Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

(Accredited 'A++' Grade by NAAC with a score of 3.6)

Hingna Road, Wanadongri, Nagpur - 441 110



Bachelor of Technology

SoE & Syllabus 2023

1st to 8th Semester

(Department of Information Technology)

B. Tech in Information Technology

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B.TECH SCHEME OF EXAMINATION 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Information Technology)

B. Tech. in Information Technology

SoE No. 23IT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
FIRST SEMESTER (GROUP-A)															
1	1	BS	GE	23GE1101	Calculus and Vector	T	3	0	0	3	3	30	20	50	3
2	1	BS	GE	23GE1106	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3
3	1	BS	GE	23GE1107	**Lab :** Engineering Chemistry	P	0	0	2	2	1		60	40	
4	1	HS/AEC-1	GE	23GE1112	Professional Communication	T	2	0	0	2	2	30	20	50	2
5	1	HS/IKS	GE	23GE1115	Indian Knowledge System	T	2	0	0	2	2	30	20	50	2
6	1	BES	CV	23CV1101	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3
7	1	BES	CV	23CV1102	**Lab :** Engineering Mechanics	P	0	0	2	2	1		60	40	
8	1	BES	IT	23IT1103	Programming for Problem Solving	T	2	0	0	2	2	30	20	50	2
9	1	BES	IT	23IT1104	**Lab :** Programming for Problem Solving	P	0	0	2	2	1		60	40	
10	1	VSEC-1	GE	23GE1117	Get Set Go	…	…	…	…	…	2		60	40	
11	1	CC-1	GE		**Liberal Learning Course (LLC1)**	…	…	…	…	…	2		60	40	
					TOTAL FIRST SEM		**15**	**0**	**6**	**21**	**22**				
MANDATORY LEARNING COURSES															
1	1	HS		GE2301	Disaster Management and Preparedness	A	2	0	0	2	0				

SECOND SEMESTER (GROUP-A)															
1	2	BS	GE	23GE1203	Differential Equations and Complex Analysis	T	3	0	0	3	3	30	20	50	3
2	2	BS	GE	23GE1210	Applied Physics	T	3	0	0	3	3	30	20	50	3
3	2	BS	GE	23GE1211	**Lab:** Applied Physics	P	0	0	2	2	1		60	40	
4	2	BES	ME	23ME1201	Engineering Graphics	T	1	0	0	1	1	30	20	50	3
5	2	BES	ME	23ME1202	**Lab :** Engineering Graphics	P	0	0	4	4	2		60	40	
6	2	BES	EL	23EL1201	Basic Electrical and Electronics Engineering	T	3	0	0	3	3	30	20	50	3
7	2	BES	CT	23CT1205	**Lab :** Computer WorkShop	P	0	0	2	2	1		60	40	
8	2	PC	IT	23IT1201	Basics of Python Programming	T	3	0	0	3	3	30	20	50	3
9	2	PC	IT	23IT1202	**Lab :** Basics of Python Programming	P	0	0	2	2	1		60	40	
10	2	VSEC-2	GE	23GE1218	Functional English	…	…	…	…	…	2		60	40	
11	2	CC-2	GE		**Liberal Learning Course (LLC2)**	…	…	…	…	…	2		60	40	
					TOTAL SECOND SEM		**13**	**0**	**10**	**23**	**22**				
MANDATORY LEARNING COURSES															
1	2	HS		GE2131	Universal Human Values (UHV)	A	2	0	0	2	0				

MSEs* = Two MSEs of 15 Marks each will conducted and marks of these 2 MSEs will be considered for Continuous Assessment
TA ** = for Theory : TA1-5 marks on Proctored Online Exam, TA2-12 marks on activitied decided by course teacher, TA3 - 3 marks on class attendance
TA = for Practical : MSPA will be 15 marks each**

Chairperson	Dean (Acad. Matters)	July, 2023	1.00
		Date of Release	Version

Applicable for AY 2023-24 Onwards

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B.TECH SCHEME OF EXAMINATION 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Information Technology)

B. Tech. in Information Technology

SoE No. 23IT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE
							L	T	P	Hrs		MSEs*	TA**	ESE	Duration Hours

Liberal Learning Course

SN	Sem	Type	BoS / Deptt	Sub. Code	Subject
1	2	CC2	GE	LLC1201	Music (Vocal)
2	2	CC2	GE	LLC1202	Music (Instrumental)
3	2	CC2	GE	LLC1203	Indian Classical Dance
4	2	CC2	GE	LLC1204	Folk Dances
5	2	CC2	GE	LLC1205	Painting
6	2	CC2	GE	LLC1206	Theatre and acting
7	2	CC2	GE	LLC1207	Photography
8	2	CC2	GE	LLC1208	Yoga
9	2	CC2	GE	LLC1209	Chess
10	2	CC2	GE	LLC1210	Athletics
11	2	CC2	GE	LLC1211	Basket Ball
12	2	CC2	GE	LLC1212	Judo
13	2	CC2	GE	LLC1213	Elements of Japanese Language
14	2	CC2	GE	LLC1214	Elements of German Language
15	2	CC2	GE	LLC1215	Elements of French Language
16	2	CC2	GE	LLC1216	Elements of Spanish Language
17	2	CC2	GE	LLC1217	Basics of Vedic Maths
18	2	CC2	GE	LLC1218	Skilling in Microsoft Visio and Inkscape
19	2	CC2	GE	LLC1219	Art of Public Speaking
20	2	CC2	GE	LLC1220	Kabbadi
21	2	CC2	GE	LLC1221	Kho-Kho
22	2	CC2	GE	LLC1222	Volley Ball
23	2	CC2	GE	LLC1223	Holistic Wellness
24	2	CC2	GE	LLC1224	Nutrition and Diet

Liberal Learning Course

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject
1	1	CC1	GE	LLC1101	Music (Vocal)
2	1	CC1	GE	LLC1102	Music (Instrumental)
3	1	CC1	GE	LLC1103	Indian Classical Dance
4	1	CC1	GE	LLC1104	Folk Dances
5	1	CC1	GE	LLC1105	Painting
6	1	CC1	GE	LLC1106	Theatre and acting
7	1	CC1	GE	LLC1107	Photography
8	1	CC1	GE	LLC1108	Yoga
9	1	CC1	GE	LLC1109	Chess
10	1	CC1	GE	LLC1110	Athletics
11	1	CC1	GE	LLC1111	Basket Ball
12	1	CC1	GE	LLC1112	Judo
13	1	CC1	GE	LLC1113	Elements of Japanese Language
14	1	CC1	GE	LLC1114	Elements of German Language
15	1	CC1	GE	LLC1115	Elements of French Language
16	1	CC1	GE	LLC1116	Elements of Spanish Language
17	1	CC1	GE	LLC1117	Basics of Vedic Maths
18	1	CC1	GE	LLC1118	Skilling in Microsoft Visio and Inkscape
19	1	CC1	GE	LLC1119	Art of Public Speaking
20	1	CC1	GE	LLC1120	Kabbadi
21	1	CC1	GE	LLC1121	Kho-Kho
22	1	CC1	GE	LLC1122	Volley Ball
23	1	CC1	GE	LLC1123	Holistic Wellness
24	1	CC1	GE	LLC1124	Nutrition and Diet

MSEs* = Two MSEs of 15 Marks each will conducted and marks of these 2 MSEs will be considered for Continuous Assessment
TA ** = for Theory : TA1-5 marks on Proctored Online Exam, TA2-12 marks on activitied decided by course teacher, TA3 - 3 marks on class attendance
TA = for Practical : MSPA will be 15 marks each**

Chairperson	Dean (Acad. Matters)	July, 2023	1.00
		Date of Release	Version

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(Department of Information Technology)

B. Tech. in Information Technology

SoE No. 23IT-101

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							L	T	P	Hrs		MSEs*	TA**	ESE	
THIRD SEMESTER															
1	3	BS	GE	23GE1303	Linear Algebra	T	3	0	0	3	3	30	20	50	3
2	3	HSSM-1	GE	23GE1301	Fundamentals of Management & Economics	T	2	0	0	2	2	30	20	50	3
3	3	VEC-1	CV	23CV1311	Environmental Sustainability, Pollution and Management	T	2	0	0	2	2	30	20	50	3
4	3	PC	IT	23IT1301	Data Structure and Program Design	T	3	0	0	3	3	30	20	50	3
5	3	PC	IT	23IT1302	**Lab :** Data Structure and Program Design	P	0	0	2	2	1		60	40	
6	3	PC	IT	23IT1303	Computer Archtecture & Organization	T	3	0	0	3	3	30	20	50	3
7	3	PC	IT	23IT1304	Object Oriented Programming	T	3	0	0	3	3	30	20	50	3
8	3	PC	IT	23IT1305	**Lab :** Object Oriented Programming	P	0	0	2	2	1		60	40	
9	3	PC	IT	23IT1306	**Lab :** Software Lab-1	P	0	0	2	2	1		60	40	
10	3	CEP	IT	23IT1307	Community Engagement Project	P	0	0	2	4	2		60	40	
11	3	OE-1	OE		**Open Elective-I**	T	2	0	0	2	2	30	20	50	3
12	3	MDM	IT		**MD Minor Course-I**	T	2	0	0	2	2	30	20	50	3
					TOTAL		**20**	**0**	**8**	**30**	**25**				
List of Mandatory Learning Course (MLC)															
1	3	HS	T&P	MLC2123	**YCAP3 :** YCCE Communication Aptitude Preparation	**A**	3	0	0	3	**0**				

Open Elective - I

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject
1	3	OE1	GE	23OE1301	OE-I : Combinatorics
2	3	OE1	GE	23OE1302	OE-I : Fuzzy Set Theory, Arithmetic And Logic
3	3	OE1	GE	23OE1303	OE-I : Green Chemistry & Sustainability
4	3	OE1	GE	23OE1304	OE-I : Hydrogen Fuel
5	3	OE1	GE	23OE1305	OE-I : Electronic Materials And Applications
6	3	OE1	GE	23OE1306	OE-I : Laser Technology And Applications
7	3	OE1	MGT	23OE1307	OE-I : Finance And Cost Management
8	3	OE1	MGT	23OE1308	OE-I : Operation Research Techniques
9	3	OE1	MGT	23OE1309	OE-I : Project Evaluation & Management
10	3	OE1	MGT	23OE1310	OE-I : Total Quality Management
11	3	OE1	MGT	23OE1311	OE-I : Value Engineering
12	3	OE1	MGT	23OE1312	OE-I : Maintenance Management
13	3	OE1	MGT	23OE1313	OE-I : Industrial Safety
14	3	OE1	MGT	23OE1314	OE-I : Industry 4.0
15	3	OE1	MGT	23OE1315	OE-I : Operation Management
16	3	OE1	MGT	23OE1316	OE-I : Material Management
17	3	OE1	MGT	23OE1317	OE-I : Hospitality Management
18	3	OE1	MGT	23OE1318	OE-I : Human Resource Management & Organizational Behaviour
19	3	OE1	MGT	23OE1319	OE-I : Agri-Business Management
20	3	OE1	MGT	23OE1320	OE-I : Rural Marketing
21	3	OE1	MGT	23OE1321	OE-I : Marketing Management
22	3	OE1	MGT	23OE1322	OE-I : Health Care Management
23	3	OE1	MGT	23OE1323	OE-I : Designated approved online NPTEL/KKSU Course
24	3	OE1	MGT	23OE1324	OE-I : Indian Archeology
25	3	OE1	MGT	23OE1325	OE-I : Social & Positive Psychology
26	3	OE1	MGT	23OE1326	OE-I : Seismology & Earthquake

Chairperson	Dean (Acad. Matters)	July, 2023	1.00	Applicable for AY 2023-24 Onwards
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B. Tech. in Information Technology

SoE No. 23IT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
FOURTH SEMESTER															
1	4	HSSM-2	GE	23GE1401	Entrepreneurship Development	T	2	0	0	2	2	30	20	50	3
2	4	**AEC-2**	GE	23GE1405 23GE1406	Marathi Language / Hindi Language	T	2	0	0	2	2	30	20	50	3
3	4	PC	IT	23IT1401	Discrete Mathamatics and Graph Theory	T	3	0	0	3	3	30	20	50	3
4	4	PC	IT	23IT1402	Digital Circuits and Microprocessor	T	3	0	0	3	3	30	20	50	3
5	4	PC	IT	23IT1403	**Lab :** Digital Circuits and Microprocessor	P	0	0	2	2	1		60	40	
6	4	PC	IT	23IT1404	Computer Netwrok	T	3	0	0	3	3	30	20	50	3
7	4	PC	IT	23IT1405	**Lab :** Computer Netwrok	P	0	0	2	2	1		60	40	
8	4	PC	IT	23IT1406	**Lab :** Software Lab-2	P	0	0	2	2	1		60	40	
9	4	VSEC-3	IT	23IT1407	**Lab :** Adv. Python Programming	P	0	0	4	4	2		60	40	
10	4	VEC-2	IT	23IT1408	Cyber Laws	T	2	0	0	2	2	30	20	50	3
11	4	MDM	IT		**MD Minor Course-II**	T	2	0	0	2	2	30	20	50	3
12	4	OE-2	OE		**Open Elective-II**	T	2	0	0	2	2	30	20	50	3
					TOTAL		**19**	**0**	**10**	**29**	**24**				
List of Mandatory Learning Course (MLC)															
1	4	HS	T&P	MLC2124	**YCAP4 :** YCCE Communication Aptitude Preparation	**A**	3	0	0	3	**0**				

Open Elective - II

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject
1	4	OE2	GE	23OE2401	OE-II : Combinatorics
2	4	OE2	GE	23OE2402	OE-II : Fuzzy Set Theory, Arithmetic And Logic
3	4	OE2	GE	23OE2403	OE-II : Green Chem. & Sustainability
4	4	OE2	GE	23OE2404	OE-II : Hydrogen Fuel
5	4	OE2	GE	23OE2405	OE-II : Electronic Materials And Applications
6	4	OE2	GE	23OE2406	OE-II : Laser Technology And Applications
7	4	OE2	MGT	23OE2407	OE-II : Finance And Cost Management
8	4	OE2	MGT	23OE2408	OE-II : Operation Research Techniques
9	4	OE2	MGT	23OE2409	OE-II : Project Evaluation & Management
10	4	OE2	MGT	23OE2410	OE-II : Total Quality Management
11	4	OE2	MGT	23OE2411	OE-II : Value Engineering
12	4	OE2	MGT	23OE2412	OE-II : Maintenance Management
13	4	OE2	MGT	23OE2413	OE-II : Industrial Safety
14	4	OE2	MGT	23OE2414	OE-II : Industry 4.0
15	4	OE2	MGT	23OE2415	OE-II : Operation Management
16	4	OE2	MGT	23OE2416	OE-II : Material Management
17	4	OE2	MGT	23OE2417	OE-II : Hospitality Management
18	4	OE2	MGT	23OE2418	OE-II : Human Resource Management & Organizational Behaviour
19	4	OE2	MGT	23OE2419	OE-II : Agri-Business Management
20	4	OE2	MGT	23OE2420	OE-II : Rural Marketing
21	4	OE2	MGT	23OE2421	OE-II : Marketing Management
22	4	OE2	MGT	23OE2422	OE-II : Health Care Management
23	4	OE2	MGT	23OE2423	OE-II : Designated approved online NPTEL/KKSU Course
24	4	OE2	MGT	23OE2424	OE-II : Indian Archeology
25	4	OE2	MGT	23OE2425	OE-II : Social & Positive Psychology
26	4	OE2	MGT	23OE2426	OE-II : Seismology & Earthquake

Chairperson	Dean (Acad. Matters)	July, 2023	1.00	Applicable for AY 2023-24 Onwards
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SoE No. 23IT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
FIFTH SEMESTER															
1	5	PC	IT	23IT1501	Theory of Computation	T	3	0	0	3	3	30	20	50	3
2	5	PC	IT	23IT1502	Database and Information System	T	3	0	0	3	3	30	20	50	3
3	5	PC	IT	23IT1503	**Lab :** Database and Information System	P	0	0	2	2	1		60	40	
4	5	PC	IT	23IT1504	Machine Learning	T	3	0	0	3	3	30	20	50	3
5	5	PC	IT	23IT1505	**Lab :** Machine Learning	P	0	0	2	2	1		60	40	
6	5	PC	IT	23IT1506	Operating System	T	3	0	0	3	3	30	20	50	3
7	5	PC	IT	23IT1507	**Lab :** Operating System	P	0	0	2	2	1		60	40	
8	5	PE	IT		**Professional Elective-I**	T	3	0	0	3	3	30	20	50	3
9	5	MDM	IT		**MD Minor Course-III**	T	3	0	0	3	3	30	20	50	3
10	5	OE-3	OE		**Open Elective-III**	T	3	0	0	3	3	30	20	50	3
11	5	STR	IT	23IT1508	Internship, Seminar and Report	P	0	0	1	1	1		60	40	
					TOTAL		**21**	**0**	**7**	**28**	**25**				
List of Mandatory Learning Course (MLC)															
1	5	HS	T&P	MLC2125	**YCAP5 :** YCCE Communication Aptitude Preparation	**A**	3	0	0	3	**0**				
Professional Elective - I															
1	5	PE-I	IT	23IT1521	**PE-I :** Mobile Communication										
2	5	PE-I	IT	23IT1522	**PE-I :** Advance Computer Architecture										
3	5	PE-I	IT	23IT1523	**PE-I :** Digital Image Processing										
4	5	PE-I	IT	23IT1524	**PE-I :** Embeded Systems										
6	5	PE-I	IT	23IT1525	**PE-I :** Graphics Design										
7	5	PE-I	IT	23IT1526	**PE-I :** Mobile Operating Systems										
8	5	PE-I	IT	23IT1527	**PE-I :** Data Analytics and Statistics										
9	5	PE-I	IT	23IT1529	**PE-I :** Deep Learning										
Coursera Elective															
1	5	PE-I	IT	23IT1528	**PE-I :** Software Testing and Automation										

Open Elective - III

SN	Sem	Type	BoS/Deptt	Sub. Code	Subject	FACULTY
1	5	OE3	CSE	23OE3501	OE-III : Social Reformers in Modern Maharashtra	ARTS
2	5	OE3	CSE	23OE3502	OE-III : Independent India 1948-2010	ARTS
3	5	OE3	CT	23OE3503	OE-III : Introduction To Cognitive Psychology	ARTS
4	5	OE3	CT	23OE3504	OE-III : Introduction To Engineering Psychology	ARTS
5	5	OE3	CT	23OE3505	OE-III : Introduction To Behavioural Psychology	ARTS
6	5	OE3	CT	23OE3506	OE-III : Introduction To Emotional Psychology	ARTS
7	5	OE3	EL	23OE3507	OE-III : Elements of Public Administration	ARTS
8	5	OE3	ETC	23OE3508	OE-III : Ancient Indian History	ARTS
9	5	OE3	IT	23OE3509	OE-III : Consciousness Studies	ARTS
10	5	OE3	IT	23OE3510	OE-III : Psychology for Professionals	ARTS
11	5	OE3	IT	23OE3511	OE-III : Introduction to Sociology and Human Behavior	ARTS
12	5	OE3	GE	23OE3512	OE-III : Economics of Money and Banking	ARTS
13	5	OE3	GE	23OE3513	OE-III : Economics of Capital Market	ARTS
14	5	OE3	GE	23OE3514	OE-III : Digital Humanities	ARTS
15	5	OE3	GE	23OE3515	OE-III : Introduction to Political Science	ARTS
16	5	OE3	CT	23OE3516	OE-III : Bhagwat Geeta - An Engineer's Interpretation	ARTS - IKS
17	5	OE3	CT	23OE3517	OE-III : Artha shastra by Kautiliya	ARTS - IKS
18	5	OE3	CSD	23OE3518	OE-III : Glimpses of Ancient science and Technology	ARTS - IKS
19	5	OE3	CV	23OE3519	OE-III : Indian taxation system	COMMERCE
20	5	OE3	CV	23OE3520	OE-III : Elements of share trading	COMMERCE
21	5	OE3	EE	23OE3521	OE-III : Introduction to Fintech	COMMERCE
22	5	OE3	EE	23OE3522	OE-III : Financial Analytics	COMMERCE
23	5	OE3	ETC	23OE3523	OE-III : Fundamentals of Investments	COMMERCE
24	5	OE3	EE	23OE3524	OE-III : Lifestyle Diseases	HEALTHCARE & MEDICINE
25	5	OE3	EE	23OE3525	OE-III : Holistic Nutrition	HOME SCIENCE
26	5	OE3	EL	23OE3526	OE-III : Community Organization & Development	HOME SCIENCE
27	5	OE3	CSE	23OE3527	OE-III : Human Rights & International Laws	LAW
28	5	OE3	CSE	23OE3528	OE-III : Cyber Crime Administration	LAW
29	5	OE3	MATHS	23OE3529	OE-III : Finite Differences & Numerical Methods	SCIENCE
30	5	OE3	MATHS	23OE3530	OE-III : Business Statistics	SCIENCE
31	5	OE3	PHY	23OE3531	OE-III : Crystalline Solids: Properties and Applications.	SCIENCE
32	5	OE3	PHY	23OE3532	OE-III : Nanotechnology: Fundamental to Applications	SCIENCE
33	5	OE3	CHE	23OE3533	OE-III : Chemistry in daily life	SCIENCE
34	5	OE3	CHE	23OE3534	OE-III : Battery Systems and Management	SCIENCE
35	5	OE3	NPTEL	23OE3535	OE-III : Designated approved online NPTEL Course	NPTEL

