वारि
- ❖ शिक्षकः - अहं वैद्यः - मम नाम सुरेशः  
(छात्राः तमुद्दिश्य प्रश्नान् पृच्छेयुः ।)
- ❖ ..... अर्थम् (समाजार्थम्, संस्कृतकार्यार्थम्... ) ।
- ❖ गीतम् ।
- ❖ तव्यत् – अनीयत् ।
- ❖ अनन्त्यकथारचना ।
- ❖ सङ्ख्यान्वेषणम् (क्रीडा) ।
- ❖ छात्रैः सह प्रश्नोत्तरम् ।
- ❖ समाजनिधिविषये पुनःस्मरणम् ।
- ❖ ऐक्यमन्त्रः ।

### दशमं दिनम्

- ❖ गीतम् ।
- ❖ पुनःस्मरणम् ।
- ❖ पत्रलेखनम् ।
- ❖ दूरवाणीसम्भाषणम् ।
- ❖ मार्गनिर्देशः - कुत्र गन्तव्यम् इत्यादि ।
- ❖ तव्यत् अभ्यासार्थम् – अद्य किं किं करणीयम् ?
- ❖ सान्दर्भिकभाषणम् –  
1. प्रवासात् प्रतिनिवर्तनस्य ।  
2. आपणिकस्य इत्यादि ।
- ❖ क्रीडा – सङ्ख्यायोजनम् (गणद्वये) ।
- ❖ शुभाशयाः ।
- ❖ असत्यकथनम् / कल्पनाकथनम् ।
- ❖ समारोपः (सर्वैः शिक्षार्थिभिः भारतमातुः पूजां कृत्वा निधिसमर्पणं करणीयम् ।)
- ❖ पत्राचारप्रगतशिक्षणादिविषये सूचना ।
- ❖ ऐक्यमन्त्रः ।

### Course outcome

At the end of the course, the students will be able to achieve the following:

- CO1: Enhanced writing skills in Sanskrit
- CO2: Enhanced speaking skills in Sanskrit
- CO3: Enhanced listening skills in Sanskrit
- CO4: Enhanced writing skills in Sanskrit

**Syllabus for Semester I/II, B. TECH Computer Science & Engineering**  
**Course Code: 26HS02PR0102-18/ Course: Introduction to German Language and**  
**26HS02PR0202-18 culture**  
**L: 00 Hrs, P: 2 Hrs, Per Week Total Credits: 01**

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**List of Practicals**

**Practical-1:** Orientation about Germany, the language, and culture

**Practical-2:** Vocabulary building for everyday conversations

**Practical -3:** Numbers, days and time

**Practical-4:** Introducing Oneself & Others

**Practical-5:** Reading Skills: Reading simple text in German language

**Practical-6:** Basic Verbs & Sentence Construction

**Practical-7:** Food & Dining, Giving Directions & Transportation

**Practical-8:** Writing Skills: Write basic German and practice

**Course outcomes:**

On successful completion of the course the students will be able to achieve the following:

1. Demonstrate basic knowledge about Germany, the culture and similarities/differences between India and Germany
2. Learn to use simple language structures in everyday communication.
3. Develop ability to write in basic German about themselves and others.
4. Develop ability to read and understand beginner level texts in German.

**Recommended reading**

1. German Made Easy by Diego A. Agundez
2. Teach Yourself Complete German: Learn to Read, write, Speak and Understand A new Language by Paul Coggle, Heiner Schenke
3. Netzwerk A1 by Helen Smitz, Stefanie Dengler and Paul Rusch
4. Deutsche Welle (DW) – [www.dw.com/learngerman](http://www.dw.com/learngerman)
5. BBC Languages – German – [www.bbc.co.uk/languages/german](http://www.bbc.co.uk/languages/german)
6. Goethe-Institut – [www.goethe.de](http://www.goethe.de)