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B. Tech. in Information Technology

SoE No. 23IT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
SIXTH SEMESTER															
1	6	PC	IT	23IT1601	Design and Analysis of Algorithm	T	3	0	0	3	3	30	20	50	3
2	6	PC	IT	23IT1602	**Lab :** Design and Analysis of Algorithm	P	0	0	2	2	1		60	40	
3	6	PC	IT	23IT1603	Artificial Intelligence	T	3	0	0	3	3	30	20	50	3
4	6	PC	IT	23IT1604	**Lab :** Artificial Intelligence	P	0	0	2	2	1		60	40	
10	6	PC	IT	23IT1605	Design Thinking in Information Technology & Research Methodology	T	2	0	0	2	2	30	20	50	3
5	6	PE	IT		**Professional Elective-II**	T	3	0	0	3	3	30	20	50	3
6	6	PE	IT		**Professional Elective-III**	T	3	0	0	3	3	30	20	50	3
7	5	PE	IT		**Lab : Professional Elective - III**	P	0	0	2	2	1		60	40	
11	6	MDM	IT		**MD Minor Course-IV**	T	3	0	0	3	3	30	20	50	3
8	6	VSEC-4	IT	23IT1606	Lab : Customer Relationship Management	P	0	0	4	4	2		60	40	
9	6	STR	IT	23IT1607	Project Phase-I	P	0	0	4	4	2		60	40	
					TOTAL		**17**	**0**	**14**	**31**	**24**				

List of Mandatory Learning Course (MLC)															
1	6	HS		MLC126	**YCAP6 :**YCCE Communication Aptitude Preparation	**A**	3	0	0	3	**0**				

Professional Elective - II					
1	6	PE-II	IT	23IT1621	**PE-II :** Wireless Sensor Network
2	6	PE-II	IT	23IT1622	**PE-II :** Distributed Systems
3	6	PE-II	IT	23IT1623	**PE-II :** Neural Networks and Fuzzy Logic
4	6	PE-II	IT	23IT1624	**PE-II :** Industry 5.0
5	6	PE-II	IT	23IT1625	**PE-II :** Software Security
6	6	PE-II	IT	23IT1626	**PE-II :** Motion Graphics
7	6	PE-II	IT	23IT1627	**PE-II :** Sensors & Actuators
8	6	PE-II	IT	23IT1628	**PE-II :** Business Intellegience
9	6	PE-II	IT	23IT1629	**PE-II :** Quantum Computing
10	6	PE-II	IT	23IT1630	**PE-II :** Natural Language Processing

Professional Elective - III					
1	6	PE-III	IT	23IT1641	**PE-III :** Network Security and Cryptography
2	6	PE-III	IT	23IT1642	**PE-III : Lab :** Network Security and Cryptography
3	6	PE-III	IT	23IT1643	**PE-III :** Cloud Computing
4	6	PE-III	IT	23IT1644	**PE-III : Lab :** Cloud Computing
5	6	PE-III	IT	23IT1645	**PE-III :** Computer Vision
6	6	PE-III	IT	23IT1646	**PE-III : Lab :** Computer Vision
7	6	PE-III	IT	23IT1647	**PE-III :** Internet of Things
8	6	PE-III	IT	23IT1648	**PE-III : Lab :** Internet of Things
9	6	PE-III	IT	23IT1649	**PE-III :** Design Patterns
10	6	PE-III	IT	23IT1650	**PE-III : Lab :** Design Patterns
11	6	PE-III	IT	23IT1651	**PE-III :** Game theory
12	6	PE-III	IT	23IT1652	**PE-III : Lab :** Game theory
13	6	PE-III	IT	23IT1653	**PE-III :** Data Aquision & Hardware Interfaces
14	6	PE-III	IT	23IT1654	**PE-III : Lab :** Data Aquision & Hardware Interfaces
15	6	PE-III	IT	23IT1655	**PE-III :** Data Mining
16	6	PE-III	IT	23IT1656	**PE-III : Lab :** Data Mining
17	6	PE-III	IT	23IT1657	**PE-III :** Java Fullstack Development
18	6	PE-III	IT	23IT1658	**PE-III : Lab :** Java Fullstack Development
19	6	PE-IV	IT	23IT1661	**PE-III :** Dot Net Fullstack Development
20	6	PE-IV	IT	23IT1662	**PE-III : Lab :** Dot Net Fullstack Development
21	6	PE-IV	IT	23IT1663	**PE-III :** Generative AI
22	6	PE-IV	IT	23IT1664	**PE-III : Lab :** Generative AI
Coursera Elective					
19	6	PE-III	IT	23IT1659	**PE-III :** Mobile App Development
20	6	PE-III	IT	23IT1660	**PE-III : Lab :** Mobile App Development

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Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B.TECH SCHEME OF EXAMINATION 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Information Technology)

B. Tech. in Information Technology

SoE No. 23IT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
SEVENTH SEMESTER															
1	7	PC	IT	23IT1701	Principles of Compiler Design	T	3	0	0	3	3	30	20	50	3
2	7	PC	IT	23IT1702	**Lab :** Principles of Compiler Design	P	0	0	2	2	1		60	40	
3	7	PC	IT	23IT1703	Software Engineering	T	3	0	0	3	3	30	20	50	3
4	7	PC	IT	23IT1704	**Lab** : Software Engineering	P	0	0	2	2	1		60	40	
5	7	PC	IT	23IT1705	**Lab :** Software Lab-3	P	0	0	2	2	1		60	40	
6	7	PE	IT		**Professional Elective-IV**	T	3	0	0	3	3	30	20	50	3
7	7	PE	IT		**Lab : Professional Elective-IV**	P	0	0	2	2	1		60	40	
8	7	PE	IT		**Professional Elective-V**	T	3	0	0	3	3	30	20	50	3
9	7	MDM	IT		**MD Minor Course-V**	T	2	0	0	2	2	30	20	50	3
10	7	STR	IT	23IT1706	Project Phase-II	P	0	0	8	8	4		60	40	
11	7	STR	IT	23IT1707	Campus Recrutment Training (CRT)	P	0	0	0	0	2			100	
12	7	STR	IT	23IT1708	Comprehensive Evaluation of Core Knowledge	P	0	0	2	2	1		60	40	
					TOTAL		**14**	**0**	**18**	**32**	**25**				

Professional Elective - IV					
1	7	PE-IV	IT	23IT1721	**PE-IV :** Blockchain Technology
2	7	PE-IV	IT	23IT1722	**PE-IV : Lab :** Blockchain Technology
3	7	PE-IV	IT	23IT1725	**PE-IV :** Basics of Bioinformatics
4	7	PE-IV	IT	23IT1726	**PE-IV : Lab :** Basics of Bioinformatics
5	7	PE-IV	IT	23IT1727	**PE-IV :** UI /UX Design
6	7	PE-IV	IT	23IT1728	**PE-IV : Lab :** UI /UX Design
7	7	PE-IV	IT	23IT1729	**PE-IV :** Software Construction and Maintenance
8	7	PE-IV	IT	23IT1730	**PE-IV : Lab :** Software Construction and Maintenance
9	7	PE-IV	IT	23IT1731	**PE-IV :** Game Design and Programming
10	7	PE-IV	IT	23IT1732	**PE-IV : Lab :** Game Design and Programming
11	7	PE-IV	IT	23IT1735	**PE-IV :** Augmented and Virtual Reality
12	7	PE-IV	IT	23IT1736	**PE-IV : Lab :** Augmented and Virtual Reality
13	7	PE-IV	IT	23IT1737	**PE-IV :** Parallel Computing
14	7	PE-IV	IT	23IT1738	**PE-IV : Lab :** Parallel Computing

Professional Elective - V					
1	7	PE-V	IT	23IT1741	**PE-V :** Edge Computing
3	7	PE-V	IT	23IT1745	**PE-V :** Genetic Algorithms and Application
4	7	PE-V	IT	23IT1747	**PE-V :** Software Testing and Quality Assurance
5	7	PE-V	IT	23IT1749	**PE-V :** Software Project Management
6	7	PE-V	IT	23IT1751	**PE-V :** Artificial Intelligence for Games
7	7	PE-V	IT	23IT1753	**PE-V :** PLC (Programming for Industrial Automation)
8	7	PE-V	IT	23IT1755	**PE-V :** Big Data Analytics
9	7	PE-V	IT	23IT1756	**PE-V :** Cloud Services
10	7	PE-V	IT	23IT1757	**PE-V :** Real Time Systems
11	7	PE-V	IT	23IT1758	**PE-V :** Information Retrieval

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Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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B.TECH SCHEME OF EXAMINATION 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Information Technology)

B. Tech. in Information Technology

SoE No. 23IT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
EIGHTH SEMESTER															
1	8	MDM	IT	23IT1801	**MD Minor Course-VI**	T	2	0	0	2	2	30	20	50	3
2	8	STR	IT	23IT1802	Internship / On Job training	P	0	0	14	14	7			100	
					TOTAL		**2**	**0**	**14**	**16**	**9**				
					GRAND TOTAL		**121**	**0**	**87**	**210**	**176**				

Multidisciplinary Minor Courses

		Track 1	Track 2
Courses	**Sem**	**Cloud Computing**	**Cyber Security**
MDM-I	3	(MDM1IT101) Introduction to Cloud Computing	(MDM1IT201) Mathematics for Cyber Security
MDM-II	4	(MDM2IT102) Cloud Security	(MDM2IT202) Cyber Security Fundamentals
MDM-III	5	(MDM3IT103) Introduction to Salesforce	(MDM3IT203) Cyber Security Techniques and Tools
MDM-IV	6	(MDM4IT104) Application Development using Salesforce	(MDM4IT204) Introduction to Blockchain
MDM-V	7	(MDM5IT105) Cloud Web Services	(MDM5IT205) Blockchain Security
MDM-VI	8	(MDM6IT106) Edge Computing	(MDM6IT206) Advanced Cyber Security

		Track 3
Courses	**Sem**	**Web Development**
MDM-I	3	(MDM1IT301) Fundamentals of Web Programming
MDM-II	4	(MDM2IT302) Dynamic web Programming
MDM-III	5	(MDM3IT303) Web Programming Framework
MDM-IV	6	(MDM4IT304) Java Full Stack
MDM-V	7	(MDM5IT305) Dot Net Full Stack
MDM-VI	8	(MDM6IT306) AI Tools for Web Development

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Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

(Accredited 'A++' Grade by NAAC with a score of 3.6)

Hingna Road, Wanadongri, Nagpur - 441 110



Bachelor of Technology

SoE & Syllabus 2023

1st Semester

(Department of Information Technology)

B. Tech in Information Technology

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

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(Department of Information Technology)

B. Tech. in Information Technology

SoE No. 23IT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
FIRST SEMESTER (GROUP-A)															
1	1	BS	GE	23GE1101	Calculus and Vector	T	3	0	0	3	3	30	20	50	3
2	1	BS	GE	23GE1106	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3
3	1	BS	GE	23GE1107	**Lab :** Engineering Chemistry	P	0	0	2	2	1		60	40	
4	1	HS/AEC-1	GE	23GE1112	Professional Communication	T	2	0	0	2	2	30	20	50	2
5	1	HS/IKS	GE	23GE1115	Indian Knowledge System	T	2	0	0	2	2	30	20	50	2
6	1	BES	CV	23CV1101	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3
7	1	BES	CV	23CV1102	**Lab :** Engineering Mechanics	P	0	0	2	2	1		60	40	
8	1	BES	IT	23IT1103	Programming for Problem Solving	T	2	0	0	2	2	30	20	50	2
9	1	BES	IT	23IT1104	**Lab :** Programming for Problem Solving	P	0	0	2	2	1		60	40	
10	1	VSEC-1	GE	23GE1117	Get Set Go	…	…	…	…	…	2		60	40	
11	1	CC-1	GE		**Liberal Learning Course (LLC1)**	…	…	…	…	…	2		60	40	
					TOTAL FIRST SEM		**15**	**0**	**6**	**21**	**22**				
MANDATORY LEARNING COURSES															
1	1	HS		GE2301	Disaster Management and Preparedness	A	2	0	0	2	0				

SECOND SEMESTER (GROUP-A)															
1	2	BS	GE	23GE1203	Differential Equations and Complex Analysis	T	3	0	0	3	3	30	20	50	3
2	2	BS	GE	23GE1210	Applied Physics	T	3	0	0	3	3	30	20	50	3
3	2	BS	GE	23GE1211	**Lab:** Applied Physics	P	0	0	2	2	1		60	40	
4	2	BES	ME	23ME1201	Engineering Graphics	T	1	0	0	1	1	30	20	50	3
5	2	BES	ME	23ME1202	**Lab :** Engineering Graphics	P	0	0	4	4	2		60	40	
6	2	BES	EL	23EL1201	Basic Electrical and Electronics Engineering	T	3	0	0	3	3	30	20	50	3
7	2	BES	CT	23CT1205	**Lab :** Computer WorkShop	P	0	0	2	2	1		60	40	
8	2	PC	IT	23IT1201	Basics of Python Programming	T	3	0	0	3	3	30	20	50	3
9	2	PC	IT	23IT1202	**Lab :** Basics of Python Programming	P	0	0	2	2	1		60	40	
10	2	VSEC-2	GE	23GE1218	Functional English	…	…	…	…	…	2		60	40	
11	2	CC-2	GE		**Liberal Learning Course (LLC2)**	…	…	…	…	…	2		60	40	
					TOTAL SECOND SEM		**13**	**0**	**10**	**23**	**22**				
MANDATORY LEARNING COURSES															
1	2	HS		GE2131	Universal Human Values (UHV)	A	2	0	0	2	0				

MSEs* = Two MSEs of 15 Marks each will conducted and marks of these 2 MSEs will be considered for Continuous Assessment
TA ** = for Theory : TA1-5 marks on Proctored Online Exam, TA2-12 marks on activitied decided by course teacher, TA3 - 3 marks on class attendance
TA = for Practical : MSPA will be 15 marks each**

Chairperson	Dean (Acad. Matters)	July, 2023	1.00
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Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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B.TECH SCHEME OF EXAMINATION 2023

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(Department of Information Technology)

B. Tech. in Information Technology

SoE No. 23IT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE
							L	T	P	Hrs		MSEs*	TA**	ESE	Duration Hours

Liberal Learning Course

SN	Sem	Type	BoS / Deptt	Sub. Code	Subject
1	2	CC2	GE	LLC1201	Music (Vocal)
2	2	CC2	GE	LLC1202	Music (Instrumental)
3	2	CC2	GE	LLC1203	Indian Classical Dance
4	2	CC2	GE	LLC1204	Folk Dances
5	2	CC2	GE	LLC1205	Painting
6	2	CC2	GE	LLC1206	Theatre and acting
7	2	CC2	GE	LLC1207	Photography
8	2	CC2	GE	LLC1208	Yoga
9	2	CC2	GE	LLC1209	Chess
10	2	CC2	GE	LLC1210	Athletics
11	2	CC2	GE	LLC1211	Basket Ball
12	2	CC2	GE	LLC1212	Judo
13	2	CC2	GE	LLC1213	Elements of Japanese Language
14	2	CC2	GE	LLC1214	Elements of German Language
15	2	CC2	GE	LLC1215	Elements of French Language
16	2	CC2	GE	LLC1216	Elements of Spanish Language
17	2	CC2	GE	LLC1217	Basics of Vedic Maths
18	2	CC2	GE	LLC1218	Skilling in Microsoft Visio and Inkscape
19	2	CC2	GE	LLC1219	Art of Public Speaking
20	2	CC2	GE	LLC1220	Kabbadi
21	2	CC2	GE	LLC1221	Kho-Kho
22	2	CC2	GE	LLC1222	Volley Ball
23	2	CC2	GE	LLC1223	Holistic Wellness
24	2	CC2	GE	LLC1224	Nutrition and Diet

Liberal Learning Course

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject
1	1	CC1	GE	LLC1101	Music (Vocal)
2	1	CC1	GE	LLC1102	Music (Instrumental)
3	1	CC1	GE	LLC1103	Indian Classical Dance
4	1	CC1	GE	LLC1104	Folk Dances
5	1	CC1	GE	LLC1105	Painting
6	1	CC1	GE	LLC1106	Theatre and acting
7	1	CC1	GE	LLC1107	Photography
8	1	CC1	GE	LLC1108	Yoga
9	1	CC1	GE	LLC1109	Chess
10	1	CC1	GE	LLC1110	Athletics
11	1	CC1	GE	LLC1111	Basket Ball
12	1	CC1	GE	LLC1112	Judo
13	1	CC1	GE	LLC1113	Elements of Japanese Language
14	1	CC1	GE	LLC1114	Elements of German Language
15	1	CC1	GE	LLC1115	Elements of French Language
16	1	CC1	GE	LLC1116	Elements of Spanish Language
17	1	CC1	GE	LLC1117	Basics of Vedic Maths
18	1	CC1	GE	LLC1118	Skilling in Microsoft Visio and Inkscape
19	1	CC1	GE	LLC1119	Art of Public Speaking
20	1	CC1	GE	LLC1120	Kabbadi
21	1	CC1	GE	LLC1121	Kho-Kho
22	1	CC1	GE	LLC1122	Volley Ball
23	1	CC1	GE	LLC1123	Holistic Wellness
24	1	CC1	GE	LLC1124	Nutrition and Diet

MSEs* = Two MSEs of 15 Marks each will conducted and marks of these 2 MSEs will be considered for Continuous Assessment
TA ** = for Theory : TA1-5 marks on Proctored Online Exam, TA2-12 marks on activitied decided by course teacher, TA3 - 3 marks on class attendance
TA = for Practical : MSPA will be 15 marks each**

Chairperson	Dean (Acad. Matters)	July, 2023	1.00
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B. Tech SoE and Syllabus 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Mathematics & Humanities)

B.Tech First Year

SoE No. 23FY-101

I SEMESTER

23GE1101: Calculus and Vector

Course Outcomes :
The students will be able to 1. Apply the knowledge of differentiation to solve the Engineering problems. 2. Determine the derivatives of functions of several variables and develop the relations among the derivatives of variables. 3. Apply the knowledge of Beta and Gamma functions to find area, volume and mass. 4. Discuss Calculus of Scalar and vector point function and use appropriate theorems to evaluate integrals of functions of single and multiple variables.

Unit I: Differential Calculus	**(6 Hrs.)**
Successive differentiation, n^{th} derivative of rational function, Trigonometrical transformations, n^{th} derivative of the product of two functions (Leibnitz's theorem), Taylor's theorem, Use of Maclaurin's theorem for one variable, standard expansions, Examples on Taylor's Theorem. **(Contemporary Issues related to Topic)**	
Unit II: Partial Differentiation	**(7 Hrs.)**
Functions of several variables, First and higher order derivatives, Homogeneous functions, Euler's theorem on homogeneous function, Chain rule and total differential coefficient of composite functions. Jacobians. **(Contemporary Issues related to Topic)**	
Unit III: Integral Calculus	**(6 Hrs.)**
Improper integrals: Gamma and Beta functions, applications of integral calculus in computing area, length, volumes, and surface of solids of revolutions. **(Contemporary Issues related to Topic)**	
Unit IV: Multiple integrals	**(6 Hrs.)**
Double integral, change of order of integral, change of variables, triple integrals and its applications. **(Contemporary Issues related to Topic)**	
Unit V: Vector Calculus	**(7 Hrs.)**
Vector fields, Vector differentiation, Gradient, Divergence and Curl, Directional derivatives with physical interpretation, Solenoidal and irrotational motions. **(Contemporary Issues related to Topic)**	
Unit VI: Vector Integration & Applications	**(7 Hrs.)**
Vector integration: Line, surface and volume integrals, Statement of Stoke's theorem, Gauss divergence theorem and Green's theorem (without proof), Simple applications of these theorems. **(Contemporary Issues related to Topic)**	
Total Lecture	**39 Hours**

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Textbooks:	
1.	Erwin Kreyzig, Advance Engineering Mathematics, 10th Edition, John Wiley and Sons, INC.
2.	H.K. Dass, Engineering Mathematics, 11th revised edition, S. Chand, Delhi.
3.	H.K. Dass, Advanced Engineering Mathematics, 8th revised edition, S. Chand, Delhi.
4.	Dr. B.S. Grewal, Higher Engineering Mathematics, 42th edition, Khanna Publishers.
5.	P.N.Wartikar and J.N.Wartikar, Applied Mathematics, 4th Edition, Vidyarthi GrihaPrakashan.

Reference Books:	
1.	G B Thomas and R L Finney, Calculus and Analytical Geometry, 9th edition, Addison-Wesley, 1999.
2.	Michael Spivak and Tom Apostol, Calculus, VolI & Vol II 2nd edition, Wiley.
3.	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, 10th edition, Laxmi Prakashan.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Mathematics%20and%20Humanities/

MOOCs Links and additional reading, learning, video material	
1.	https://nptel.ac.in/courses/111/106/111106146/
2.	https://nitkkr.ac.in/docs/5-Multiple%20Integrals%20and%20their%20Applications.pdf

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B. Tech SoE and Syllabus 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Applied Chemistry)

B.Tech First Year

SoE No. 23FY-101

I/II SEMESTER

23GE1106/23GE1206: Engineering Chemistry

Course Outcomes :

Upon successful completion of the course the students will be able to:

1. **Build** the knowledge of qualitative and quantitative aspects of water for industrial and domestic applications. (L3)
2. **Apply** fundamental principles of electrochemistry to understand corrosion, energy storage devices and their industrial applications. (L3)
3. **Develop** insight into spectroscopic techniques for material characterization. (L3)
4. **Utilize** knowledge of advanced engineering materials for technological applications. (L3).

Unit I: Water Chemistry **(8 Hrs.)**

Introduction, Potable water quality parameters. Hardness, Types of hardness. Sterilization. Desalination of water by R.O. Softening of water by Zeolite process and Ion Exchange Process (principle, advantages, and limitations). Numerical based on Hardness and Zeolite process. Boiler trouble (Scale and sludge).
Contemporary issues related to the topic.

Unit II: Electrochemistry **(8 Hrs.)**

Introduction, Redox reactions, EMF of a cell, standard electrode potential, Nernst equation, numerical and applications to chemical cells. Conductance in electrolytic solutions, specific and molar conductivity, variations of conductivity with concentration, Electrolysis, laws of electrolysis and numerical.
Industrial applications: Electroplating, Electrolytic refining.
Corrosion: Definition, Causes, theories of corrosion- dry, wet and differential aeration.
Contemporary issues related to the topic.

Unit III: Energy storage devices **(7 Hrs.)**

Battery: Introduction, Characteristics, and General applications
Lithium-ion battery, Glass battery, H_2-O_2 Fuel cell. Differences between Battery and Fuel cell. Recycling and safe disposal of batteries.
Supercapacitors: Definition, Types, Characteristics,and Application.
H_2 as a green fuel: Introduction, Production, Storage, and Utilization.Contemporary issues related to the topic.

Unit IV: Spectroscopic Techniques and Applications **(7 Hrs.)**

Introduction, fundamentals, types, principles, and selection rules of spectroscopy.
Basic principle and applications of UV- Visible, IR, NMR Spectroscopy and numerical.
Contemporary issues related to the topic.

Unit V: Drugs & Polymer chemistry **(8 Hrs.)**

Drugs: Introduction, types of drugs, synthesis of commonly used drug molecules such as aspirin and paracetamol.
Polymer: Introduction, Classification of polymers, Use and disposal of polymers.
Properties of polymers - Solubility, Molecular Weight, Crystallinity and Glass transition temperature.
Synthesis of conducting polymers: Polyaniline, Polypyrole. Contemporary issues related to the topic.

Unit VI: Advanced Materials **(7 Hrs.)**

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Nanomaterials: Definition, Carbon Nanotubes and types. Applications of Nanomaterials in Electronics, Environment and Medicine.
Chemical sensors: Types and application.
Liquid Crystal Polymers: Introduction**,** General properties and applications.
Polymers in electronic industries: Introduction**,** Piezo, Pyroelectric, Ferroelectric polymers.
Smart materials: Introduction**,** Properties and applications of Chromoactive, Photoactive and Magneto rheological materials. Contemporary issues related to the topic

Total Lecture	**45 Hours**

Text books	
1	S S. Dara, A Textbook of Engineering Chemistry, S. Chand & Co New Delhi. Eleventh Edition.
2	P.C. Jain and Monica Jain, Engineering Chemistry, Dhanpat Rai & sons New Delhi, Sixteenth Edition.
3	P. W. Atkins, Physical Chemistry, Oxford Publications, Eighth edition.
4	Y.R. Sharma, Elementary organic spectroscopy, S. Chand and company private limited.
Reference Books	
1.	B.K.Sharma Krishna, Engineering Chemistry, Prakashan media private LTD. 1st Edition, 2014.
2.	CNR Rao, Chemistry of Advanced Materials, Willey Publications, 1993.
3.	Fred. Billmeyer Jr., A textbook of polymer science, Wiley India, 2nd Edition.
4.	Robert B Leighou , Chemistry of Engineering Materials ,Hill Book Company, Inc New York
5.	C.N. Banwell ,Fundamentals of Molecular Spectroscopy ,Mc Graw hill education , 4th Edition
6.	William C. O'Mara, Robert B. Herring, Handbook of Semiconductor Silicon Technology ,Noyes Publications Park Ridge, NJ, USA.1st Edition.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/SERIES%20WISE%20BOOKS/CHEMISTRY/
MOOCs Links and additional reading, learning, video material	
1	https://www.youtube.com/watch?v=XTt3gXB0a84
2	https://www.youtube.com/watch?v=iihYXx79QiE
3	https://www.youtube.com/watch?v=JfJ7MlP9Dco
4	https://www.youtube.com/watch?v=L2VSOccUrSk
5	https://www.youtube.com/watch?v=p5pk4Um6lsk
6	https://www.youtube.com/watch?v=zVDMgoffmC0

I/II SEMESTER

23GE1107/23GE1207: Engineering Chemistry Lab

Course Objectives (PR)

1) Develop analytical ability.
2) Integrate chemistry fundamentals with practical applications.

Course Outcomes

Upon successful completion of the course the students will be able to

1. **Apply** the knowledge of quantitative and qualitative chemical analysis to perform record and analyze the results. (L3)
2. **Experiment** with instrumental and analytical techniques in Chemistry to solve engineering problems related to sustainability. (L3)
3. **Write** effective reports and communicate through oral presentations. (L3)
4. **Review a**nd apply laboratory safety protocols and procedures to acquire the ability for independent and lifelong learning. (L3)

Total 9 experiments are to be performed

(4 each from Lab I and Lab II and one demonstration experiment)

SN	**Experiments based on**
	List of Experiments-Lab- I
1	Estimation of Nickel.
2	Estimation of Fe^{2+} ions by redox titration
3	Determination of copper by iodometric titration
4	Determination of Cation exchange capacity of an ion exchange resin
5	To determine the strength of a given potassium dichromate solution with N/20 sodium thiosulphate solution
6	Determination of COD of water sample.
	List of Experiments-Lab- II
1	Determination of viscosity of lubricating oil by Redwood Viscometer I or II
2	Determination of molecular weight of a polymer.
3	Proximate analysis of coal
4	Determination of electrochemical equivalence of copper using Faradays Law
5	Determination of strength of the given acid conductometrically.
6	To verify Beer-Lambert law for $KMnO_4$ calorimetrically and determine the concentration of the given solution of $KMnO_4$.
	List of Demonstration Experiments
1	Synthesis of urea formaldehyde.

	Advanced Topics (CBS)
1.	To Determine optimum alum dosage for water or wastewater treatment by turbidity measurement using nephelometer and residual chlorine testing using chloroscope.
2.	Comparative study of effects of different drying techniques on the quality of fruits and vegetables.

Nagar Yuwak Shikshan Sanstha's

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B. Tech SoE and Syllabus 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Mathematics & Humanities)

B.Tech First Year

SoE No. 23FY-101

I SEMESTER

23GE1112 : Professional Communication

Course Outcomes :
Upon successful completion of the course the students will be able to: 1.Apply different modes for effective communication 2.Produce competently the Phonology of English language 3.Apply nuances of LSRW skills 4.Practice Communication through different channels

Unit I: Basics of Communication	**(6 Hrs.)**
Process of Communication, Levels of Communication, Flow of Communication, Networks of Communication, Classification of Barriers (Intrapersonal, Interpersonal, Organizational).	
Unit II: English Phonetics	**(7 Hrs.)**
Speech Mechanism, Organs of speech, Consonant and Vowels sounds symbols, word stress rules	
Unit III: Presentation & Interview Skills	**(6 Hrs.)**
Presentation-Nuances of presentation- Kinesics, Proxemics, Chronemics, Vocalics, Modes of Presentation, Interview-Purpose , expectations of employer and preparation for Interview, Types, Types of Questions &Answering Techniques, Telephonic Interviews – preparation and guidelines	
Unit IV: Technical Reports, Memo & E-Mail Etiquettes	**(7 Hrs.)**
Report -Types, Characteristics, prewriting aspects of report and preparing writing of reports Memo- Objectives, Types, Structure and Layout Email-Etiquettes, acronyms.	
Total Lecture	**26 Hours**

Textbooks:	
1.	Meenakshi Raman & Sangeeta Sharma, Technical Communication, Raman & Sharma, Oxford University Press Orford University Press
2.	T. Balasubramaniam, Textbook of English Phonetics for Indian Students, Macmillan India Ltd
3.	

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Reference Books:	
1.	Dale Carnegie ,How to Develop Self – Confidence & Influence People by Public Speaking
2.	Asha Kaul, Communication Skills
3.	Allen Peas ,Body Language
4.	Gerson's Gerson, Technical Communication

MOOCs Links and additional reading, learning, video material	
1.	https://dl.uswr.ac.ir/bitstream/Hannan/141245/1/9781138219120.pdf
2.	https://www.pdfdrive.com/word-power-made-easy-the-complete-handbook-for-building-a-superiorvocabulary-e157841139.html
3.	https://www.pdfdrive.com/improve-your-communication-skills-present-with-confidence-write-with-stylelearn-skills-of-persuasion-e156963640.html
4.	https://www.pdfdrive.com/21-days-of-effective-communication-everyday-habits-and-exercises-to-improveyour-communication-skills-and-social-intelligence-e158273760.html

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(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Mathematics & Humanities)

B.Tech First Year

SoE No. 23FY-101

I SEMESTER

23GE1115 : Indian Knowledge System

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Apply primary requirements pertaining towards awareness of Indian Knowledge System.
2. Analyze various Indian society, culture and literature to enhance their traditions.
3. Evaluate structure of Indian art.
4. Understand Indian heritage and architectural skills.

Unit:1	**Introduction to Indian Civilization**	**6 Hours**
Development of Human Civilization with specific reference: Stone age: Tool Technology and Cultural Development, Indus Valley civilization, Vedic Civilization. **(Contemporary Issues related to Topic)**		
Unit:2	**Indian Society, Culture and Literature**	**6 Hours**
Society and its types, Culture and its Characteristics, Foundational Literature. **(Contemporary Issues related to Topic)**		
Unit:3	**Tradition of Indian Art and Painting**	**7 Hours**
Indian Traditional Painting, Art style folk, mural with Gandhara and Mathura school of art. **(Contemporary Issues related to Topic)**		
Unit:4	**Indic Traditions of Architecture, Design and Planning**	**7 Hours**
Monumental studies of architectural skill: Rock Cut Caves, Stupa and Temple Architecture, The Ancient cities of Indus Saraswati region. Town Planning and drainage system. **(Contemporary Issues related to Topic)**		
	Total Lecture Hours	**26 Hours**

Textbooks	
1	Reader's Digest: Vanished Civilizations, THE READER'S DIGEST ASSOCIATION LIMITED, LONDON,NEWYORK.
2	Qaiser Zoha Alam ; Language and Literature Divers Indian Experience
3	Bal Ram Singh (Author), Nath Girish (Author) ; Science and Technology in Ancient Indian Texts
4	NCERT Books

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	Reference Books
1	B S Harishankar; Art and Archaeology of India: Stone Age to the Present, 2003.
2	Gupte R S and Mahajan B D; Ajanta, Ellora and Aurangabad, 1962.
3	Dharampal, Some Aspects of Earlier Indian Society and Polity and Their Relevance Today, New Quest Publications, Pune, 1987.
4	Michel Lorblanchet, "Rock Art In The Old World" IGNCA series, in India
5	Percy Brown, "Indian Architecture" D. B. Taraporevala sons & co. Pvt. Ltd. Bombay(1959).

	PPT's/Research papers
1	https://www.researchgate.net/publication/360889208_STONE_AGE_TOOL_TECHNOLOGY_and_CULTURAL_DEVELOPMENT
2	https://scholar.google.com/citations?view_op=view_citation&hl=en&user=iT1KSV8AAAAJ&sortby=pubdate&citation_for_view=iT1KSV8AAAAJ:UeHWp8X0CEIC

	MOOCs Links and additional reading, learning, video material
1	https://prepp.in/news/e-492-indian-architecture-art-and-culture-notes
2	https://www.artzolo.com/blog/most-famous-indian-painting-styles
3	https://www.researchgate.net/publication/360889332_Stone_Age_Tool_Technology_Cultural_Development
4	https://testbook.com/ias-preparation/ancient-history-16-mahajanapadas

I SEMESTER
23CV1101 : Engineering Mechanics

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Describe the fundamental concepts of statics and dynamics. 2. Apply the basic concepts of applied mechanics for solution of problems on planar force system. 3. Determine the properties of surface like centroid, moment of inertia, etc. for planar surfaces and mass moment of inertia for rigid body. 4. Analyze pin jointed truss frame structure and beam structure analytically and graphically. 5. Evaluate the dynamic variables of kinetics of particles and simple lifting machine

Unit I: Resultant of planar force System	**(7 Hrs.)**
Fundamental concepts, system of forces, laws of mechanics, principle of transmissibility of force, Moment of force, Principle of moment, Couple, Resultant of a planar force system, Equivalent force couple system. **(Contemporary Issues related to Topic)**	
Unit II: Equilibrium of planar force System	**(6 Hrs.)**
Free body diagrams, Conditions of equilibrium, types of supports, types of beams, types of loads on beam, Equilibrium of a planar force system **(Contemporary Issues related to Topic)**	
Unit III: Friction and Trusses	**(7 Hrs.)**
Friction: Coulomb's laws of dry friction, plane friction, belt friction. Trusses: Types of trusses, assumptions in analysis of truss, Analysis of truss by method of joint. **(Contemporary Issues related to Topic)**	
Unit IV: Properties of Surfaces	**(6 Hrs.)**
Centroid: Introduction, First Moment of Area, Centroid of composite areas. Moment of Inertia: Introduction, Second Moment of Area, Polar moment of Inertia, Radius of Gyration, Transfer formula for moment of Inertia, Product of Inertia, Moment of Inertia, and product of inertia for composite areas, Principal Moments of Inertia. **(Contemporary Issues related to Topic)**	
Unit V: Virtual Work Method and Kinetics of Particle	**(7 Hrs.)**
Virtual Work Method: Introduction, Principle of virtual work, Application to beam and frame. Kinetics of Particle: Introduction, Newton's law of motion for a Particle, D' Alembert's principle, Translation of particle and connected system. **(Contemporary Issues related to Topic)**	
Unit VI: Work Energy and Impulse Momentum Method	**(6 Hrs.)**
Work Energy Method: Introduction, Work energy equation for translation, Work energy applied to particle motion and connected system. Impulse Momentum Method: Introduction, Linear Impulse momentum, Conservation of linear momentum, coefficient of restitution, elastic impact, Impulse momentum in plane motion. **(Contemporary Issues related to Topic)**	
Total Lecture	**39 Hours**

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Textbooks:	
1.	Nelson A., Engineering Mechanics (Statics and Dynamics), ed 2009, Tata Mc. Grew Hill Education Pvt. Ltd., New Delhi, 2009.
2.	Dubey N.H., Engineering Mechanics (Statics and Dynamics) first edition 2013, Tata Mc. Graw Hill Education Pvt. Ltd., New Delhi, 2013.
3.	Singer F.L, Engineering Mechanics (Statics and Dynamics), Harper and Rowe publication, New Delhi, 1994.
Reference Books:	
1.	Timoshenko S, Young D.H and Rao J.V, Engineering Mechanics, Mc. Graw Hill Publication, New Delhi, 2007.
2.	Bhattacharyya B., Engineering Mechanics, Oxford University Press, New Delhi, 2008.
3.	Hibbeler R.C, Engineering Mechanics (Statics and Dynamics), Pearson Publication, Singapore, 2000.
4.	Shames I.H. and Rao J.V., Engineering Mechanics (Statics and Dynamics), First Edition, Pearson Publication, New Delhi, 2003.
5.	Beer F.P. and Johnston E.R; Vector Mechanics for Engineers, 9th edition Tata Mc. Graw Hill Publication, New Delhi. 2007.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Civil%20Engineering/78.%20Engineering-Mechanics-Statics-and-Dinamics-E-W-Nelson-C-L-Best-W-G-McLean-1st-Ed-1997-Schaum-Outline-McGraw-Hill%20(1).pdf
2	chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Civil%20Engineering/79.%20Engineering%20Mechanics.%20Statics-%20MERIAM%20%20AND%20KRAIGE.pdf
3	chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Civil%20Engineering/81.%20Engineering%20Mechanics%201.pdf
MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=nGfVTNfNwnk
2.	https://www.youtube.com/watch?v=6nguX-cEsvw
3.	https://nptel.ac.in/courses/112103108

I SEMESTER

23CV1102 : Lab. Engineering Mechanics

Course Outcomes
Upon successful completion of the course the students will be able to 1. Describe the fundamental concepts of statics and dynamics. 2. Apply the basic concepts of applied mechanics for solution of problems on planar force system. 3. Determine the properties of surface like centroid, moment of inertia, etc. for planar surfaces and mass moment of inertia for rigid body. 4. Analyze pin jointed truss frame structure and beam structure analytically and graphically. 5. Evaluate the dynamic variables of kinetics of particles and simple lifting machine

Minimum Eight Practical's to be performed from the list as below

SN	Experiments based on
1	To find determine the support reactions of a Simply Supported Beam experimentally and analytically.
2	To determine the forces in the members of a Jib Crane Apparatus experimentally and graphically.
3	To determine the coefficient of friction between two surfaces of different material on Plane Friction Apparatus.
4	To determine the coefficient of friction of Coil Friction Apparatus.
5	To determine the forces in members of a Shear Leg Apparatus experimentally and manually.
6	To determine the mass moment of inertia of a fly wheel using Fly Wheel Apparatus
7	To determine efficiency and law of machine of Differential Axel & Wheel machine.
8	To determine efficiency and Law of machine of Single Purchase Crab machine.
9	To determine efficiency and Law of machine of Double Purchase Crab machine.
10	To verify law of polygonal of forces using Law of Polygon Apparatus.
11	To find support reactions of a simply supported beam using graphical method and hand calculation.
12.	To find the forces in the member of truss using graphical method and hand calculation.
13.	To find (1) Principle moment of inertia and (2) Moment of inertia and product of inertia about any inclined axis for a composite figure using Mohr's circle and hand calculation,

I SEMESTER

23IT1103 : Programming for Problem Solving

Course Outcomes :
1) Understand the basics of computer system operations and algorithms, flowcharts.
2) Apply the basics of C programming for problem solving.
3) Apply and analyze the different dimensional arrays for problem solving.
4) Understand the basics of string, structure, and union and apply them to problem solving.

Unit I: Computer System Basics:	**(3 Hrs.)**
Basics of programming and problem solving. Introduction to algorithms and flowcharts, Types of programming errors, basic input/output statements and functions (scanf, printf, getch, putch, gets, puts), Introduction to library functions,	
Unit II: Basic of C Programming	**(6 Hrs.)**
Basic building blocks of C: Character set, variables, identifiers & keywords, Data types, Operators: arithmetic, logical and relational operators, , bitwise operators, precedence of operators, Expressions, sizeof() operator, constants, typedef statement, writing straight line programs. Decision control statements: if, if - else and nested if-else statements, else-if ladder statement, switch-case control statement.	
Unit III: Loop Structures:	**(5 Hrs.)**
While, do while and for loops, break and continue statement, "goto" statement, real life programming examples based on these loop structures, real life programming examples.	
Unit IV: Modular Programming:	**(6 Hrs.)**
Concept of functions, user defined functions, function prototypes, formal parameters, actual parameters, return types, call by value , call by reference, C programs using functions, Recursive functions, comparing recursion against iteration, C programs using recursive functions, real life programming examples	
Unit V: Arrays:	**(6 Hrs.)**
One dimensional array, array manipulation, insertion, deletion of an element, searching techniques- Linear and binary search, sorting technique – Bubble sort. Two-dimensional arrays: matrix representation, programs for basic matrix operations such as addition, multiplication and transpose, Array as function arguments. real life programming examples	
Unit VI: String, Structure and Union:	**(4 Hrs.)**
Strings: string representation and string handling functions, Introduction to pointer, structure and union. real life programming examples	
Total Lecture	**30 Hours**

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Text books	
1	The C Programming Language, J.B.W.Kernighan & D.M.Ritchie, Prentice Hall
2	Mastering C, K.R.Venugopal & S.R. Prasad, TMH, 2007.
3	Programming in ANSI C, E. Balaguruswamy, Mc Graw Hill Education

Reference Books	
1	Problem Solving And Program Design In C, Jeri. R. Hanly, Elliot B. Koffman, Pearson Education.
2	Programming with C, Byron Gottfried, Schaum;s Outline Series
3	How to solve it by computers, R. G. Dromey, Prentice Hall India

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books

MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/106104128
2	https://nptel.ac.in/courses/106104128
3	https://www.youtube.com/watch?v=rQoqCP7LX60&list=PLxgZQoSe9cg1drBnejUaDD9GEJBGQ5hMt

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B. Tech SoE and Syllabus 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Information Technology)

B.Tech in Information Technology

SoE No. 23IT-101

I SEMESTER

23IT1104 : Lab. Programming for Problem Solving

Course Outcomes: Students will be able to
1) Understand the basics of computer system operations and algorithms, flowcharts.
2) Apply the basics of C programming for problem solving.
3) Apply and analyze the different dimensional arrays for problem solving.
4) Understand the basics of string, structure, and union and apply them to problem solving.