**Syllabus for Semester I/II, B. TECH Computer Science & Engineering**  
**Course Code: 26HS02PR0102-19/** **Course Name: Adventure Sports**  
**26HS02PR0202-19**  
**L: 0 Hrs. P: 2 Hrs. Per Week** **Total Credits: 01**

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**Syllabus:**

- Tent pitching, knot practice session and Tent allotment
- Activities like Jumaring and Climbing
- Individual challenge like Burma bridge, ladder bridge, multi vine
- Group Task like improvise raft making and Kayaking
- activities like Archery rifle shooting, cycle ride

**Pattern of Classes:** 2 Days and 1 Night Camp

**Course Outcome:** By the end of this course, students will:

- Understand the principles and benefits of adventure sports.
- Develop basic skills in selected adventure sports.
- Learn and apply safety measures and risk management techniques.
- Foster teamwork, leadership, and problem-solving skills.
- Cultivate a greater appreciation for nature and outdoor activities.

**Syllabus for Semester I/II, B. TECH Computer Science & Engineering**  
**Course Code: 26HS02PR0102-20/ 26HS02PR0202-20**      **Course Name: Introduction to Defence Forces & Obstacle Training**  
**L: 0 Hrs. P: 2Hrs. Per Week**      **Total Credits: 01**

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**Syllabus:**

- Knot and Hitch practice session
- Activities like Rappelling & Wall Climbing
- Burma bridge & ladder bridge
- First Aid
- Rifle Shooting
- Horse riding
- Group Task and Team building activities

**Pattern of Classes:** 2 Days and 1 Night Camp

**Course Outcome:**

Upon successful completion of the course, students should be able to:

- Describe the Structure and Functions of Defense Forces
- Demonstrate Knowledge of Defense Training Protocols
- Navigate Basic Obstacle Courses
- Collaborate and Problem-Solve in Team-Based Exercises
- Connect Obstacle Training to Defense Preparedness
- Evaluate and Reflect on Training Experiences



**Syllabus for Semester I/II, B. TECH Computer Science & Engineering**  
**Course Code: 26HS02PR0102-22/**                      **Course Name: Basic Nutritional Course**  
**26HS02PR0102-22**  
**L: 0 Hrs. P: 2 Hrs. Per Week**                      **Total Credits: 01**

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**Syllabus:**

**Unit I**

- Introduction to Nutrition – Define Balanced Diet, Nutrition, Optimum Nutrition, Nutrients, Concept of Health, Recommended Dietary Allowances (RDA)
- Carbohydrates (sources, functions and digestion)
- Proteins (sources, functions and digestion)
- Fats (sources, functions and digestion)
- Micronutrients (vitamins and minerals-sources, functions and digestion)

**Practical I**

- Display of all the foods with the help of students and while demonstrating teacher will again explain role and importance of nutrition in daily life. Deficiency will lead to chronic diseases and its prevention is very necessary for the quality of life.

**Unit II**

- What is Body Mass Index?
- What is Basal Metabolic Rate?
- What is Ideal Body Weight? (Male/Female)
- How to read labels on Food Packets?
- How to choose smart food and Concept of Rainbow diet, My Food Pyramid or My plate given by ICMR-NIN.

**Practical II**

- Calculation of Body Mass Index, Basal Metabolic Rate, Ideal Body Weight (Male/Female) with the use of self-body measurements.
- Demonstration of Rainbow diet, My Food Pyramid or My plate in a class.

**Pattern of Classes:** Theory Classes – 10, Practical Classes – 2

**Course Outcome:**

By the end of the course, students will be able to accurately describe the functions of key nutrients and their impact on health, create balanced meal plans based on established dietary guidelines, and critically evaluate nutrition information to distinguish between credible and misleading sources.

**Syllabus for Semester I/II, B. TECH Computer Science & Engineering**  
**Course Code: 26HS02PR0102-23/ 26HS02PR0202-23**      **Course Name: Stress Management through Yoga & Meditation**  
**L: 0 Hrs. P: 2 Hrs. Per Week**      **Total Credits: 01**

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**Unit-1**

Introduction to Stress: The Meaning of Stress, types of stress: distress, eustress

Stress Management Techniques I:

**Treatment 1- (Asanas):** Tadasana, Trikonasana, Vrikshasana, Garudasana,, Ardha-Padamasana, Padamasana, Vajarasana, Ushtrasana, Gomukhasna,, Paschimottanasan, ,Ardha Halasana, ,Setu-Bandhanasa,Naukasana, Bhujangasana, and Dhanurasana; along with relaxing asanas

**Unit-2**

Spiritual approach to stress management.

Stress Management Techniques II

**Treatment 2 – (Pranayam) Deep breathing, Yoga, Mindfulness meditation**

Rechak, Purak, Kumbhak, Nadi Suddhi and Bhramari Pranayama.

**Measuring Academic stress-** It can be measure using questionnaire: Academic stress Scale (Sun .et al 2011).

**Course Outcome:**

Upon successful completion of the course, students should be able to:

1. Understand the basics of stress management.
2. Analyze stress triggers and to manage them.
3. Evaluate the responses to stressful situations.
4. Apply the techniques of Yog & Meditation for stress management in day-to-day life.

## **Syllabus for Semester I/II, B. TECH Computer Science & Engineering**

**Course Code: 26HS02PR0102-24/ 0202-24**  
**L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week**

**Course: Audio Recording & Dubbing**  
**Total Credits: 01**

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### **Course Outcomes:**

CO1: Develop a Comprehensive Understanding of Audio in Content Creation

CO2: Equip students with in-depth knowledge of the role, benefits, and applications of audio in enhancing digital content across various platforms.

CO3: Design and Implement a Personalized Audio Setup. Enable students to build and optimize their own audio recording setups tailored for platforms such as YouTube, Instagram, podcasts, and other digital media outlets.

CO4: Enhance Presentation and Marketing Skills Through Audio Integration.

Demonstrate how high-quality audio contributes to effective communication, audience engagement, and brand marketing in both professional presentations and promotional content.

### **Syllabus:**

Practical 1: Orientation in Sound and Basics of Audio

Practical 2: Orientation in Input and Output

Practical 3: Orientation in Audio Devices (Hardware & Software)

Practical 4: Audio Recording: Song, Voiceover, Dubbing

Practical 5: Audio Editing

Practical 6: Audio Session I

Practical 7: Audio Session II

Practical 8: Audio Session III

### **References books**

1. Sound and Recording: Applications and Theory - Francis Rumsey & Tim McCormick (Focal Press)
2. Practical Recording Techniques - Bruce Bartlett & Jenny Bartlett (Routledge)
3. Mixing Audio: Concepts, Practices and Tools - Roey Izhaki (Focal Press)
4. The Art of Sound Recording - David Moulton
5. Digital Audio Editing: Correcting and Enhancing Audio - Simon Langford (Focal Press)
6. Mixing Secrets for the Small Studio - Mike Senior (Focal Press)
7. The Mixing Engineer's Handbook - Bobby Owsinski (Hal Leonard)
8. Audio Engineering 101 - Tim Dittmar (Focal Press)

**Course Objectives:**

The course aims to introduce students to the fundamentals of filmmaking, nurturing creativity and technical understanding through hands-on practical sessions. Students will learn the visual language of cinema and explore storytelling through the medium of film.

**Course Outcomes (COs)**

On completion of the course, students will be able to:

CO1: Understand the basic concepts, history, and evolution of film as an art form.

CO2: Apply principles of visual storytelling, framing, and composition in short film projects.

CO3: Develop creative and technical skills related to camera handling, lighting, sound, and editing.

CO4: Work collaboratively to conceptualize, plan, shoot, and edit a short film, demonstrating teamwork, creativity, and problem-solving skills.