Unit I: Computer System Basics:	**(3 Hrs.)**
Basics of programming and problem solving. Introduction to algorithms and flowcharts, Types of programming errors, basic input/output statements and functions (scanf, printf, getch, putch, gets, puts), Introduction to library functions,	
Unit II: Basic of C Programming	**(6 Hrs.)**
Basic building blocks of C: Character set, variables, identifiers & keywords, Data types, Operators: arithmetic, logical and relational operators, , bitwise operators, precedence of operators, Expressions, sizeof() operator, constants, typedef statement, writing straight line programs. Decision control statements: if, if - else and nested if-else statements, else-if ladder statement, switch-case control statement.	
Unit III: Loop Structures:	**(5 Hrs.)**
While, do while and for loops, break and continue statement, "goto" statement, real life programming examples based on these loop structures, real life programming examples.	
Unit IV: Modular Programming:	**(6 Hrs.)**
Concept of functions, user defined functions, function prototypes, formal parameters, actual parameters, return types, call by value , call by reference, C programs using functions, Recursive functions, comparing recursion against iteration, C programs using recursive functions, real life programming examples	
Unit V: Arrays:	**(6 Hrs.)**
One dimensional array, array manipulation, insertion, deletion of an element, searching techniques- Linear and binary search, sorting technique – Bubble sort. Two-dimensional arrays: matrix representation, programs for basic matrix operations such as addition, multiplication and transpose, Array as function arguments. real life programming examples	
Unit VI: String, Structure and Union:	**(4 Hrs.)**
Strings: string representation and string handling functions, Introduction to pointer, structure and union. real life programming examples	
Total Lecture	30 Hours

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Text books	
1	The C Programming Language, J.B.W.Kernighan & D.M.Ritchie, Prentice Hall
2	Mastering C, K.R.Venugopal & S.R. Prasad, TMH, 2007.
3	Programming in ANSI C, E. Balaguruswamy, Mc Graw Hill Education

Reference Books	
1	Problem Solving And Program Design In C, Jeri. R. Hanly, Elliot B. Koffman, Pearson Education.
2	Programming with C, Byron Gottfried, Schaum;s Outline Series
3	How to solve it by computers, R. G. Dromey, Prentice Hall India

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1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books

MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/106104128
2	https://nptel.ac.in/courses/106104128
3	https://www.youtube.com/watch?v=rQoqCP7LX60&list=PLxgZQoSe9cg1drBnejUaDD9GEJBGQ5hMt

List of Practical

SN	Unit	Name Of The Practical	Remark	CO'S Mapped	PO'S Mapped
1(A)		Introduction to Linux Operating system & it's different commands.	**Manual**	**CO 1**	**PO1**
1(B)		Introduction to Vi editor, Compilation and Execution of a program in Linux.	**Manual**	**CO 1**	**PO1**
2	**II**	Practical based on Arithmetic and Conditional operators.	**Operators**	**CO 1**	**PO1**
3	**II**	Practical based on Conditional and Unconditional Statements.	**Conditional Statements**	**CO 1**	**PO1**
4	**III**	Practical based on Entry Controlled Looping Statements.	**For / While Loop**	**CO 2**	**PO 1, PO 2**
5	**III**	Practical based on Exit Controlled Looping Statement	**Do while Loop**	**CO 2**	**PO 1, PO 2**
6	**IV**	Practical based on Functions and Recursion.	**Functions / Recursion**	**CO 3**	**PO2, PO3**
7	**V**	Practical based on 1-D Array.	**1D Array**	**CO 3**	**PO2, PO3**
8	**V**	Practical based on 2-D Array.	**2D Array**	**CO 3**	**PO2, PO3**
9	**VI**	Practical based on Strings.	**Strings & Pointers**	**CO 3**	**PO2, PO3**
10	**VI**	Practical based on Structures.	**Structures**	**CO 4**	**PO1, PO2, PO3**

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(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Civil Engineering)

B.Tech in FYC

SoE No. 23FY-101

I SEMESTER

23GE1117-Get Set Go

Course Outcomes:

Upon successful completion of the course the students will be able to

1. Students will understand the importance of building trust in communication and learn how to use the 3Vs of communication (Visual, Vocal, Verbal) to energize their interactions.
2. The course will focus on leadership principles and styles, emphasizing how effective communication can motivate others and gain willing cooperation. Students will participate in activities like skits and team presentations to demonstrate their leadership skills.
3. The course will equip students with team management and organization skills, enabling them to lead and participate in team-building activities effectively.

Unit:1	Build a foundation for success	6 Hours
Explain the Importance of Process of improvement, stating your Name with Impact, Recall and Use Names, Name Remembering Formula o LIRA o PACE – Individual Activity o BRAMMS o Chaining Method, Introduce "My Vision" Communication Fundamentals for Building Trust- Be a good listener, use conversation links, show genuine interest Hi-Five of Success ♣ Build on Memory Skills and Enhance Relationships ♣ PEG words ♣ Explain Permanent PEG Memory System, energize our Communications – Explain 3Vs of communication – Visual-Vocal-Verbal Activity – Practice Conversations, Pause-Part-Punch, Group Activity		
Unit:2	**Increase Self Confidence**	**6 Hours**
Use our experiences to communicate more confidently • Communicate with clarity and conciseness • Discover how past experiences influence behaviour ,Motivate Others and Enhance Relationships- • Learning Objectives • Explain Gain Willing Cooperation Principles • Group Presentation • Explain Demonstration of Leadership Principles • Explain "Evidence" critical in establishing credibility Individual Activity – Sharing of defining moment, Skit to demonstrate Leadership Principles, Stranded on Island .		
Unit:3	**Fundamentals of Communication**	**6 Hours**
Fundamentals of Communication (Earn the right – Excite -Eagerness) ♣ Elevator Pitch ♣ Develop more Flexibility, ♣ Recap and Summarize Activities - – Individual Presentation, Flexibility Drills, Individual Presentations – My Vision Assignment		
Unit:4	**Team Management and Organization skills**	**5 Hours**
Team Management and Organization skills, Leadership Styles, Effective Communication Activity- Team Presentation, Team building activities.		
EVALUATION	**1 Hour**	**EVALUATION**
WRITTEN TEST		
Total Lecture Hours		**24 Hours**

			July,2023	1.00	Applicable for AY 2023-24 Onwards
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Reference Books	
1	Soft Skills - Enhancing Employability: Connecting Campus with Corporate. - M S Rao
2	Soft Skills Training: A Workbook to Develop Skills for Employment - Frederick H Wentz
3	Soft Skills: Know Yourself and Know the World - Alex

I & II SEMESTER
Audit Course
GE2301 : Disaster Management and Preparedness

Course Outcomes :		
Upon successful completion of the course, the students will be able to **CO1:**Explain the basic concepts, classifications and causes of disasters. **CO2:**Identify the impacts of disasters on society, environment and economy. **CO3:**Describe disaster risk reduction measures and disaster management practices. **CO4:** Explain sustainable recovery methods and accessibility measures during disasters.		
Unit:1	**Introduction to Disasters**	7 Hours
Definition and Classification: Natural and Man-made disasters; Concepts: Hazard, vulnerability, risk, resilience, capacity building; Disaster Cycle: Preparedness, response, recovery, mitigation; Brief about Global and Indian perspectives: Case studies		
Unit:2	**Common Disasters and Their Safety Measures**	6 Hours
Natural Disasters : Earthquakes, Landslides, Tsunamis, Floods, Glacial lake outburst floods (GLOFs) ;Volcanic Eruptions Types, monitoring, volcanic hazards ; Cloud burst, Cyclones & Storm Surges, Classification, impacts, prediction ; Forest Fires: Causes, spread, control measures; Desertification and Droughts: Types, causes, and management; Anthropogenic Disasters: Industrial & Chemical Accidents; Nuclear Hazards , safety measures; Urban Disasters: Building collapses, fires ; Environmental Pollution: Air, water, soil contamination incidents		
Unit:3	**Disaster Impacts and Disaster Preparedness**	7 Hours
Disaster impacts: (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate change and urban disasters. Emergency preparedness: Evacuation, emergency kits, and communication; Early warning systems and basic use of GIS in disaster management; relief and rehabilitation: Temporary shelters and community support.		
Unit:4	**Disaster Management & Policies, Institutions, and Governance**	6 Hours
Disaster Management Act, 2005 and amendments – Overview, National and State Disaster Management Authorities (NDMA & SDMA), Disaster Risk Reduction (DRR) and the Sendai Framework, Role of Government, NGOs, and Community in disaster management, Responsibilities of citizens and engineers during disasters.		
	Total Lecture	26 Hours

Text books	
1	Anil K. Gupta, Pradeep K. Goyal(2026). Disaster Management, Khanna Publishing House
2	R Subramanian(2023). Disaster Management . Vikas Publication
3	Coppola, D.P. (2015). Introduction to International Disaster Management. Elsevier.
4	Shaw, R., & Krishnamurthy, R. (2009). Disaster Management: Global Challenges and Local Solutions. Universities Press.
5	Alexander, D. (2002). Principles of Emergency Planning and Management. Oxford University Press.
Reference Books	
1	NDMA (2005 & updates). Disaster Management Guidelines. Government of India
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	https://onlinecourses.swayam2.ac.in/e-learning/preview/cec24_hs83
MOOCs Links and additional reading, learning, video material	
1	https://www.youtube.com/watch?v=-dxhci6s9tY

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

(Accredited 'A++' Grade by NAAC with a score of 3.6)

Hingna Road, Wanadongri, Nagpur - 441 110



Bachelor of Technology

SoE & Syllabus 2023

2nd Semester

(Department of Information Technology)

B. Tech in Information Technology

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B.TECH SCHEME OF EXAMINATION 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Information Technology)

B. Tech. in Information Technology

SoE No. 23IT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
FIRST SEMESTER (GROUP-A)															
1	1	BS	GE	23GE1101	Calculus and Vector	T	3	0	0	3	3	30	20	50	3
2	1	BS	GE	23GE1106	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3
3	1	BS	GE	23GE1107	**Lab :** Engineering Chemistry	P	0	0	2	2	1		60	40	
4	1	HS/AEC-1	GE	23GE1112	Professional Communication	T	2	0	0	2	2	30	20	50	2
5	1	HS/IKS	GE	23GE1115	Indian Knowledge System	T	2	0	0	2	2	30	20	50	2
6	1	BES	CV	23CV1101	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3
7	1	BES	CV	23CV1102	**Lab :** Engineering Mechanics	P	0	0	2	2	1		60	40	
8	1	BES	IT	23IT1103	Programming for Problem Solving	T	2	0	0	2	2	30	20	50	2
9	1	BES	IT	23IT1104	**Lab :** Programming for Problem Solving	P	0	0	2	2	1		60	40	
10	1	VSEC-1	GE	23GE1117	Get Set Go	…	…	…	…	…	2		60	40	
11	1	CC-1	GE		**Liberal Learning Course (LLC1)**	…	…	…	…	…	2		60	40	
					TOTAL FIRST SEM		**15**	**0**	**6**	**21**	**22**				
MANDATORY LEARNING COURSES															
1	1	HS		GE2301	Disaster Management and Preparedness	A	2	0	0	2	0				

SECOND SEMESTER (GROUP-A)															
1	2	BS	GE	23GE1203	Differential Equations and Complex Analysis	T	3	0	0	3	3	30	20	50	3
2	2	BS	GE	23GE1210	Applied Physics	T	3	0	0	3	3	30	20	50	3
3	2	BS	GE	23GE1211	**Lab:** Applied Physics	P	0	0	2	2	1		60	40	
4	2	BES	ME	23ME1201	Engineering Graphics	T	1	0	0	1	1	30	20	50	3
5	2	BES	ME	23ME1202	**Lab :** Engineering Graphics	P	0	0	4	4	2		60	40	
6	2	BES	EL	23EL1201	Basic Electrical and Electronics Engineering	T	3	0	0	3	3	30	20	50	3
7	2	BES	CT	23CT1205	**Lab :** Computer WorkShop	P	0	0	2	2	1		60	40	
8	2	PC	IT	23IT1201	Basics of Python Programming	T	3	0	0	3	3	30	20	50	3
9	2	PC	IT	23IT1202	**Lab :** Basics of Python Programming	P	0	0	2	2	1		60	40	
10	2	VSEC-2	GE	23GE1218	Functional English	…	…	…	…	…	2		60	40	
11	2	CC-2	GE		**Liberal Learning Course (LLC2)**	…	…	…	…	…	2		60	40	
					TOTAL SECOND SEM		**13**	**0**	**10**	**23**	**22**				
MANDATORY LEARNING COURSES															
1	2	HS		GE2131	Universal Human Values (UHV)	A	2	0	0	2	0				

MSEs* = Two MSEs of 15 Marks each will conducted and marks of these 2 MSEs will be considered for Continuous Assessment
TA ** = for Theory : TA1-5 marks on Proctored Online Exam, TA2-12 marks on activitied decided by course teacher, TA3 - 3 marks on class attendance
TA = for Practical : MSPA will be 15 marks each**

Chairperson	Dean (Acad. Matters)	July, 2023	1.00
		Date of Release	Version

Applicable for AY 2023-24 Onwards

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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B.TECH SCHEME OF EXAMINATION 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Information Technology)

B. Tech. in Information Technology

SoE No. 23IT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE
							L	T	P	Hrs		MSEs*	TA**	ESE	Duration Hours

Liberal Learning Course

SN	Sem	Type	BoS / Deptt	Sub. Code	Subject
1	2	CC2	GE	LLC1201	Music (Vocal)
2	2	CC2	GE	LLC1202	Music (Instrumental)
3	2	CC2	GE	LLC1203	Indian Classical Dance
4	2	CC2	GE	LLC1204	Folk Dances
5	2	CC2	GE	LLC1205	Painting
6	2	CC2	GE	LLC1206	Theatre and acting
7	2	CC2	GE	LLC1207	Photography
8	2	CC2	GE	LLC1208	Yoga
9	2	CC2	GE	LLC1209	Chess
10	2	CC2	GE	LLC1210	Athletics
11	2	CC2	GE	LLC1211	Basket Ball
12	2	CC2	GE	LLC1212	Judo
13	2	CC2	GE	LLC1213	Elements of Japanese Language
14	2	CC2	GE	LLC1214	Elements of German Language
15	2	CC2	GE	LLC1215	Elements of French Language
16	2	CC2	GE	LLC1216	Elements of Spanish Language
17	2	CC2	GE	LLC1217	Basics of Vedic Maths
18	2	CC2	GE	LLC1218	Skilling in Microsoft Visio and Inkscape
19	2	CC2	GE	LLC1219	Art of Public Speaking
20	2	CC2	GE	LLC1220	Kabbadi
21	2	CC2	GE	LLC1221	Kho-Kho
22	2	CC2	GE	LLC1222	Volley Ball
23	2	CC2	GE	LLC1223	Holistic Wellness
24	2	CC2	GE	LLC1224	Nutrition and Diet

Liberal Learning Course

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject
1	1	CC1	GE	LLC1101	Music (Vocal)
2	1	CC1	GE	LLC1102	Music (Instrumental)
3	1	CC1	GE	LLC1103	Indian Classical Dance
4	1	CC1	GE	LLC1104	Folk Dances
5	1	CC1	GE	LLC1105	Painting
6	1	CC1	GE	LLC1106	Theatre and acting
7	1	CC1	GE	LLC1107	Photography
8	1	CC1	GE	LLC1108	Yoga
9	1	CC1	GE	LLC1109	Chess
10	1	CC1	GE	LLC1110	Athletics
11	1	CC1	GE	LLC1111	Basket Ball
12	1	CC1	GE	LLC1112	Judo
13	1	CC1	GE	LLC1113	Elements of Japanese Language
14	1	CC1	GE	LLC1114	Elements of German Language
15	1	CC1	GE	LLC1115	Elements of French Language
16	1	CC1	GE	LLC1116	Elements of Spanish Language
17	1	CC1	GE	LLC1117	Basics of Vedic Maths
18	1	CC1	GE	LLC1118	Skilling in Microsoft Visio and Inkscape
19	1	CC1	GE	LLC1119	Art of Public Speaking
20	1	CC1	GE	LLC1120	Kabbadi
21	1	CC1	GE	LLC1121	Kho-Kho
22	1	CC1	GE	LLC1122	Volley Ball
23	1	CC1	GE	LLC1123	Holistic Wellness
24	1	CC1	GE	LLC1124	Nutrition and Diet

MSEs* = Two MSEs of 15 Marks each will conducted and marks of these 2 MSEs will be considered for Continuous Assessment
TA ** = for Theory : TA1-5 marks on Proctored Online Exam, TA2-12 marks on activitied decided by course teacher, TA3 - 3 marks on class attendance
TA = for Practical : MSPA will be 15 marks each**

Chairperson	Dean (Acad. Matters)	July, 2023	1.00
		Date of Release	Version

Applicable for AY 2023-24 Onwards

II SEMESTER
23GE1203: Differential Equations and Complex Analysis

Course Outcomes
The students will be able to
1. Use appropriate Methods to solve first order and higher order differential equations and apply it to find solutions of engineering problems.
2. Use appropriate methods to solve partial differential equations.
3. Determine the various functions of complex numbers.
4. Evaluate the integration of function of complex variables.

Unit I: Differential Equations I	**(7 Hrs.)**
Linear differential equations of first order and first degree, Differential equation reducible to linear form, Exact differential equations (excluding the case of integrating factor) and their applications to various fields. **(Contemporary Issues related to Topic)**	
Unit II: Differential Equations II	**(7 Hrs.)**
Higher order linear differential equations with constant coefficients, Complementary functions and Particular Integral for different cases, Method of variation of parameters, Examples on application to various fields. **(Contemporary Issues related to Topic)**	
Unit III: Differential Equations III	**(6 Hrs.)**
Cauchy's homogeneous linear differential equations, Legendre's linear differential equations, Applications of differential equations to various fields (only up to second order). **(Contemporary Issues related to Topic)**	
Unit IV: Partial Differential Equations	**(6 Hrs.)**
Partial Differential Equations of first order, first degree i.e. Lagrange's form, linear homogeneous equations of higher order with constant coefficient. Application of variable separable method to solve first and second order partial differential equations. **(Contemporary Issues related to Topic)**	
Unit V: Complex Number	**(7 Hrs.)**
Basic concepts of complex numbers and its various forms. Separation of real and imaginary parts, De Moivre's theorem, Application of De Moivre's theorem, Exponential function of complex numbers, Circular function of complex numbers, Hyperbolic function and their inverse, Logarithm of a complex number. **(Contemporary Issues related to Topic)**	
Unit VI: Complex Variables	**(6 Hrs.)**
Analytic function, Cauchy-Riemann conditions, Harmonic functions, Finding Harmonic conjugates, Taylor's and Laurent's Theorem (statement only), Examples on Taylor's and Laurent's Theorem, Evaluation integral by using Residue theorem. **(Contemporary Issues related to Topic)**	
Total Lecture	**39 Hours**

Textbooks:	
1.	Erwin Kreyzig, Advance Engineering Mathematics, 6th Edition, John Wiley and Sons, INC.
2.	H.K. Dass, Engineering Mathematics, 11th revised edition, S. Chand, Delhi.
3.	H.K. Dass, Advanced Engineering Mathematics, 8th revised edition, S. Chand, Delhi.
4.	Dr. B.S. Grewal, Higher Engineering Mathematics, 42th edition, Khanna Publishers.
5.	P.N.Wartikar and J.N.Wartikar, Applied Mathematics, 4th Edition, Vidyarthi GrihaPrakashan.

Reference Books:	
1.	G B Thomas and R L Finney, Calculus and Analytical Geometry, 9th edition, Addison-Wesley, 1999.
2.	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, 10th edition, Laxmi Prakashan.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Mathematics%20and%20Humanities/

MOOCs Links and additional reading, learning, video material	
1.	https://nptel.ac.in/courses/111103070
2.	https://onlinecourses.nptel.ac.in/noc19_ma28/preview
3.	https://nptel.ac.in/courses/111/106/111106100/

II SEMESTER
23GE1210 : Applied Physics

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Correlate fundamentals of quantum mechanics to solve problems dealing with quantum particles.
2. Justify the characteristics of semiconductor materials in terms of crystal structures, charge carriers and energy bands.
3. Analyze the motion of charged particles in electric and magnetic field and its applications to electron optic devices.
4. Examine the intensity variation of light due to Laser and its application.
5. Illustrate working principles of optical fibers for their use in the field of industry.

Unit I: Quantum Physics	**(6 Hrs.)**
Wave particle duality, Davisson and Germer experiment, Wave packet, Heisenberg's uncertainty principle, thought experiment, Significance, Applications. **(Contemporary Issues related to Topic)**	
Unit II: Introduction to Quantum Computing	**(7 Hrs.)**
Introduction of complex numbers, operators, Eigen values, Eigen functions. Wave function and its probability interpretation, Schrodinger Equation, Particle in infinite and finite potential well, quantum tunneling, Introduction to Bits and Qubits. **(Contemporary Issues related to Topic)**	
Unit III: Band Theory of Solids	**(7 Hrs.)**
Formation of energy bands in solids; Classification of solids, Energy band diagram of Si and Ge, Intrinsic and extrinsic semiconductors, Conductivity, Law of mass action, Hall effect, Direct and Indirect band gap semiconductors. **(Contemporary Issues related to Topic)**	
Unit IV: Electron Ballistics and Devices	**(7 Hrs.)**
Motion of a charged particle in uniform electric and magnetic field, Cross field configuration; Electron refraction, Electron lens. Cathode ray oscilloscope and its application. **(Contemporary Issues related to Topic)**	
Unit V: Lasers	**(7 Hrs.)**
Coherence and its types, Interaction of radiation with matter, Population Inversion, Pumping: methods and schemes, Optical resonant cavity, Ruby laser, He-Ne laser, diode laser, Properties and engineering applications of laser. **(Contemporary Issues related to Topic)**	

Unit VI: Optical Fibres	(6 Hrs.)
Principle, structure and classification, Acceptance angle, Numerical aperture, Losses in optical fibers, Applications as sensors. **(Contemporary Issues related to Topic)**	
Total Lecture	**40 Hours**

Textbooks	
1	M. N. Avadhanulu, P. G. Kshirsagar, A Textbook of Engg. Physics, S. Chand and Company.
2	Hitendra K Malik, A K Singh, Engineering Physics, 2nd Edition, Tata McGraw Hill Education Private Limited,

Reference Books	
1	David Halliday, Robert Resnick and Jerle Walker, John-Wiley India, Fundamentals of Physics, 10th John Wiley & Sons Inc.
2	Brijlal and Subramanyam, Text Book of Optics, Revised edition, S. Chand and Company.
3	M.N. Avadhanulu, 2nd Edition, Laser, S.Chand and Company.
4	A. Beiser, Concept of Modern Physics, 6th Edition, Laser, Tata McGraw-Hill.
5	Thyagarajan K. and Ghatak A.K, LASERS: Theory and Applications, 2nd Edition, Macmillan Publication
6	S. O. Pillai, Solid State Physics, 9th Edition, New Edge International Publishers.
7	Palanisamy, Solid State Physics, 8th Edition, New Edge International Publishers.
8	C. Kittel, Solid State Physics, 8th Edition, Willey Publication.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	chrome-http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Physics/Eisberg%20&%20Resnick%20-%20Quantum%20Physics.pdf
2	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Physics/2016_Book_ThePhysicsOfSemiconductors.pdf

MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/115106066 - Quantum Physics
2	https://archive.nptel.ac.in/courses/115/105/115105121/ -CRO
3	www.digimat.in/nptel/courses/video/115102124/L36.html- Laser

II SEMESTER

23GE1211 : Lab. Applied Physics

Course Outcomes:
Upon successful completion of the course the students will be able to 1. Correlate fundamentals of quantum mechanics to solve problems dealing with quantum particles. 2. Justify the characteristics of semiconductor materials in terms of crystal structures, charge carriers and energy bands. 3. Analyze the motion of charged particles in electric and magnetic field and its applications to electron optic devices. 4. Examine the intensity variation of light due to Laser and its application. 5. Illustrate working principle of optical fibers for their use in the field of industry.

List of Experiments :	
Sr. No.	**Experiments based on**
1	Determination of Planck's Constant
2	Study of Tunnel Diode.
3	Determination of Hall coefficient and density of charge carriers using Hall effect.
4	Dependence of Hall coefficient on temperature.
5	The study of V-I characteristics of a semiconductor diode (Germanium and silicon) in forward and reverse bias mode.
6	Determination of Band gap in a semiconductor by four probe method.
7	Determination of Band gap in a semiconductor using reverse biased p-n junction diode.
8	Determination of wavelength of laser using diffraction grating.
9	Determination of divergence of laser beam.
10	Determination of Acceptance angle and numerical aperture of a given optical fiber.
11	To measure the phase shift introduced by a phase shift network using Dual beam CRO.
12	Determination of amplitude and frequency of sinusoidal signal using CRO.

II SEMESTER

23ME1201 : Engineering Graphics

Course Outcomes :
Upon successful completion of the course the students will be able to
1. Construct orthographic drawing and isometric drawing of a given object
2. Evaluate Projections of various One Dimensional, Two dimensional, Three dimensional objects
3. Develop the lateral surfaces of various solids, their section and intersection**.**
4. Practice the use of software tools used for Two dimensional drawings.

Unit I: Theory of Orthographic Projections:	**(3 Hrs.)**
Introduction, Quadrant system, Theory of orthographic projection, Projection method and principal planes, First and Third angle projections,	
Unit II: Theory of Isometric Projections:	**(2 Hrs.)**
Theory of isometric projection, Method for drawing isometric views, Different problems on isometric projections.	
Unit III: Lines:	**(2 Hrs.)**
Projection of points, Projection of lines, True lengths and inclinations, apparent lengths and inclinations, various positions of lines in different quadrants, Traces of lines, projection of line on auxiliary plane.	
Unit IV: Planes and Solids:	**(4 Hrs.)**
Projection planes: (Polygonal Lamina, Circular Lamina), Projection of Perpendicular planes and oblique planes. Auxiliary views (Auxiliary planes) Projection of Solids :(Inclined to One Plane Only) - Polyhedra (Regular and Irregular Polyhedra), Solids of Revolution	
Unit V: Section of Solids and Development of Surfaces:	**(2 Hrs.)**
Types of Section planes, Sectional top view, True shape. Development of different solids using Radial line and parallel line methods.	
Unit VI: Intersection of Surfaces of solids:	**(2 Hrs.)**
Intersection between similar solids, Intersection between dissimilar solids, Lines and Curves of Intersection.	
Total Lecture	**15 Hours**

Textbooks:	
1.	D.M. Kulkarni, A. P. Rastogi and A. K. Sarkar , Engineering Graphics with AutoCAD PHI learning Pvt. Ltd., Revised Edition(2014),
2.	N. D. Bhatt ,Engineering Drawing Charotar Publishing House Pvt. Ltd, 53 rd Edition 2017

Reference Books:	
1.	D. A. Jolhe Engineering Drawing , Tata McGraw Hill Publications , 2008,
2.	K. L. Narayana & P. Kannaiah , Engineering Drawing SciTech Publication , 2010
3.	R. K. Dhawan Engineering Drawing S. Chand Publication Multicolor revised edition 2015

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	Intranet on address 172.16.1.10. data/CCC/software / AutoCAD Software Setup.

MOOCs Links and additional reading, learning, video material	
1.	https://youtube.com/playlist?list=PLLy_2iUCG87Bw9XPfEF3r3EW5UlAOv8iz
2.	Eng https://nptel.ac.in/courses/112105294

II SEMESTER

23ME1202 : Lab. Engineering Graphics

Course Outcomes :
Upon successful completion of the course the students will be able to
1. Construct orthographic drawing and isometric drawing of a given object
2. Evaluate Projections of various One Dimensional, Two dimensional, Three dimensional objects
3. Develop the lateral surfaces of various solids, their section and intersection**.**
4. Practice the use of software tools used for Two dimensional drawings.

Practical's to be performed from the list as below

SN	**Experiments based on**	**No.of Practical's**
1	Introduction of AutoCAD Basic Commands	02
2	Orthographic Projection	03
3	Isometric Projection	03
4	Projection of Straight Line	03
5	Projection of Planar Surface	03
6	Projection of Solid	03
7	Section and Development of Solid	04
8	Intersection of Surfaces	03
9	Drawing Sheet 1: Convention for various lines, Dimensioning and Orthographic Projection	02
10	Drawing Sheet 2: Projection of line, planar surface or solid. (Any one)	02
	Total Practical's	**28 Hours**

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B. Tech SoE and Syllabus 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Electrical Engineering)

B.Tech in Electrical Engineering

SoE No. 23EL-101

II SEMESTER

23EL1201 : Basic Electrical and Electronics Engineering

Course Outcomes:

1. Understand the fundamental concepts of Analog Electronic and Electrical Circuits
2. Apply the concepts of Electrical and Electronic Circuits to obtain the desired parameter
3. Analyze analog Electrical Circuits for given application.
4. Analyze analog Electronic Circuits for given application

Unit I: Circuit Elements and Energy Sources	**(7 Hrs.)**
Circuit Elements, Series and Parallel Combination of Resistances, Inductance and Capacitances, Energy Sources, Source Transformation, Sources with Periodic Waveforms, A.C. in Inductance and Capacitance, Star-Delta Connection. **(Contemporary Issues related to Topic)**	
Unit II: Analysis of Network	**(7 Hrs.)**
Kirchhof's Laws, Current Division, Voltage Division, Nodal and Mesh Analysis of Electric Circuits, Thevenin's Theorem **(Contemporary Issues related to Topic)**	
Unit III: Generator and Motors	**(7 Hrs.)**
Introduction to Generator, Construction, working principle, Types of Generators, Introduction to DC Motor,Working Principle of DC Motor, Types of Motors. **(Contemporary Issues related to Topic)**	
Unit IV: Diode and Transistor	**(6 Hrs.)**
Introduction to Semiconductor, P-N junction diodes, Biasing & Characteristics of diodes. Diode Circuits - Half wave rectifier, full wave rectifier, bridge rectifier. Introduction to BJT- NPN and PNP, Modes of operation,. **(Contemporary Issues related to Topic)**	
Unit V: Operational Amplifier and Its Application	**(7 Hrs.)**
Introduction to Op-Amp, Inverting and Non-Inverting Amplifier, Linear Applications of OP-AMP like adder, Subtractor, integrator, differentiator and non-linear application using Comparator. **(Contemporary Issues related to Topic)**	
Unit VI: Electronics Measurement	**(6 Hrs.)**
Introduction to Measurement System, Generalized block diagram of Measurement System, Static & dynamic characteristics of measurement system, Types of errors & their sources, Statistical analysis. **(ContemporaryIssues related to Topic)**	
Total Lecture	**40 Hours**

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

Textbooks:	
1.	Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford Higher Education, First Edition2005
2.	Electronics Devices and circuits, Millman Jacob, McGraw Hill Education, Fourth Edition (2015)
3.	Circuit Theory (Analysis and Synthesis) , by A. Chakrabarti, Dhanpat Rai & Co., Reprint Edition 2014

Reference Books:	
1.	OP-AMP and Linear Integrated Circuit, by Ramakant A. Gayakwad, Prentice Hall India Learnin Private Limited, Published in 2002
2.	Electrical & Electronic measurement & Instrument, A. K. Sawhney, Dhanpat Rai & Co.,18th edition 2008

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://link.springer.com/openurl?genre=book&isbn=978-1-4613-6193-0
2	https://onlinelibrary.wiley.com/doi/book/10.1002/9780470168042

MOOCs Links and additional reading, learning, video material	
1.	https://onlinecourses.nptel.ac.in/noc22_ee113/preview

II SEMESTER
23CT1205: Lab. Object Oriented Programming

Course Outcomes
Upon successful completion of the course the students will be able to
1. Understand the concept of object-oriented programming and modelling
2. Apply the knowledge of object-oriented programming to solve the given problem
1. Analyze the problem to provide the object oriented solution using advanced programming concepts

Minimum Eight Practical's to be performed from the list as below

SN	Program based on
1	Implement the concept of Class and its data members and member functions
2	Implement the concept of function overloading
3	Implement the concept of passing object as a function argument
4	Implement the concept of friend function
5	Implement the concept of constructor and its type.
6	Implement the concept of operator overloading
7	Implement the concept of single inheritance.
8	Implement the concept of multilevel Inheritance
9	Implement the concept of each access specifiers (Private, Public and Protected).
10	Implement the concept of run time polymorphism
11	Implement the concept of Files
12	Implement the concept of command line arguments
13	Implement the concept of function templates
14	Implement the concept of Class templates.
15	Implement the concept of exception.

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech SoE and Syllabus 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Information Technology)

B.Tech in Information Technology

SoE No. 23IT-101

II SEMESTER

23IT1201 : Basics of Python Programming

Course Outcomes :

After completion of the course:

1. Understand fundamentals, syntax, and semantics of Python programming
2. Apply concepts of different data structure, control flow statements, Arrays, lists, dictionaries, tuples and sets.
3. Analyze and present the data by utilizing various data visualization tools
4. Design & Develop programs to offer solutions using basics of Python.

Unit I: Introduction	**(9 Hrs.)**

Generationsofcomputer,computerlanguages.IntroductiontoPythonProgrammingLanguage,Identifiers,Keywords,StatementsandExpressions,Variables,Operators,PrecedenceandAssociativity,DataTypes,Indentation,Comments,ReadingInput,PrintOutput,TypeConversions,Thetype()FunctionandIsOperator,DynamicandStronglyTypedLanguage,ControlFlowStatements,TheifDecisionControlFlowStatement,Theif…else Decision Control Flow Statement, The if…elif…else Decision Control Statement, Nested if Statement,(Contemporary Issues related to Topic)

Unit II: Control Structure and Functions	**(8 Hrs.)**

The while Loop, The for Loop, The continue and break Statements, Catching Exceptions Using try and except Statement, Functions, Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, Thereturn Statement and void Function, Scopeand Life time of Variables, Default Parameters, Keyword Arguments,*argsand **kwargs, Command Line Argument **(Contemporary Issues related to Topic)**

Unit III: Strings and Lists	**(8 Hrs.)**

Strings, Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings, Lists, Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Use don Lists, List Methods, The del Statement. (Contemporary Issues related to Topic)

Unit IV: Dictionaries	**(8 Hrs.)**

Dictionaries, Creating Dictionary, Accessing and Modifying key: value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, The del Statement, **Tuples and Sets**, Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Tuple Methods, Using zip() Function, Sets, Set Methods, Traversing of Sets, Frozen set. **(Contemporary Issues related to Topic)**

Unit V: Files	(8 Hrs.)
Files, Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, The Pickle Module, Reading and Writing CSV Files, Python os and os. path Modules, **Regular Expression Operations,** Using Special Characters, Regular Expression Methods, Named Groups in Python Regular Expressions, Regular Expression with glob Module **(Contemporary Issues related to Topic)**	
Unit VI: Visualizing Information	**(8 Hrs.)**
Visualizing Information: what is data visualization, use of Pyplot Matplotlib Library, Creating Line charts and scatter plot, Creating bar charts and Pie Charts, Customizing the plots, Creating Histogram with PyPlot and other library, Creating Frequency Polygons, Creating Box plot, Plotting data from Dataframe. **(Contemporary Issues related to Topic)**	
Total Lecture	**49 Hours**

Text Books:	
1	"Introduction to Python Programming", 1st Edition, Gowrishankar S, Veena ACRCPress/Taylor&Francis

ReferenceBooks:	
1	"PythonDataScienceHandbook:EssentialToolsforWorkingwithData",1stEdition,JakeVanderPlas,O'Reilly Media
2	"Hands-On Machine Learning with Scikit- Learnand Tensor Flow :Concepts, Tools, and Techniques to Build Intelligent Systems", 2ndEdition, Aurelien Geron O'Reilly Media.
3	"CorePythonApplicationsProgramming",3rdEdition,WesleyJChun,PearsonEducation

YCCE e-library book links[ACCESSIBLEFROM COLLEGECAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology/5._DataStructuresAndAlgorithmsWith%20Python.pdf
2	http://103.152.199.179/YCCE/DTEL%20Material/7.Information%20Technology/DTEL%20PPTs/

MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/106/106/106106182/
2.	https://archive.nptel.ac.in/courses/106/106/106106145/

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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B. Tech SoE and Syllabus 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Information Technology)

B.Tech in Information Technology

SoE No. 23IT-101

II SEMESTER

23IT1202 : Lab. Basics of Python Programming

Course Outcomes
Upon successful completion of the course the students will be able to 1. Comprehend programming constructs operators, command line Arguments, Strings etc. 2. Design application by using Python for real world problems.

Minimum Eight Practical's to be performed from the list as below

SN	**Experiments based on**
1	A. Write a python program to demonstrate different number data types in Python. B. Write a python program to perform different arithmetic operators on numbers.
2	A. Write a python program to find largest of three numbers. B. Write a python program to convert temperature to and from Celsius to Fahrenheit
3	A. Write a python program to print for a score between 0.0 to 1.0. If the score is out of range print an error message. if the score is between 0.0 to 1.0 print a grade using a following grade using following table Score / Grade: >= 0.9 / A; >= 0.8 / B; >= 0.7 / C; >=0.6 / D; <0.6 / E B. Write a python program to check if given year is leap year or not.
4	A. Write a python program to print Fibonacci series. B. Write a python program to find the GCD of two positive numbers.
5	A. Write a python program to demonstrate command line argument in python. B. Write a python program to check whether a particular character is present or not in the string using command line argument
6	A. Write a python program to create, concatenate, and print a string and access sub string B. Write a python program to create append, and remove from list.

7	A. Write a python program to count vowels, consonant and blank from a string.
8	Write a python program to input information of n students as given below: a. name b. registration number c. total marks The user has to specify a value for n numbers of student. The program should output the registration number and marks of specified student given his name.
9	Write a python program for reading a CSV files using CSV reader() to read a CSV file in python
10	A. Draw a line chart by using Pyplot matplotlib library of data visualization B. Draw a bar graph of the given data for the production of apples and oranges of a field of toranto using pyplot matplotlib library. range(2000,2006) apples=[0.35,0.6,0.9,0.8,0.65,0.8] oranges=[0.4,0.8,0.9,0.7,0.6,0.8]

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B. Tech SoE and Syllabus 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Mathematics & Humanities)

SoE No. 23FY-101

B.Tech First Year

II SEMESTER

23GE1218 : Functional English

Course Outcomes:
Upon successful completion of the course the students will be able to 1. Understand the concept of FE (Functional English) and its application in various real-life scenarios. 2. Develop basic interactive communication skills, including greetings, asking for information, stating opinions, and providing feedback. 3. Acquire knowledge of social networking, texting, instant messaging, blogs, and discussion boards, along with the ethical considerations associated with online communication. 4. Successfully complete quizzes and assignments assessing knowledge in the covered topics of FE, social media, tenses, and effective communication.

Unit:1	Introduction to Functional English	6 Hours
What is FE? And Areas of application. Basic Interactive sentences - Greetings & Replies, Asking for information, Telling people what you do, Asking somebody's opinion, Giving your opinion, Saying someone is correct, Saying that someone is wrong, Apologizing, Praising someone's work, Saying goodbye. Introduction & Basics of Common Expressions – Offer, Request, Gratitude, Apology. Modal Verbs - Words used often: Can- could, Will – would, Shall – should, Ought to-Must, May-might. Practice exercises, Practice Conversations, Script Activity		
Unit:2	**Internet & Social Media Communication**	**6 Hours**
Introduction & Basics to Social Networking, Texting & Instant messaging, Blogs & Discussion Board- discussion with examples, Ethics of social media & communication Topic: Introduction to Creative Ads Why Ads, What's in it for me? Characteristics of ads. Assignment Quiz on the above Topics, Exercises for Evaluation		
Unit:3	**TENSES**	**6 Hours**
Introduction & Basics, Simple Tense (Past, Present, Future), Continuous Tense (Past, Present, Future) – discussion with examples. Introduction & Basics, Perfect Tense (Past, Present, Future), Perfect Continuous Tense (Past, Present, Future) – discussion with examples Introduction to Movie Magic, Learn English with films, Film Vocabulary, Describing a film, Types of Films Assessment – Letter and Email Writing, Tenses – Quiz		
Unit:4	**Written Communication**	**5 Hours**
Introduction & Basics of Writing, five methods of communication, Mind your grammar, Commonly confusing words Letters – Format, Parts of a business letter, When does communication fail?, Things to remember, Positive language not negative language, Active voice not passive voice Effective emailing -How to make an effective e-mail, Few common e-mail habits that cause problems, Parts of an e-mail, Some other important aspects.		