**Syllabus:**

- Practical 1 Introduction and Orientation to Film Making
- Practical 2 Basics of Visual Storytelling and Cinematic Language
- Practical 3 Camera Handling and Shot Composition
- Practical 4 Lighting and Sound Techniques
- Practical 5 Scripting and Storyboarding
- Practical 6 Shooting Exercises and On-Set Practice
- Practical 7 Basics of Editing and Post-Production
- Practical 8 Final Short Film Project and Screening

## **Syllabus for Semester II, B. Tech. Computer Science & Engineering**

**Course Code: 26CS01TP0201**

**Course: Object Oriented Programming**

**L: 3 Hrs, P: 2Hrs, Per Week**

**Total Credits: 4**

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### **Unit I:**

Features of Object-Oriented Programming languages, Abstraction, Encapsulation, Inheritance, polymorphism, and late binding. Programming paradigms, Bytecode, JDK, JRE, JVM.  
Concept of a class and object, ways of representing objects, constructors, and methods, Constructor Overloading

### **Unit II:**

Method Overloading, Arrays and Array of objects, Wrapper classes (Integer, Double etc.), String Class, creating packages, importing packages, access specifiers, static and non-static members.

### **Unit III:**

Concept of inheritance, methods of derivation, use of super keyword and final keyword in inheritance, overriding, run time polymorphism, abstract classes and methods, Interface, implementation of interface.

Lambda Expressions Introduction, Block, Passing Lambda expression as Argument

### **Unit IV:**

Exceptions: Types of exception, use of try-catch block, handling multiple exceptions, using finally, throw and throws clause, user-defined exceptions.

Introduction to streams, byte streams, character streams, file handling in Java, Serialization.

### **Unit V:**

Generics: type-safety, generic class with two type parameters, bounded generics, wildcard, and generic method.

Collection classes: ArrayList, TreeSet, HashMap, Iterator, ListIterator, Collections class, Comparator, Comparable

Introduction to Design Patterns, Need of Design Pattern, Classification of Design Patterns, Role of Design Pattern in Software design, Creational Patterns, Structural Design Patterns and Behavioral Patterns.

### **Course Outcomes:**

On successful completion of the course, students will be able to:

1. Apply object-oriented principles such as abstraction, encapsulation, inheritance, and polymorphism to develop efficient Java programs.
2. Illustrate various Java constructs, including constructors, methods, arrays, wrapper classes, packages, and lambda expressions, for effective program development.
3. Implement exception handling mechanisms and Java streams for robust and error-free programming.
4. Utilize generics and collections to develop scalable and maintainable software solutions.

5. Analyze the characteristics, significance, and application of design patterns in the software development process

**Text Books**

1. Herbert Schildt; JAVA The Complete Reference; Ninth Edition, Tata McGraw- Hill Publishing Company Limited.

**Reference Books**

1. Herbert Schildt and Dale Skrien; Java Fundamentals A Comprehensive Introduction; Tata McGraw- Hill Education Private Ltd 2013.
2. Domain Java Volume I – Fundamentals” by Cay S. Horstmann and Gary Cornell
3. Design Patterns By Erich Gamma, Pearson Education

## Syllabus for Semester II, B. Tech. Computer Science & Engineering

Course Code: 26CS01TP0202

Course: Data Structures

L: 3 Hrs, P: 2Hrs, Per Week

Total Credits: 4

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### UNIT-I: Data Structures and Algorithm Basics

**Introduction:** Elementary data organizations and operations on it. Abstract data types (ADT) and their characteristics.

**Algorithms:** Characteristics, Asymptotic notations, time and space trade-offs, Analysis of algorithm.

**Array ADT:** Representations – row-major and column-major form, Dynamic Arrays, Implementation of Real-life problems using arrays.

### UNIT-II: Stacks and Queues

**Stack ADT:** Stack implementation using arrays, Applications of stacks – expression conversion and evaluation, implementation of multiple stacks, Real life problem implementation using stacks.

**Queue ADT:** Queue implementation using arrays, Circular queue, Real life problem implementation using Queue, introduction to double-ended queues and priority queues.