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

Assignment Presentation on Mad Ads, Quiz on Tenses and social media-Internet Communication
Topic: Activity Extempore

EVALUATION			**1 Hour**
WRITTEN TEST	**TA=60**	**ESE=40**	**TOTAL=100**
Total Lecture Hours			**24 Hours**

Reference Books	
1	How to win friends & influence people – Dale Carnegie
2.	Functional English for Communication - Ujjwala Kakarla
3	Functional English for Technical Students – Dr Prathibha Mahato & Dr Dora Thompson

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Bachelor of Technology

SoE & Syllabus 2023

3rd Semester

(Department of Information Technology)

B. Tech in Information Technology

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B.TECH SCHEME OF EXAMINATION 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Information Technology)

B. Tech. in Information Technology

SoE No. 23IT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
THIRD SEMESTER															
1	3	BS	GE	23GE1303	Linear Algebra	T	3	0	0	3	3	30	20	50	3
2	3	HSSM-1	GE	23GE1301	Fundamentals of Management & Economics	T	2	0	0	2	2	30	20	50	3
3	3	VEC-1	CV	23CV1311	Environmental Sustainability, Pollution and Management	T	2	0	0	2	2	30	20	50	3
4	3	PC	IT	23IT1301	Data Structure and Program Design	T	3	0	0	3	3	30	20	50	3
5	3	PC	IT	23IT1302	**Lab :** Data Structure and Program Design	P	0	0	2	2	1		60	40	
6	3	PC	IT	23IT1303	Computer Archtecture & Organization	T	3	0	0	3	3	30	20	50	3
7	3	PC	IT	23IT1304	Object Oriented Programming	T	3	0	0	3	3	30	20	50	3
8	3	PC	IT	23IT1305	**Lab :** Object Oriented Programming	P	0	0	2	2	1		60	40	
9	3	PC	IT	23IT1306	**Lab :** Software Lab-1	P	0	0	2	2	1		60	40	
10	3	CEP	IT	23IT1307	Community Engagement Project	P	0	0	2	4	2		60	40	
11	3	OE-1	OE		**Open Elective-I**	T	2	0	0	2	2	30	20	50	3
12	3	MDM	IT		**MD Minor Course-I**	T	2	0	0	2	2	30	20	50	3
					TOTAL		**20**	**0**	**8**	**30**	**25**				
List of Mandatory Learning Course (MLC)															
1	3	HS	T&P	MLC2123	**YCAP3 :** YCCE Communication Aptitude Preparation	**A**	3	0	0	3	**0**				

Open Elective - I

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject
1	3	OE1	GE	23OE1301	OE-I : Combinatorics
2	3	OE1	GE	23OE1302	OE-I : Fuzzy Set Theory, Arithmetic And Logic
3	3	OE1	GE	23OE1303	OE-I : Green Chemistry & Sustainability
4	3	OE1	GE	23OE1304	OE-I : Hydrogen Fuel
5	3	OE1	GE	23OE1305	OE-I : Electronic Materials And Applications
6	3	OE1	GE	23OE1306	OE-I : Laser Technology And Applications
7	3	OE1	MGT	23OE1307	OE-I : Finance And Cost Management
8	3	OE1	MGT	23OE1308	OE-I : Operation Research Techniques
9	3	OE1	MGT	23OE1309	OE-I : Project Evaluation & Management
10	3	OE1	MGT	23OE1310	OE-I : Total Quality Management
11	3	OE1	MGT	23OE1311	OE-I : Value Engineering
12	3	OE1	MGT	23OE1312	OE-I : Maintenance Management
13	3	OE1	MGT	23OE1313	OE-I : Industrial Safety
14	3	OE1	MGT	23OE1314	OE-I : Industry 4.0
15	3	OE1	MGT	23OE1315	OE-I : Operation Management
16	3	OE1	MGT	23OE1316	OE-I : Material Management
17	3	OE1	MGT	23OE1317	OE-I : Hospitality Management
18	3	OE1	MGT	23OE1318	OE-I : Human Resource Management & Organizational Behaviour
19	3	OE1	MGT	23OE1319	OE-I : Agri-Business Management
20	3	OE1	MGT	23OE1320	OE-I : Rural Marketing
21	3	OE1	MGT	23OE1321	OE-I : Marketing Management
22	3	OE1	MGT	23OE1322	OE-I : Health Care Management
23	3	OE1	MGT	23OE1323	OE-I : Designated approved online NPTEL/KKSU Course
24	3	OE1	MGT	23OE1324	OE-I : Indian Archeology
25	3	OE1	MGT	23OE1325	OE-I : Social & Positive Psychology
26	3	OE1	MGT	23OE1326	OE-I : Seismology & Earthquake

Chairperson	Dean (Acad. Matters)	July, 2023	1.00	Applicable for AY 2023-24 Onwards
		Date of Release	Version	

III SEMESTER
23GE1303: Linear Algebra

Course Outcomes:
Upon successful completion of the course the students will be able to
1 Solve systems of linear equations using rank of matrix.
2. Determine eigen values and eigen vectors and solve eigen value problems.
3. Explain the concepts of vector space and subspace, span and basis.
4. Apply principles of matrix algebra to linear transformations and inner product.

Unit I:	**8 Hrs.**
Elementary matrix operations: Introduction to Matrices and Determinants, Solution of Linear Equations, Cramer's rule, Inverse of a Matrix.	
Unit II:	**7 Hrs.**
Matrix Algebra: Rank of a matrix, Gaussian elimination, LU Decomposition (Crout's method), Solving Systems of Linear Equations using the tools of Matrices.	
Unit III:	**7 Hrs.**
Diagonalization of Matrix: Eigen Values and Eigen vectors, Linear dependence and independence of Eigen Vectors, Orthogonal Eigen vector, Diagonalization of matrix, Cayley-Hamilton Theorem and Sylvester's Theorem.	
Unit IV:	**8 Hrs.**
Vector Space: Vector Space, Subspace, Sum of Sub space, linear combination, Linear dependence and independence, Span and basis, Spanning sets, Generators.	
Unit V:	**7 Hrs.**
Linear Transformation: Linear transformation, Ranges and Kernel (null space) of linear transformation, Inverse of linear transformation, Algebra of linear transformation, Singular and nonsingular linear transformation.	
Unit VI:	**8 Hrs.**
Inner product Spaces: Inner product space and Norms, orthogonal vector, the Gram Schamidt orthogonalization Process, orthogonal compliment, Adjoint of Linear operator, Normal and self-adjoint operator, Unitary and orthogonal operator, Bilinear and Quadratic form.	
	Total Lecture **45 Hours**

Textbooks:	
1	Erwin Kreyzig, Advance Engineering Mathematics, 9th Edition, John Wiley and Sons, INC.
2	Dr. B. S. Grewal, Higher Engineering Mathematics, 40th edition, Khanna Publisher.
3	H.K. Dass, Advanced Engineering Mathematics, 8th revised edition, S. Chand, Delhi.
4	Hoffman and Kunze, Linear Algebra, prentice Hall of India, New Delhi
5	Glbert Strang, Linear Algebra and its Applications, Nelson Engineering (2007)

Reference Books:	
1	Chandrika Prasad, Mathematics for Engineers (19th edition), , John Wiley & Sons.
2	L.A. Pipes and Harville, Applied Mathematics for Engineers (3rd edition), McGraw Hill.
3	K.B.Datta, Matrix and Linear Algebra, , Prentice Hall of India.
4	Linear Algebra, Schaum's Solved Problem Series, Seymour Lipschutz, McGraw-Hill Book Company.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Mathematics%20and%20Humanities/

MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/111106051
2	https://archive.nptel.ac.in/courses/111/104/111104137/
3	https://archive.nptel.ac.in/courses/111/106/111106135/

III SEMESTER

23GE1301: Fundamentals of Management and Economics

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Develop the Managerial Perspective and perform the various functions of management for optimum utilization of Engineering Resources 2. Identify and Analyze the role of Financial Accountancy and Marketing Management in the Organization 3. Develop perspective about economy based on logical reasoning and estimate the economic outcomes. 4. Interprets comparative advantage of resources.

Unit I:	**7 Hrs.**
Principles of Management: Evolution of Management Thought: Scientific and Administrative Theory of Management, Definition and Concept of Management, Functions of Management: Planning, Organizing, Directing, Staffing and Controlling, Motivational Theories, Concept of Leadership.	
Unit II:	**8 Hrs.**
Marketing and Financial Management: Marketing and Financial Management –Marketing Theories and Concept-Marketing Mix, Market Segmentation, Targeting and Positioning and Functions Financial Management and Accountancy- Accountancy Rules and Capital, Preparation of Books of Account-Journal posting of Transaction into ledger and preparation of trial Balance, Introduction of Trading Account, Profit and loss account and balance sheet.	
Unit III:	**7 Hrs.**
Introduction to Microeconomics: Nature and Scope of Microeconomics, Demand Analysis: Meaning and determinants of demand, law of demand, Elasticity of Demand - types and degrees, Utility analysis, Law of diminishing marginal utility, supply- law of supply, Law of Variable proportions and Return to Scale, Classification of market structure.	
Unit IV:	**8 Hrs.**
Introduction to Macroeconomics: Nature and Scope of Macroeconomics, Concept of GDP, GNP, NDP, NNP, Measurement of GDP; Economic Growth and development, Money – definition, types and function of money, Inflation – meaning, types, causes and measure to control, concept of deflation, functions of central and commercial bank , Sources of public revenue - direct and indirect taxes. .	
Total Lecture	**30 Hours**

Textbooks:	
1	Principle of Management, 9th edition , Harold Koontz Ramchandra, Tata McGrow hills
2	Marketing Management: Planning, Implementation and Control, 3rd Edition, Ramaswamy V.S. and Namakumari S, Macmillian
3	Fundamentals of Accounting Gupta R.L. & Radhaswamy ;
4	Modern Economics, 13th Edition, H. L. Ahuja, S. Chand Publisher, 2009

5	Modern Economic Theory, 3rd edition, K. K. Devett, S. Chand Publisher,2007
6	Principle of Economics, 7th edition, Mankiw N. Gregory, Thomson, 2013

Reference Books:	
1	Foundations of Financial Markets and Institutions, 3rd Edition, Fabozzi, Pretice Hall
2	Fundamentals of Financial Instruments , 2nd Edition, Parameshwaran, Wiley India
3	Marketing Management , 3rd Edition , RajanSaxena, Tata McGraw Hill
4	Advance Economic Theory, 17th Edition, H. L. Ahuja, S. Chand Publisher, 2009
5	International Trade, 12th edition, M. L. Zingan, Vindra Publication, 2007
6	Macro Economics, 11th edition, M. L. Zingan, Vindra Publication, 2007
7	Monitory Economics:,1st Edition, M. L. Sheth, Himayalaya Publisher, 1995

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://link.springer.com/openurl?genre=book&isbn=978-1-4613-6193-0
2	https://onlinelibrary.wiley.com/doi/book/10.1002/9780470168042

MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.nptel.ac.in/noc22_mg104/preview
2	https://archive.nptel.ac.in/courses/110/101/110101131/
3	https://onlinecourses.nptel.ac.in/noc23_mg122/preview
4	https://onlinecourses.nptel.ac.in/noc21_hs52/preview
5	https://onlinecourses.nptel.ac.in/noc22_hs67/preview

III/IV SEMESTER
23CV1311/23CV1411
Environmental Sustainability, Pollution and Management

Course Outcomes :
Upon successful completion of the course, the students will be able to
The student will be able to 1. Gain insights into the efforts to safeguard the Earth's environment and resources. 2. Develop a critical understanding of the contemporary environmental issues of concern 3. Have an overview of pollution, climate change and national and global efforts to address adaptation and mitigation to changing environment through environmental management. 4. Learn about the major international treaties and our country's stand on and responses to the major international agreements.

Unit:1	**Environment and Sustainable Development**	**8 Hours**
The man-environment interaction; Overview of natural resources: renewable, and non-renewable energy resources; Introduction to sustainable development: Sustainable Development Goals (SDGs)- targets and indicators, challenges and strategies for SDGs; Environmental issues: Global change, Climate Change and Mitigation.		
Unit:2	**Environmental Pollution and Health**	**7 Hours**
Understanding pollution: Production processes and generation of wastes, Air pollution, Water pollution, Soil pollution and solid waste, Noise pollution, Thermal and Radioactive pollution. Impact on biotic and abiotic things.		
Unit:3	**Environmental Management**	**8 Hours**
Environmental management system: ISO 14001, Concept of Circular Economy, Life cycle analysis; Cost-benefit analysis, Environmental audit and impact assessment; Waste Management and sustainability; Ecolabeling /Eco mark scheme		
Unit:4	**Environmental Treaties and Legislation**	**7 Hours**
Introduction to environmental laws and regulation, An overview of instruments of international cooperation, Major International Environmental Agreements, Major Indian Environmental Legislations, Major International organizations, and initiatives		
	Total Lecture	**30 Hours**

Text books	
1	Chiras, D. D and Reganold, J. P. (2010). Natural Resource Conservation: Management for a Sustainable Future.10th edition, Upper Saddle River, N. J. Benjamin/Cummins/Pearson
2	Rajagopalan, R. (2011). Environmental Studies: From Crisis to Cure. India: Oxford University Press
3	Krishnamurthy, K.V. (2003) Textbook of Biodiversity, Science Publishers, Plymouth, UK
4	Jackson, A. R., & Jackson, J. M. (2000). Environmental Science: The Natural Environment and Human Impact. Pearson Education
5	Pittock, Barrie (2009) Climate Change: The Science, Impacts and Solutions. 2nd Edition. Routledge.
6	Theodore, M. K. and Theodore, Louis (2021) Introduction to Environmental Management, 2nd Edition. CRC Press
7	Kanchi Kohli and Manju Menon (2021) Development of Environment Laws in India, Cambridge University Press

Reference Books	
1	Headrick, Daniel R. (2020) Humans versus Nature- A Global Environmental History, Oxford University Press
2	Gilbert M. Masters and W. P. (2008). An Introduction to Environmental Engineering and Science, Ela Publisher (Pearson)
3	William P. Cunningham and Mary A. (2015). Cunningham Environmental Science: A global concern, Publisher (Mc-Graw Hill, USA)
4	Varghese, Anita, Oommen, Meera Anna, Paul, Mridula Mary, Nath, Snehlata (Editors) (2022) Conservation through Sustainable Use: Lessons from India. Routledge.
5	Central Pollution Control Board Web page for various pollution standards. https://cpcb.nic.in/ standards
6	Barnett, J. & S. O'Neill (2010). Maladaptation. Global Environmental Change—Human and Policy Dimensions 20: 211–213
7	Richard A. Marcantonio, Marc Lame (2022). Environmental Management: Concepts and Practical Skills. Cambridge University Press
8	Ministry of Environment, Forest and Climate Change (2019) A Handbook on International Environment Conventions & Programmes. https://moef.gov.in/wp- content/uploads/2020/02/ convention-V-16-CURVE-web.pdf
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	
MOOCs Links and additional reading, learning, video material	
1	

III SEMESTER

23IT1301: Data Structure and Program Design

Course Outcomes :
Upon successful completion of the course the students will be able to. 1. Comprehend programming constructs like function, array, string, pointer, structure, file and also understand basic data structures like list, stack, queue. 2. Apply appropriate data structures in problem solving. 3. Analyze the performance of operations performed on data structures. 4. Design application by using data structures for real world problems.

Unit I	**(7 Hrs.)**
Introduction to DS, Introduction to Time and Space Complexity, ADT,Aarry and Strings, representation of 1D in memory, pointers and dynamic allocation, Structure ,Union.	
Unit II	**(6 Hrs.)**
Stack:-Application and Operations of Stack. Queue:- Application and Operations of Queue , Types: Priority Queues, Circular Queue, Dequeue.	
Unit III	**(7 Hrs.)**
Link List: Implementation of linked list using arrays and pointers, operations on singly, Doubly and Circular linked list.	
Unit IV	**(7 Hrs.)**
Trees: Binary trees: Representations in memory and Traversals, Binary search trees(BST), B-Tree, B+Trees, AVL Trees, Threads and its Operations.	
Unit V	**(6 Hrs.)**
Graphs: Graphs and diagraphs: Representations and its operations, Breadth and Depth First Searches, Spanning Trees.	
Unit VI	**(6 Hrs.)**
2D array, sparse matrix, storage classes, File handling, Hashing.	
Total Lecture	**39 Hours**

Textbooks:	
1.	Data Structures & Program Design in C,Robert Kruse, G. L. Tondo and,B. Leung,PHI-EEE
2.	Data Structures and Algorithms Jeffrey D. Ullman, Alfred V. Aho

Reference Books:	
1.	Robert Kruse, G. L. Tondo and B. Leung PHI-EEE Data Structures & Program Design in C
2.	Seymour Lipschutz Data Structures Tata McGraw-Hill
3.	Ellis Horowitz, Satraj Sahni and Susan Anderson-Freed Fundamentals of Data Structures in C W. H. Freeman and Company.

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1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://youtu.be/6VF2Q0pgUFI?feature=shared
2.	https://youtu.be/zWg7U0OEAoE
3.	https://youtu.be/g1USSZVWDsY
4.	https://youtu.be/tORLeHHtazM

III SEMESTER

23IT1302: Lab.: Data Structure and Program Design

Course Outcomes
Upon successful completion of the course the students will be able to 1. Comprehend programming constructs like function, array, string, pointer, structure, file and also understand basic data structures like list, stack, queue. 2. Apply appropriate data structures in problem solving. 3. Analyze the performance of operations performed on data structures. 4. Design application by using data structures for real world problems.

S.N	List of Practical
1 1	• Array-based: check whether given string is anagram or not. • Check whether given string is isogram or not. • Search an element in sorted rotated array
2	• Stack-based: matching of parenthesis • Reverse polish expression evaluation
3	Queue-based: There are n people in a line queuing to buy tickets, where the 0^{th} person is at the **front** of the line and the $(n - 1)^{th}$ person is at the **back** of the line. You are given a **0-indexed** integer array tickets of length n where the number of tickets that the i^{th} person would like to buy is tickets[i].Each person takes **exactly 1 second** to buy a ticket. A person can only buy **1 ticket at a time** and has to go back to **the end** of the line (which happens **instantaneously**) in order to buy more tickets. If a person does not have any tickets left to buy, the person will **leave** the line.Return the **time taken** for the person **initially** at position **k** (0-indexed) to finish buying tickets.
4	Program based on linked list: • Given the head of a sorted linked list, delete all duplicates such that each element appears only once. Return the linked list **sorted** as well. • Merge two sorted linked list into new linked list
5	• Program based on Binary Search Trees • Display all tree traversals
6	Program based on Binary Search Trees • Sum of left leaves

	• Right view of Tree • Given the root of a binary tree, return *the zigzag level order traversal of its nodes' values*. (i.e., from left to right, then right to left for the next level and alternate between).
7	Program based on tries • Create a text file containing keys{"and", "bat", " ball", "book","cot", "cotton", "internet", "interview", "joy", "job", "King", "Lion", "man", "mango", "manage"} separated by tab and then read those keys and insert them in trie and search the key which is accepted as input from user • Read the keys from char array which is already given and search the keys which are accepted as input from user • Read the keys from char array and search those keys which are given in text file
8	Graph-based: there are n rooms labeled from 0 to n - 1 and all the rooms are locked except for room 0. Your goal is to visit all the rooms. However, you cannot enter a locked room without having its key.When you visit a room, you may find a set of distinct keys in it. Each key has a number on it, denoting which room it unlocks, and you can take all of them with you to unlock the other rooms. Given an array rooms where rooms[i] is the set of keys that you can obtain if you visited room i, return true if you can visit all the rooms, or false otherwise.
9	Graph-based: here are n cities. Some of them are connected, while some are not. If city a is connected directly with city b, and city b is connected directly with city c, then city a is connected indirectly with city c.A province is a group of directly or indirectly connected cities and no other cities outside of the group.You are given an n x n matrix isConnected where isConnected[i][j] = 1 if the ith city and the jth city are directly connected, and isConnected[i][j] = 0 otherwise. Return the total number of provinces.
10	Problem solving on codechef and leetcode with Coding competition for MSPA on codechef

III SEMESTER

23IT1303: Computer Architecture and Organization

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Describe fundamentals of computer architecture and organization and able to design control sequence for instructions. 2. Apply mathematical techniques and perform computer arithmetic operations along with the understanding of processor design. 3. Design memory organization and understand the concept of cache mapping techniques, Input/output subsystem interfaces and buses.