### UNIT-III: Linked Lists

**Singly Linked Lists (SLL):** Creation of SLL, Operations on SLL: Insertion, Deletion, Traversal, reversal, ordering, etc., Linked representation of stacks and queues, Header node linked lists.

**Doubly and Circular Linked Lists (DLL and CLL):** Creation of Linked list and operations on it.

### UNIT-IV: Trees and Graphs

**Trees:** Terminologies, Binary tree and operations, Binary search tree [BST] and operations, Threaded binary trees.

**Self-balancing Search Trees:** Tree rotations, AVL tree and operations, B tree, B+- tree and operations.

**Introduction to Graphs:** Basic terminologies, representation of graphs, graph traversals: depth first search (DFS) and Breadth first search (BFS).

### UNIT-V: Sorting and Searching

**Sorting:** Internal and External sorting, Concept of Stable sort. Implementation of Shell, quick, merge, heap, counting sort, performance analysis and comparison.

**Searching:** Revision of linear search, binary search and complexity analysis of search methods. Hash functions and hash tables, closed and open hashing, randomization methods (division method, mid-square method, folding), collision resolution techniques.

### Course Outcomes:

On successful completion of the course, students will be able to:

1. Analyze the efficiency of algorithms by evaluating their time and space complexities.
2. Design solutions to problems using linear data structures, such as stacks and queues.
3. Implement real-life problems using arrays and linked lists with dynamic memory allocation.

4. Demonstrate nonlinear data structures and their operations, such as trees and graphs.
5. Apply different searching, sorting, and hashing techniques for efficient data organization and retrieval.

### **Textbooks**

1. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed; Fundamentals of Data Structures in C; Second Edition; Universities Press; 2008.
2. Robert Kruse, C. L. Tondo, Bruce Leung, Sashu Mogalla, Data Structures and Program Design in C; Second Edition; Pearson Education; 2006.
3. Mark Allen Weiss; Data Structures and Algorithm Analysis in C; Second Edition; Pearson Education; 2002.

### **References**

1. Seymour Lipschutz; Data Structures; First Edition; McGraw Hill; 2006.
2. Yedidyah Moshe, J. Augenstein, Aaron M. Tenenbaum; Data Structures Using C; Second Edition; PHI publication.
3. Thomas Cormen, Charles Leiserson, Ronald Rivest and Clifford Stein, Introduction to Algorithms, Third Edition; Prentice Hall of India; 2009.

**Syllabus for Semester II, B. TECH Computer Science & Engineering**  
**Course Code : 26CS01TP0203** **Course: Operating Systems**  
**L: 3Hrs, P: 2Hrs, Per Week** **Total Credits: 4**

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**Unit I: Introduction:** Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls

**Process Management:** Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching, Types of Schedulers and their role, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time. Scheduling algorithms: Pre-emptive and Non-pre-emptive, FCFS, SRTF, Priority, RR, Multilevel queue and multilevel feedback queue.

**Unit II: Threads:** difference between a process and a thread, Benefits of threads, Types of threads, Concept of multithreads.

**Inter-process Synchronization:** Critical Section, Race Conditions, Mutual Exclusion, Peterson's solution for synchronization, Hardware Solutions, Semaphores, Monitors, Classical synchronization Problems: Producer-Consumer Problem, Reader-Writer Problem, Dining Philosopher Problem.

**Unit III: Deadlocks:** Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock Detection and Recovery.

**Unit IV: Memory Management:** Basic concept, Address binding, Dynamic loading, Dynamic Linking, Swapping, Logical and Physical address mapping, Contiguous Memory allocation – Fixed and variable partition, internal and external fragmentation, Compaction, Non-contiguous Memory allocation: Segmentation: principle of operation, Segment Map table, protection and sharing, Paging: Principle of operation – Page Map table, Hardware support for paging, Protection and sharing, Structure of Page Map table.

**Virtual Memory:** Concept of Virtual Memory, Instruction Interruptibility, Locality of reference, Demand paging: Page fault, Dirty bit, valid-invalid bit, Page Replacement algorithms: First in First Out, Optimal, Least Recently used, LRU approximation algorithms, counting based page replacement, Page Buffering algorithms, Local Vs Global algorithms, Thrashing, Page allocation strategies to overcome thrashing: Working set model and Page Fault Frequency

**Unit V: File Management:** Concept of File, Access methods, File types, File operations, Directory structure, File System structure, Allocation methods, Free-space management.

**Disk Management:** Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK, Boot block, Bad blocks.

**Course Outcomes:**

On successful completion of the course, students will be able to:

1. Differentiate between different types of operating systems and different CPU scheduling algorithms

2. Apply the concept of process synchronization in real life problems
3. Identify the occurrence of deadlock and handle it.
4. Apply various memory management techniques
5. Apply various file management techniques

**Textbooks**

1. Operating System Concepts, 8th Edition by A. Silberschatz, P.Galvin, G. Gagne, Wiley India.
2. Modern Operating Systems, 2nd Edition by Andrew Tanenbaum, PHI.

**Reference Books:**

1. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.
2. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly

## **Syllabus for Semester II, B. TECH Computer Science & Engineering**

**Course Code: 26CS01PR0204**

**Course: Computer Workshop-II Lab**

**L: 0Hrs, P: 2Hr, Per Week**

**Total Credits: 1**

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**JavaScript:** Introduction to JavaScript, Syntax, Variables and Data Types, Statements, Operators, Literals, Objects, Strings, Arrays, Functions, Control Flow Statements, Class and Objects, Popup Boxes, Document Object Model (DOM) Manipulation, Handling Events in JavaScript, Form Validation.

**Exploring ES6 Features:** Let and Const Declarations, Arrow Functions and Template Literals, Destructuring and Spread/Rest Operators, Classes and Modules, Exploring Array Methods and Iterators, Promises and Async/Await.

### **Course Outcomes**

On successful completion of the course, students will be able to:

1. Gain proficiency in handling events and user interactions.
2. Design and develop dynamic web pages using JavaScript.
3. Learn how to use ES6 features to enhance productivity and code readability.
4. Apply ES6 features to create interactive and dynamic web designs.

### **Text Books:**

1. JavaScript: The Definitive Guide: Master the World's Most-Used Programming Language, David Flanagan, Shroff/O'Reilly, 7th edition, 2020.
2. Simply ES6: Mastering JavaScript and ES6 to its fullest, Anna Voice, Ray Voice, Independently published, 2nd edition, 2020.
3. Mastering HTML, CSS & Javascript Web Publishing, Laura Lemay, Rafe Colburn and Jennifer Kyrnin, BPB Publications, 1st edition, 2016.

### **Reference Books**

1. JavaScript: The Complete Reference, Thomas Powell, Fritz Schneider, MGH, 3rd edition, 2012.
2. Exploring ES6, Axel Rauschmayer, Leanpub, 2018.

**Syllabus for Semester II, B. Tech. Computer Science & Engineering**

**Course Code: 26HS03TP0212**

**Course: Calculus & Linear Algebra**

**L: 3 Hrs, P: 2Hrs, Per Week**

**Total Credits: 4**

**Module 1 : (8 Lectures)**

Differential Calculus: Functions of univariate, Mean value theorems: Rolle's theorem, Lagrange's theorem, Cauchy's theorem, Taylor's theorem, Taylor's and Maclaurin series.

**Module 2: (10 Lectures)**

Partial Differentiation: Partial derivatives, Euler's Theorem, chain rule, application of partial differentiation: total derivative, Jacobians, Maxima, Minima for the functions of two variables., Extrema of function of multivariable,

**Module 3: (8 Lectures)**

Vector Calculus: Scalar and vector fields, gradient of scalar point function, directional derivatives, divergence and curl of vector point function, application of vector calculus: Line integral, Gradient Descent method.