Unit I	**(6 Hrs.)**
Basic Structure of Computer Hardware and Software: Functional Units, Basic Operational Concepts, addressing methods and machine program sequencing : Memory Locations , addressing and encoding of information, Main memory operation . Instruction Format, limitations of Short word- length machines, High level language considerations.	
Unit II	**(7 Hrs.)**
Processing Unit: Some fundamental concepts, Single, two, three bus organization, Instruction set architecture of a CPU – registers, instruction execution cycle, RTL interpretation of instruction, Instruction sequencing, addressing modes. Case study – instruction sets of some common CPUs.	
Unit III	**(6 Hrs.)**
Hardwired Control : Design Micro-programmed Control: Microinstructions, Grouping of control signals, Micro program sequencing, Micro Instructions with next Address field, Perfecting microinstruction, Emulation, Bit Slices.Case study – design of a simple hypothetical CPU.	
Unit IV	**(7 Hrs.)**
Arithmetic: Number Representation, Addition of Positive numbers, Logic Design for fast adders, Addition and Subtraction , Arithmetic and Branching conditions, Multiplications of positive numbers, Signed- Operand multiplication, fast Multiplication, Booth's Algorithm, Integer Division, Floating point numbers and operations.	
Unit V	**(7 Hrs.)**
The main Memory: some basic concepts, semiconductor RAM memories, Memory system consideration, semiconductor ROM memories, Multiple module memories and interleaving, Cache Memory, Mapping techniques, Replacement algorithms, write policies Virtual memories, memory management requirements.	
Unit VI	**(6 Hrs.)**
Computer Peripherals: I/O Devices, I/O device interface, DMA, Interrupt handling Role of interrupts in process state transitions, I/O device interfaces – SCII, USB. Introduction to Pipelining, Throughput and speedup, pipeline hazards Introduction to parallel processors.	
Total Lecture	**39 Hours**

Textbooks:	
1.	David A. Patterson and John L. Hennessy Computer Organization and Design: The Hardware/Software Interface 5th Edition Elsevier
2.	Carl Hamacher Computer Organization and Embedded Systems McGraw Hill Higher Education 6th Edition

Reference Books:	
1.	John P. Hayes, Computer Architecture and Organization WCB/McGraw-Hill 3rd Edition
2.	by William Stallings, Computer Organization and Architecture: Designing for Performance 10th Edition Pearson Education
3.	Vincent P. Heuring and Harry F. Jordan Computer System Design and Architecture 2nd Edition Pearson Education

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1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=Ol8D69VKX2k
2.	https://www.youtube.com/watch?v=4nEr2Z2tItg
3.	https://www.youtube.com/watch?v=-Bwiv5EGucs

III SEMESTER
23IT1304: Object Oriented Programming

Course Outcomes :

Upon successful completion of the course the students will be

1. Demonstrate the understanding of Object oriented concepts.
2. Apply the programming language JAVA efficiently in object oriented software development.
3. Able to analyze problem statement and identify appropriate objects and methods.
4. Design and implement small programs using classes.

Unit I OOP concepts:	**(6 Hrs.)**
OOP concepts: Classes and objects, data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, procedural and object oriented programming paradigm. Java programming: History of java, comments data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow statements, jump statements, simple java stand alone programs, console input and output, formatting output, constructors ,methods, parameter passing, static fields and methods, access control, this reference, overloading methods and constructors, recursion, garbage collection.	
Unit II Inheritance	**(6 Hrs.)**
Inheritance: Inheritance hierarchies, super and subclasses, member access rules, super keyword, preventing inheritance: final classes and methods, the object class and its methods; Polymorphism: dynamic binding, method overriding, abstract classes and methods; Interface: Interfaces VS Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface; Packages: Defining, creating and accessing a package, understanding CLASSPATH, importing packages.	
Unit III Arrays	**(7 Hrs.)**
Arrays, Strings Arrays, One Dimensional Arrays, Two Dimensional Arrays, variable size arrays, Strings and String Buffer classes, Wrapper Classes, Collection Vector and Framework: Introduction to collection framework, Vectors, Array List, Linked list, Hashset, Treeset, Hashmap.	
Unit IV Exception Handling	**(7 Hrs.)**
Exception Handling: Benefits of exception handling, the classification of exceptions , exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, exception specification, built in exceptions, creating own exception sub classes. Multithreading: Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter thread communication.	
Unit V Files:	**(6 Hrs.)**
Files: streams, byte streams, character stream, text input/output, binary input/output, random access file operations, file management using file class: Connecting to Database, querying a database and processing the results, updating data with JDBC.	
Unit VI: Virtual memory	**(7 Hrs.)**
GUI Programming with Java: The AWT class hierarchy, introduction to swing, swings Vs AWT, hierarchy for swing components. Containers: JFrame, JApplet, JDialog, Jpanel, overview of some swing components: JButton, JLabel, JTextField, JTextArea, simple applications.Layout management: Layout manager types, border, grid and flow.Applets: Inheritance hierarchy for applets, differences between applets and applications, life cycle of an applet, passing parameters to applets.	
	Total Lecture **39 Hours**

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

Textbooks:	
1.	Bruce Eckel Thinking in Java Prentice Hall
2.	Herbert Schildt Java2 Complete Reference McGraw-Hill

Reference books:	
1.	E. Balagurusamy Programming with Java TATA McGraw-Hill
2.	Core and Advanced Java, Black Book Recommended by CDAC, Revised and Upgraded

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MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=O5hShUO6wxs
2.	https://www.youtube.com/watch?v=7q3zXRuctQ8&list=PLd3UqWTnYXOnT6p6dll1oiKsDu96QGANk
3.	https://www.youtube.com/watch?v=P5tFJ9umhvk

III SEMESTER
23IT1305: Lab.: Object Oriented Programming

Course Outcomes
Upon successful completion of the course the students will be 1. Demonstrate the understanding of Object oriented concepts. 2. Apply the programming language JAVA efficiently in object oriented software development 3. Able to analyze problem statement and identify appropriate objects and methods 4. Design and implement a small programs using classes

Sr. No	Experiments Base On
1.	Introduction of JAVA Programming Environment
2.	Data Types and Control Structures
3.	Class and constructor
4.	Overloading
5.	Overriding
6.	Interface
7.	Arrays and String
8.	Exception
9.	Collection
10.	Applet

III SEMESTER
23IT1306: Lab.: Software Lab-1

Course Outcomes
Upon successful completion of the course the students will be able to 1. To equip students with foundational skills in web development, enabling them to create well-structured, visually appealing, and interactive web pages using HTML and CSS. 2. Add interactivity and dynamic behavior to web pages using JavaScript. 3. Develop responsive web pages that work on various devices.

Unit 1 : HTML Basics
HTML syntax and structure, Common HTML tags (headings, paragraphs, lists, links, images, character formatting tags) ,use AI tool for implementation of above concepts.
Unit 2: HTML List, IMG Tag HTML Forms and Tables
Types of list Ordered, Unordered and Definition list., Basic structure and attributes for Image tag (src, alt, width, height) Basic structure of a form (<form>, <input>, <label>, <textarea>, <button>) ,Form attributes (action, method, autocomplete, no validate) , Basic structure of a table (<table>, <tr>, <th>, <td>), Table attributes (border, cell padding, cell spacing), Merging cells (colspan, rowspan), use AI tool for implementation of above concepts.
Unit 3 Introduction to CSS
CSS syntax and selectors, Inline, internal, and external CSS, The box model (margin, border, padding content. Basic syntax and structure Inline Styles – Embedding Style Sheets - Linking External Style Sheets - Introduction to CSS3 – Backgrounds - Manipulating text - Margins and Padding - CSS animations and transitions, use AI tool for implementation of above concepts.
Unit 4 : Introduction to JavaScript
JavaScript syntax and data types, Variables, operators, and expressions Functions and events. Objects - Array, Date and Math Related Objects - Document Object Model - Event Handling - Controlling Windows & Frames and Documents - Form validations, use AI tool for implementation of above concepts.
Unit 5: Building Smarter Forms with JavaScript
Re, Cross-checking fields , Displaying more informative errors , Verifying radio button selections Setting one field ,with another field , Verifying email addresses, Demystifying cookies , Writing a cookie ,Reading a cookie ,JS Events,JS Strings, JS Arrays,JS Modules, JS Exception Handling, use AI tool for implementation of above concepts.
Unit 6 : Integrating HTML, CSS, and JavaScript
Best practices for combining HTML, CSS, and JavaScript, Building a complete web project Debugging and troubleshooting. Creating sliding menus , Creating pop-up menus, Creating slideshows with captions Creating a style sheet switcher, use AI tool for implementation of above concepts.

Textbooks:	
1.	HTML and CSS: Design and Build Websites by Jon Duckett (1st Edition, 2011)
2.	Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics by Jennifer Robbins (5th Edition, 2018)
3.	HTML5 and CSS3: Level Up with Today's Web Technologies by Brian P. Hogan **(1st Edition, 2013)**

Reference Books:	
1.	HTML & CSS: The Complete Reference by Thomas A. Powell **(5th Edition, 2010)**
2.	HTML5: The Definitive Guide by Chuck Musciano and Bill Kennedy **(7th Edition, 2013)**

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://www.coursera.org/learn/html-css-javascript-for-web-developers
2.	https://www.w3schools.com/html/

MANDATORY LEARNING COURSES

TRACK1

Cloud Computing

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

III SEMESTER
MDM1IT101: Introduction to Cloud Computing

Course Outcomes :
Upon successful completion of the course the students will be able to 1. To understand the necessary theoretical background for computing and storage clouds environments. 2. To know the methodologies and technologies for the development of applications that will be deployed and offered through cloud computing environments. 3. To be able to realize cloud infrastructures by using IaaS software, while also developing cloud applications by utilizing PaaS software.

Unit I	**(7 Hrs.)**
Introduction to Cloud Computing, definition and characteristics of cloud computing, Different Computing Paradigms: Client-Server Computing, Cluster computing, Grid Computing, Distributed Computing, Utility Computing, Fog and Sky Computing, Cloud computing Service Models and deployment models. Advantages and disadvantages of cloud Computing.	
Unit II	**(6 Hrs.)**
Functioning of Cloud Computing, Cloud Architecture, Cloud Storage, Cloud Computing Concepts: Virtualization, Types of Virtualization, Creation of Virtual Machines, Hypervisors, Types of hypervisor, Load Balancing, Deployment, scalability and Elasticity, Replication, types of replication, cloud Monitoring, Identity and Access Management, Service Level Agreement and Billing System.	
Unit III	**(7 Hrs.)**
Cloud computing architecture, cloud computing stack, comparison with traditional computing architecture (client-server), cloud storage, server storage, storage as a service, data storage in cloud computing, resource virtualization, Cloud Computing Technology, Introduction, Network- Basic Public Internet, The Accelerated Internet- Optimized Internet Overlay- Site-to-Site VPN, Software defined Network, Network function virtualization.	
Unit IV	**(6 Hrs.)**
Introduction to cloud application design, cloud design consideration for cloud applications, Design considerations: Scalability, Reliability, Availability, security, maintenance, up gradation and performance, Reference architecture for cloud application, cloud application design methodology, Service Oriented Architecture (SOA), Cloud Component Model (CCM), Data Storage approaches: Relational and Non-relational approaches, case study and example.	
Total Lecture	**26 Hours**

Textbooks:	
1.	Gautam Shroff Enterprise Cloud Computing Cambridge Press
2.	Arshdeep Bahga, Vijay Madisetti Cloud Computing- A Hands On Approach University Press(INDIA) Private Ltd.

Reference Books:	
1.	University Press(INDIA) Private Ltd. Google Apps Pearson Publication
2.	Judith Hurwitz, R. Bloor, M. Kanfman, F. Haper Cloud Computing for Dummies Wiley India Edition

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MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=CKllqKLOgSI&list=PL-gW8Fj5TGrpoW08kOfbG6yfXbExyL0EB
2.	https://www.youtube.com/watch?v=v6kD9J39dys&list=PL-gW8Fj5TGrpoW08kOfbG6yfXbExyL0EB&index=3
3.	https://www.youtube.com/watch?v=yv1IMYYTnrs&list=PL-gW8Fj5TGrpoW08kOfbG6yfXbExyL0EB&index=3

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech SoE and Syllabus 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Information Technology)

B.Tech in Information Technology

SoE No. 23IT-101

TRACK2

Cyber Security

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

III SEMESTER
MDM1IT201: Mathematics for Cyber Security

Course Outcomes
Upon successful completion of the course the students will be able to 1. Define the concepts related to the basics of set theory and binary operations. 2. Demonstrate knowledge and understanding of groups, subgroups, and order of an element in finite groups. 3. Choose appropriate algebraic structure for cryptographic operation. 4. Develop understanding of use of algebraic structure in number theory algorithms.

UNIT I : Elementary Number Theory	**(06 Hrs.)**
The division algorithm, Divisibility and the Euclidean algorithm, Euclidean domains, Polynomials, prime, irreducible elements and their properties ,The fundamental theorem of arithmetic, Modular arithmetic and basic properties of congruences; Principles of mathematical induction and well ordering principle.	
UNIT II: Advanced Number Theory	**(07Hrs.)**
Advanced Number Theory – Primality Testing algorithms, Chinese Remainder Theorem, Quadratic Congruence, Discrete Logarithm, Factorization Methods, Side Channel Attacks, Shannon Theory, Perfect Secrecy, Semantic Security.	
UNIT III: Probability theory	**(07 Hrs.)**
Probability theory: Calculating probabilities, conditional probability, and Bayes' theorem, random variables, discrete and continuous.	
UNIT IV: Statistical analysis of security data	**(06 Hrs.)**
Statistical analysis of security data: Identifying patterns and assessing risks, Random number generation and its importance in cryptography	
Total Lecture	**26 Hours**

Textbooks:	
1.	D.S. Dummit and R.M. Foote, "Abstract Algebra", John Wiley
2	Michael Artin, "Algebra", Pearson Education.
3	J.A. Gallian, "Contemporary Abstract Algebra", Narosa Publishing House.
4	I. N. Herstein, "Topics in Algebra", Wiley.
5	N. Jacobson, "Basic Algebra I", Hindustan Publishing Company.
6	William Stallings, "Cryptography and Network Security Principles and Practice", Pearson Education.

Reference Books:	
1.	J. Nocedal and S. J. Wright, Numerical Optimization. New York: Springer Science+Business Media, 2006.
2	4. J. S. Rosenthal, A First Look at Rigorous Probability Theory (Second Edition). Singapore: World Scientific

	Publishing, 2006.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology/

MOOCs Links and additional reading, learning, video material	
1.	http://digimat.in/nptel/courses/video/106105031/L01.html
2.	http://acl.digimat.in/nptel/courses/video/106106248/L26.html

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B. Tech SoE and Syllabus 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Information Technology)

B.Tech in Information Technology

SoE No. 23IT-101

TRACK3

Web Development

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

III SEMESTER
MDM1IT301: Fundamentals of Web Programming

Course Outcomes :
Upon successful completion of the course the students will be able to 1. To introduce the fundamentals of web development and the structure of the web. 2. To provide hands-on experience with HTML and DHTML. 3. To understand the role of client-server architecture in web applications. 4. To develop simple static and dynamic web pages using HTML and basic DHTML features.

Unit I: Introduction to Web and Internet Fundamentals	**(8 Hrs.)**
Evolution of the Web and Internet ,Web browsers and Web servers, Client-Server architecture, URL, URI, IP address, DNS, HTTP vs HTTPS, HTTP Request & Response, Introduction to Web Development Lifecycle, Overview of Static vs Dynamic Websites	
Unit II: Basics of HTML	**(8 Hrs.)**
Structure of an HTML document, HTML Tags, Attributes, and Elements, Text formatting tags: <h1> to <h6>, <b>, <i>, <u>, <sup>, <sub>, **Lists:** Ordered, Unordered, Definition Lists, Links: Internal, External, Email, Anchor, Images: <img> tag, image formats, alt text, Tables: <table>, <tr>, <th>, <td>, colspan, rowspan, Forms: <form>, <input>, <textarea>, <button>, <select>, <option>	
Unit III: Advanced HTML Concepts	**(8 Hrs.)**
Frames and iframes, Multimedia tags: <audio>, <video>, Meta tags and their uses, File paths: absolute vs relative, Semantic HTML5 tags: <article>, <section>, <header>, <footer>, <nav>, <aside>, Accessibility basics: alt, title, tabindex	
Unit IV: **Introduction to DHTML and Basic Dynamic Behavior**	**(8 Hrs.)**
DHTML: Components of DHTML (HTML, CSS, JavaScript) – only conceptual overview, Role of DOM (Document Object Model) in DHTML, Dynamic changes using HTML features (no scripting), Auto-refresh pages using meta tags, Embedding dynamic content like tickers using <marquee>, <blink> (legacy), Differences between HTML and DHTML, Advantages and limitations of DHTML	
Total Lecture	**32 Hours**

Textbooks:	
1.	HTML & XHTML: The Definitive Guide – Chuck Musciano & Bill Kennedy
2.	Fundamentals of Web Development – Randy Connolly and Ricardo Hoar

Reference Books:	
1.	Web Technologies – Uttam K. Roy, Oxford University Press
2.	"Web Design with HTML and CSS: Digital Classroom" – Jennifer Smith, AGI Creative Team

MOOCs Links and additional reading, learning, video material	
1.	NPTEL – Web Technology (by Prof. Sudarshan Iyengar, IIT Ropar) https://nptel.ac.in/courses/106105084
2.	NPTEL – Introduction to HTML (short module) https://onlinecourses.nptel.ac.in/noc23-cs83
3.	CodeWithHarry – HTML Full Course in Hindi (Beginner Friendly) https://www.youtube.com/playlist?list=PLu0W_9lII9agICnT8t4iYVSZ3eykIAOME

III SEMESTER
Open Elective -I : Basket

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject
1	3	OE1	GE	23OE1301	OE-I : Combinatorics
2	3	OE1	GE	23OE1302	OE-I : Fuzzy Set Theory, Arithmetic And Logic
3	3	OE1	GE	23OE1303	OE-I : Green Chem. & Sustainability
4	3	OE1	GE	23OE1304	OE-I : Hydrogen Fuel
5	3	OE1	GE	23OE1305	OE-I : Electronic Materials And Applications
6	3	OE1	GE	23OE1306	OE-I : Laser Technology And Applications
7	3	OE1	MGT	23OE1307	OE-I : Finance And Cost Management
8	3	OE1	MGT	23OE1308	OE-I : Operation Research Techniques
9	3	OE1	MGT	23OE1309	OE-I : Project Evaluation & Management
10	3	OE1	MGT	23OE1310	OE-I : Total Quality Management
11	3	OE1	MGT	23OE1311	OE-I : Value Engineering
12	3	OE1	MGT	23OE1312	OE-I : Maintenance Management
13	3	OE1	MGT	23OE1313	OE-I : Industrial Safety
14	3	OE1	MGT	23OE1314	OE-I : Industry 4.0
15	3	OE1	MGT	23OE1315	OE-I : Operation Management
16	3	OE1	MGT	23OE1316	OE-I : Material Management
17	3	OE1	MGT	23OE1317	OE-I : Hospitality Management
18	3	OE1	MGT	23OE1318	OE-I : Human Resource Management & Organizational Behaviour
19	3	OE1	MGT	23OE1319	OE-I : Agri-Business Management
20	3	OE1	MGT	23OE1320	OE-I : Rural Marketing
21	3	OE1	MGT	23OE1321	OE-I : Marketing Management
22	3	OE1	MGT	23OE1322	OE-I : Health Care Management

Link for Open Electives syllabus: https://ycce.edu/syllabus/

III SEMESTER

Mandatory Learning Course (MLC)

MLC2123 : YCAP3

Nagar Yuwak Shikshan Sanstha's

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(Accredited 'A++' Grade by NAAC with a score of 3.6)

Hingna Road, Wanadongri, Nagpur - 441 110



Bachelor of Technology

SoE & Syllabus 2023

4th Semester

(Department of Information Technology)

B. Tech in Information Technology

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B.TECH SCHEME OF EXAMINATION 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Information Technology)

B. Tech. in Information Technology

SoE No. 23IT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
FOURTH SEMESTER															
1	4	HSSM-2	GE	23GE1401	Entrepreneurship Development	T	2	0	0	2	2	30	20	50	3
2	4	**AEC-2**	GE	23GE1405 23GE1406	Marathi Language / Hindi Language	T	2	0	0	2	2	30	20	50	3
3	4	PC	IT	23IT1401	Discrete Mathamatics and Graph Theory	T	3	0	0	3	3	30	20	50	3
4	4	PC	IT	23IT1402	Digital Circuits and Microprocessor	T	3	0	0	3	3	30	20	50	3
5	4	PC	IT	23IT1403	**Lab :** Digital Circuits and Microprocessor	P	0	0	2	2	1		60	40	
6	4	PC	IT	23IT1404	Computer Netwrok	T	3	0	0	3	3	30	20	50	3
7	4	PC	IT	23IT1405	**Lab :** Computer Netwrok	P	0	0	2	2	1		60	40	
8	4	PC	IT	23IT1406	**Lab :** Software Lab-2	P	0	0	2	2	1		60	40	
9	4	VSEC-3	IT	23IT1407	**Lab :** Adv. Python Programming	P	0	0	4	4	2		60	40	
10	4	VEC-2	IT	23IT1408	Cyber Laws	T	2	0	0	2	2	30	20	50	3
11	4	MDM	IT		**MD Minor Course-II**	T	2	0	0	2	2	30	20	50	3
12	4	OE-2	OE		**Open Elective-II**	T	2	0	0	2	2	30	20	50	3
					TOTAL		**19**	**0**	**10**	**29**	**24**				
List of Mandatory Learning Course (MLC)															
1	4	HS	T&P	MLC2124	**YCAP4 :** YCCE Communication Aptitude Preparation	**A**	3	0	0	3	**0**				