**Module 4: (8 Lectures)**

Rank-nullity theorem; Consistency of system of linear equations and its solution, Orthogonal matrices, Eigen values and eigenvectors, Diagonalization of matrices, Orthogonal transformation and quadratic to canonical forms, Introduction to n-dimensional vector spaces, Singular value decomposition and its applications.

**Module 5: (6 Lectures)**

Infinite series: Sequences, Infinite series of real and complex numbers, Cauchy criterion, tests of convergence, absolute and conditional convergence, uniform convergence, power series, radius of convergence.

**Course Outcomes**

On successful completion of the course, student shall be able to

1. Apply the concepts of continuity and differentiability to derive Taylor's and Maclaurin series, and use mathematical software to visualize function approximations.
2. Compute and analyze partial derivatives, Jacobians, and determine extreme values of functions of two variables; validate optimization results using software-based visualization techniques.
3. Interpret vector fields by evaluating gradient, divergence, and curl, and use computational tools to plot and explore these vector functions in 2D and 3D.
4. Solve systems of linear equations and perform eigenvalue and eigenvector analysis to diagonalize matrices and reduce quadratic forms, demonstrating select applications using computational methods.
5. Evaluate convergence of sequences and series using standard tests, and implement recurrence relations in computational settings to solve problems in mathematics and algorithms.

## Lab Syllabus

Exp. No.	Name of Experiments	Mapped COs
1	To use mathematical software as an advance calculator.	CO1,CO4
2	2D Plotting and data visualization	CO 3
3	3D-plotting and vector calculus	CO 3
4	Curve Fitting to identify trends and patterns within dataset.	CO2
5	Applied optimization (Maxima, minima and Gradient descent method)	CO3
6	Matrix Computations and Eigenvalue Analysis	CO4
7	Linear Algebra with Various applications (computer Graphix, cryptography, stochastic process, image processing)	CO4
8	Exploring Recurrence Relations in Computational Algorithms	CO5

## Textbooks/References

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. P. N. Wartikar and J. N. Wartikar, A text book of Applied Mathematics Volume I & II, Pune Vidhyarthi Griha Prakashan, Pune-411030 (India).
6. Paul Zimmermann, Computational Mathematics with Sagemath , siam publisher.

**Syllabus for Semester II/I, B. Tech. Computer Science & Engineering**  
**Course Code: 26HS01TP0201/** **Course: Environmental Science**  
**26HS01TP0102**  
**L: 1 Hrs, P: 2 Hrs, Per Week** **Total Credits: 2**

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**Unit 1: Sustainability Engineering**

Multidisciplinary nature of Environmental Science, air and water pollution; solid waste management; local and global environmental challenges; climate change; sustainable cities; sustainable sources of energy, Introduction to the idea of sustainability and its relevance; environment-related legislation; Green Chemistry

**Unit 2: E-Waste and Green Computing**

E-waste Management: Sources, Legislation, Prevention, Control, Recent developments.  
Waste due to Nano-materials and Micro-Plastics.  
Green Computing: Green Computing, Computing in Environment and Research, Green devices and Green data Servers.

**Text Books:**

1. Shikha Agrawal, Engineering Chemistry: Fundamentals and Applications, Cambridge University Press.
2. Dr. Rajshree Khare, A Textbook of Engineering Chemistry (AICTE), S.K. Kataria & amp; Sons.
3. S. S. Dara, A Textbook of Engineering Chemistry, S. Chand Publications.
4. M Afshar Alam, Sapna Jain, Hena Parveen, Green Computing Approach Towards Sustainable Development, Wiley Interscience Publications.

**Reference Books:**

1. E-waste recycling and management: present scenarios and environmental issues, Khan, Anish, and Abdullah M. Asiri. 2019, Springer, Vol. 33. ISBN: 978-3-030-14186-8.
2. Hans-Eckhardt Schaefer, Nanoscience: The Science of the Small in Physics, Engineering, Chemistry, Biology and Medicine, Springer-Verlag Berlin Heidelberg.