Open Elective - II

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject
1	4	OE2	GE	23OE2401	OE-II : Combinatorics
2	4	OE2	GE	23OE2402	OE-II : Fuzzy Set Theory, Arithmetic And Logic
3	4	OE2	GE	23OE2403	OE-II : Green Chem. & Sustainability
4	4	OE2	GE	23OE2404	OE-II : Hydrogen Fuel
5	4	OE2	GE	23OE2405	OE-II : Electronic Materials And Applications
6	4	OE2	GE	23OE2406	OE-II : Laser Technology And Applications
7	4	OE2	MGT	23OE2407	OE-II : Finance And Cost Management
8	4	OE2	MGT	23OE2408	OE-II : Operation Research Techniques
9	4	OE2	MGT	23OE2409	OE-II : Project Evaluation & Management
10	4	OE2	MGT	23OE2410	OE-II : Total Quality Management
11	4	OE2	MGT	23OE2411	OE-II : Value Engineering
12	4	OE2	MGT	23OE2412	OE-II : Maintenance Management
13	4	OE2	MGT	23OE2413	OE-II : Industrial Safety
14	4	OE2	MGT	23OE2414	OE-II : Industry 4.0
15	4	OE2	MGT	23OE2415	OE-II : Operation Management
16	4	OE2	MGT	23OE2416	OE-II : Material Management
17	4	OE2	MGT	23OE2417	OE-II : Hospitality Management
18	4	OE2	MGT	23OE2418	OE-II : Human Resource Management & Organizational Behaviour
19	4	OE2	MGT	23OE2419	OE-II : Agri-Business Management
20	4	OE2	MGT	23OE2420	OE-II : Rural Marketing
21	4	OE2	MGT	23OE2421	OE-II : Marketing Management
22	4	OE2	MGT	23OE2422	OE-II : Health Care Management
23	4	OE2	MGT	23OE2423	OE-II : Designated approved online NPTEL/KKSU Course
24	4	OE2	MGT	23OE2424	OE-II : Indian Archeology
25	4	OE2	MGT	23OE2425	OE-II : Social & Positive Psychology
26	4	OE2	MGT	23OE2426	OE-II : Seismology & Earthquake

Chairperson	Dean (Acad. Matters)	July, 2023	1.00	Applicable for AY 2023-24 Onwards
		Date of Release	Version	

IV SEMESTER
23GE1401: Entrepreneurship Development

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Appreciate role of entrepreneurs in society and develop entrepreneurial abilities by providing information about skill sets. 2. Develop an understanding of how and what form of business organization to choose for startup. 3. Stimulate to innovate, develop prototypes or ideas by applying theory into practice. 4. Identify the Support rendered by various Government Agencies.

Unit I:	**7 Hrs.**
Entrepreneur & Entrepreneurship: Meaning of Entrepreneur, Evolution of the concept – Theories and Models, Types of Entrepreneur, Stages in entrepreneurial process- Idea Generation, Screening, Selection and Managing Resources.	
Unit II:	**8 Hrs.**
Legal Compliances for Incorporating Start up: Fundamentals of choosing the Business Organization form for startup, Incorporation of Partnership, LL.P & Co – operative, Incorporation of One Person Company, Pvt. Ltd., Pub. Ltd. and not for profit company, Financing the legal Venture and Legal Compliances.	
Unit III:	**7 Hrs.**
Entrepreneurship and IP Strategy: Intellectual Property : Definition and Concept of Trade Mark, Patent, Copyright, Industrial Design, IP Strategy and Entrepreneurship.	
Unit IV:	**8 Hrs.**
Support to Entrepreneurs: Financing new ventures, Business Incubators – Government Policy for Small Scale Enterprises, Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Subcontracting.	
Total Lecture	**30 Hours**

Student activities:	
1.	Interview at least four entrepreneurs or businessman and identify Traits of successful Entrepreneurs.
2.	Analyse case studies of any two successful entrepreneurs.
3.	Download product development and innovative films from internet.
4.	Identify your hobbies and interests and convert them into business idea
Textbooks	
1.	Khanka. S.S., "Entrepreneurial Development" S.Chand & Co. Ltd.,Ram Nagar, New Delhi, 2013.
2.	Donald F Kuratko, "Entrepreneurship – Theory, Process and Practice", 9th Edition, Cengage Learning

			July,2023	1.00	Applicable for AY 2023-24 Onwards
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	2014.
3.	Corporate Law, 33rd ed. 2016, Taxman New Delhi.
4.	Narayanan, V. K., Managing technology and innovation for competitive advantage, first edition, Pearson education, New Delhi, (2006)
5.	Idris, K. (2003), Intellectual property: a power tool for economic growth, second edition, WIPO publication no. 888, Switzerland
6.	Khanka. S.S., "Entrepreneurial Development" S.Chand & Co. Ltd.,Ram Nagar, New Delhi, 2013.
7.	Ramaiya's Guide to the Companies Act, 18th ed. 2014, Lexis Nexis New Delhi.
Reference Books	
1.	Mehta, Monica- The Entrepreneurial Instinct : How everyone has the innate ability to start a successful small business – McGraw – Hill Education, New Delhi 2012, ISBN 978-0-07-179742-9
2	Prasanna Chandra "Protect Preparation, Appraisal, Implementation" Tata McGraw Hill. New Delhi
3	S Anil Kumar "Entrepreneurship Development" New Age International Publishers
4	Nishith Dubey "Entrepreneurship Development" PHI Learning
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://link.springer.com/openurl?genre=book&isbn=978-1-4613-6193-0
2	https://onlinelibrary.wiley.com/doi/book/10.1002/9780470168042
MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.swayam2.ac.in/cec23_mg24/course- entrepreneurship development
2	https://onlinecourses.nptel.ac.in/noc23_mg74/announcements?force=true-entrepreneur
3	https://onlinecourses.nptel.ac.in/noc23_mg126/announcements?force=true- Business fundamentals for entrepreneurship

Student activities:	
1.	Interview at least four entrepreneurs or businessman and identify Traits of successful entrepreneurs.
2.	Analyse case studies of any two successful entrepreneurs.
3.	Download product development and innovative films from internet.
4.	Identify your hobbies and interests and convert them into business idea

Textbooks	
1.	Khanka. S.S., "Entrepreneurial Development" S.Chand & Co. Ltd.,Ram Nagar, New Delhi, 2013.
2.	Donald F Kuratko, "Entrepreneurship – Theory, Process and Practice", 9th Edition, Cengage Learning 2014.
3.	Corporate Law, 33rd ed. 2016, Taxman New Delhi.
4.	Narayanan, V. K., Managing technology and innovation for competitive advantage, first edition, Pearson education, New Delhi, (2006)
5.	Idris, K. (2003), Intellectual property: a power tool for economic growth, second edition, WIPO publication no. 888, Switzerland
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7.	Ramaiya's Guide to the Companies Act, 18th ed. 2014, Lexis Nexis New Delhi.
Reference Books	
1.	Mehta, Monica- The Entrepreneurial Instinct : How everyone has the innate ability to start a successful small business – McGraw – Hill Education, New Delhi 2012, ISBN 978-0-07-179742-9
2	Prasanna Chandra "Protect Preparation, Appraisal, Implementation" Tata McGraw Hill. New Delhi
3	S Anil Kumar "Entrepreneurship Development" New Age International Publishers
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YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://link.springer.com/openurl?genre=book&isbn=978-1-4613-6193-0
2	https://onlinelibrary.wiley.com/doi/book/10.1002/9780470168042
MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.swayam2.ac.in/cec23_mg24/course- entrepreneurship development
2	https://onlinecourses.nptel.ac.in/noc23_mg74/announcements?force=true-entrepreneur
3	https://onlinecourses.nptel.ac.in/noc23_mg126/announcements?force=true- Business fundamentals for entrepreneurship

IV SEMESTER
23GE1405 : Marathi Language

Course Objectives
1. मराठी भाषेच्या समृद्धीची जाणीव करून देणे. 2. विद्यार्थ्यांमध्ये भाषा कौशल्याचा विकास करणे आणि त्यातून रोजगाराच्या संधींचा शोध घेणे.

Course Outcomes
3. भाषेचा जीवन व्यवहारात योग्य पद्धतीने वापर करण्याचा प्रयत्न करणे. 4. संत साहित्याच्या शिकवणुकीमुळे मानवता आणि मानवी व्यवहाराची सांगड घालणे, नैतिक मूल्ये रुजविणे. 5. विद्यार्थ्यांना रोजगाराभिमुख बनविणे.

Unit:1	गद्य विभाग	8 Hours

१.	भारतीय लोकशाहीचे भवितव्य काय?	- डॉ. बाबासाहेब आंबेडकर
२.	काळी आई	- व्यंकटेश माडगूळकर
३.	संत तुकारामांचे अभंग	- निर्मलकुमार फडकुले
४.	माझी शाळा	- प्रकाश खरात
५.	समतेचे वारकरी संत गाडगेबाबा आणि राष्ट्रसंत तुकडोजी महाराज	- अशोक राणा
६.	लोककल्याणकारी राजा :	- शरयू तायवाडे

Unit:2	पद्य विभाग	8 Hours

१.	ज्ञानेश्वरांचे अभंग	- संत ज्ञानेश्वर
२.	वनसुधा	- वामन पंडित
३.	नवा शिपाई	- केशवसुत
४.	मेंढरं	- विठ्ठल वाघ
५.	पोरी	- अनुराधा पाटील
६.	गाव	- हेमंतकुमार कांबळे

Unit:3	व्यावहारिक मराठी	7 Hours

१. म्हणी
२. मुलाखतलेखन - डॉ. वैशाली धनविजय
३. वाक्प्रचार
४. जाहिरातलेखन - डॉ. अजय देशपांडे

Unit:4	रोजगाराभिमुख मराठी व्यावहारिक कौशल्ये	7 Hours

१. प्रत्यक्ष मुलाखत कौशल्य
२. वाचन कौशल्य - (अ) बातमी वाचन (ब) कथा वाचन
३. ऑनलाईन कौशल्य - (अ) ग्राहक सेवा केंद्राशी संवाद, (ब) ऑनलाईन अर्ज करणे

Reference Books

1. पाठ्यपुस्तक **: शब्दसाधना - भाग १**
2. रोजगाराभिमुख मराठी व्यावहारिक कौशल्ये

IV SEMESTER
23GE1406 : Hindi Language

Course Objectives

6. विद्यार्थियों में देशभक्तिपरक एवं पारिवारिक मूल्यों का विकास |
7. विद्यार्थियों पर्यावरण-संरक्षण के प्रति सजग करना |
8. एकांकी, कहानी, निबंध आदि विधाओं के मध्य का अंतर अवगत कराना |
9. हिंदी के प्रयोजनमूलक स्वरूप से परिचित कराना |
10. विद्यार्थियों को आधुनिक प्रौद्योगिकी (तकनीक) का प्रयोग करने में सक्षम बनाना |.

Course Outcomes

1. पौराणिक अथवा ऐतिहासिक घटनाओं को तार्किक आधार पर स्वीकार करेंगे | अपने परिवेश के उचित और अनुचित व्यवहारों के प्रति आकलन शक्ति बढ़ेगी |
2. एकांकी, कहानी, निबंध आदि विधाओं के मध्य का अंतर बताने में सक्षम होंगे |
3. कविता का रसास्वादन करने में समर्थ होंगे |
4. 'अनुवाद' के स्वरूप एवं प्रक्रिया से अवगत होंगे |
5. 'मार्गिक नक़्शे' का दैनिक जीवन में उपयोग करने में सक्षम होंगे |

Unit:1	गद्य विभाग	8 Hours

१. भाईसाहब (कहानी) - प्रेमचंद
२. स्मृति (निबंध) - श्रीराम शर्मा
३. गिल्लू (रेखाचित्र) - महादेवी वर्मा
४. अभाव (कहानी) - विष्णु प्रभाकर
५. महाभारत की साँझ (एकांकी) - भारतभूषण
६. उखड़े खंबे (व्यंग्य)। - हरिशंकर परसाई

Unit:2	पद्य विभाग	8 Hours

१. कबीर के दोहे - कबीरदास
२. ले चल यहाँ भुलावा देकर - जयशंकर प्रसाद
३. स्नेह-निर्झर बह गया - हैसूर्यकांत त्रिपाठी "निराला"
४. प्रथम रश्मि - सुमित्रानंदन पंत
५. जीवन का झरना - आरसीप्रसाद सिंह
६. कविता के साथ - दामोदर खड़से

Unit:3	अन्य पाठ्य सामग्री	7 Hours

१. मुहावरे और लोकोक्तियाँ: पाठ्यपुस्तक में मुहावरे और लोकोक्तियाँ का अर्थ एवं वाक्य प्रयोग

२. विज्ञापन कला : अर्थ, परिभाषा, प्रकार, शीर्षक का महत्त्व, विज्ञापन के प्रयोजन, सत्य, लक्ष्य, विज्ञापन की भाषा, अच्छे विज्ञापन के गुण इत्यादि ।

Unit:4	कौशल्य आधारित घटक	7 Hours

१. वाचन कौशल्य (समाचार-वाचन, कहानी-वाचन)
२. सोशल मीडिया के शिष्टाचार
३. ऑनलाइन आवेदन, ग्राहक-सेवा केंद्र से संवाद

Reference Books

3. पाठ्यपुस्तक : **"पलाश"**

IV SEMESTER
23IT1401: Discrete Mathematics & Graph Theory

Course Outcomes :
Upon successful completion of the course the students will be 1. Identify the importance of statements in deriving valid inferences. 2. Use relations and ordering methods to identify the relationship among the inferences. 3. Select suitable algebraic systems to find solution for real time problems. 4. Find the suitable computing methods and applying graph theory concepts to solve complex problems.

Unit I: Mathematical, Logic & Set Theory	**(7 Hrs.)**
Statement and Notation: Negation, Conjunction, Disjunction, Tautologies, Truth Tables, Basic Concepts of Set Theory, Inclusion & equality of set, Power Set, Ordered Pairs and n-tuples, Operations on Sets , mathematical induction. Propositions, Predicate logic.	
Unit II: Relations and Functions:	**(7 Hrs.)**
Relations and Ordering, Relation Matrix and Graphs, Partition and Covering of a set, Equivalence relation, Partial order relation, Partially Ordered sets, Functions, Composition of functions, Inverse Functions, Characteristics function of a set.	
Unit III: Group Theory	**(7 Hrs.)**
Groups, Subgroups and Homomorphism, Cosets and Lagrange's theorem, Normal subgroups. Semi groups and Monoids Homomorphism of semigroups and monoids, Homomorphism of Sub semi groups and monoids. semigroups and monoids, Sub semi groups and monoids.	
Unit IV:Rings	**(6 Hrs.)**
Definitions and Examples, sub ring, Integral domain, ring homomorphism, ideal of ring polynomial.	
Unit V: Field and Lattices	**(6 Hrs.)**
Definitions and Examples, Finite Field, Ordered sets, Hasse Diagrams of partially Ordered sets. Lattices, Bounded Latices, Complements Latices, Definitions and Examples of Finite Field, Ordered sets, Hasse Diagrams of partially Ordered sets. Lattices, Bounded Latices, Complements Latices.	
Unit VI: Graph theory	**(6 Hrs.)**
Basic concepts of graph theory, Basic definitions, Paths and circuits, Reach ability and connectedness, Matrix Representation of graphs, Tree and their representation and operations, Rooted trees, Path lengths in rooted trees, Multi graphs and weighted graphs, and graph isomorphism, shortest paths in weighted graphs, Hypergraphs, transitive closure, Spanning trees, Kruskal's algorithm, Prim's algorithm.	
	Total Lecture **39 Hours**

Textbooks:	
1.	J. P. Tremblay & R. Manohar, Discrete Mathematics Structure with application to Computer Science, 23rd re-print,2005, Tata McGraw-Hills Publication Company Limited, New Delhi.
2.	Lipschutz Schaums's , Outline series ,Discrete Mathematics, 2nd edition, Tata McGraw-Hills Publication Company Limited, New Delhi.

Reference books:

1.	Bernard Kolman , Robert C.Busby, Sharon Ross, Discrete Mathematical structures, 3rd edition, 2001, Prentice Hall of India, New Delhi.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Mathematics%20and%20Humanities/

MOOCs Links and additional reading, learning, video material	
1.	https://onlinecourses.nptel.ac.in/noc22_ma10/preview
2.	https://onlinecourses.nptel.ac.in/noc20_cs82/preview
3.	https://nptel.ac.in/courses/111106102

IV SEMESTER
23IT1402: Digital Circuits and Microprocessors

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Demonstrate the understanding of Digital Circuits and Microprocessor. 2. Apply the concepts of digital circuits and microprocessor in switching theory and ARM processor. 3. Able to analyze problem statement and interface the various programmable ICs. 4. Design and implement programs to simulate the functioning of 8086 processor.

Unit I	**(7 Hrs.)**
Basic logic circuits, Boolean laws, Simplification of function using algebraic methods, basic combinational logic circuits: Encoder, Decoder, Multiplexer, De-multiplexer, Totem pole and tristate output.	
Unit II	**(7 Hrs.)**
Simplification of sum of product and product of sum, K-maps (Up to 4 Variable), simplification of completely/ incompletely specified functions using K-maps & Quine McCluskey's method, Introduction to Flip Flops (RS, D, T, JK), Memory organization using Flip-Flops. Racing Condition, J-K Master Slave Flip flop. Excitation tables, Conversion of one type to another type flips flop.	
Unit III	**(7 Hrs.)**
Excitation tables, Introduction to sequential Circuits, Counters, Registers, Synchronous/Asynchronous Designs, modulo N counter with Reset or Clear facility, Design of Mod N counters Using K-map, Lock Free Counters.	
Unit IV	**(6 Hrs.)**
Introduction: Internal architecture & pin diagram of 8086/8088 microprocessor, Minimum & Maximum mode, even & odd memory banks, Accessing memory & I/O ports, Memory mapping in minimum mode.	
Unit V	**(6 Hrs.)**
Programming with 8086/8088: Addressing Modes, Instruction set, Instruction encoding format, Timing diagram Assembler directives, 8086 programming examples, String operations, File I/O processing, Far & Near procedures, Macros, Timing & delay loops.	
Unit VI	**(6 Hrs.)**
Interfacing with 8086/8088: Memory interfacing, Programmable parallel ports, Intel 8255 PPI, Block diagram & interfacing, Modes & initialization.	
Total Lecture	**39 Hours**

Textbooks:	
1.	Charles Roth Fundamentals of Logic Design CENGAGE Learning 5th Edition
2.	Anand Kumar Fundamentals of Digital Circuits PHI 2nd Edition
3.	Malvino Digital Electronics Principles Career Education 6th edition,1998
4.	Douglas Hall Microprocessor & Interfacing, Programming & Hardware. Tata McGraw Hil 2nd Edition , 2006l
5.	A. Ray, K.M. Bhurchandi Advanced Microprocessors & Peripherals: Architecture, Programming & Interfacing Tata McGraw Hill,2006

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=te5Xe3TgPC4
2.	https://www.youtube.com/watch?v=Uuxa90Xl4Rs
3.	https://www.youtube.com/watch?v=i5QjUVgY-XU

IV SEMESTER
23IT1403: Lab.: Digital Circuits and Microprocessors

Course Outcomes
Upon successful completion of the course the students will be able to 1. Student will able to be to understand designing of basic circuits using logic gates and Boolean algebra, and designing of combinational logic circuits. 2. Student will able to understand designing of counters and registers. 3. Students will be able to understand the architecture and organization of microprocessor along with instruction coding formats, addressing modes, Instructions sets of 8086. 4. Students will be able to understand the interfacing of memory And I/O with 8086 and interfacing and working principle of 8255 PPI.

SN	Experiments based on
1	Study of Logic Gates – Discrete version & IC version: AND, OR, NOT, NAND, NOR Gates – To Construct and verify the Truth Tables.
2	Study and configure of flip-flop, registers and counters using digital ICs. Design digital system using these circuits.
3	Study of Half Adder and Full Adder circuits – To Construct and verify the Truth Table.
4	To study Multiplexer and Demultiplexer circuits.
5	To study assembler, linker, MASM,TASM, 8086 Simulator and assembly language programming instructions of 8086 microprocessors.
6	To write & execute Assembly Language program to multiply two 16 bit numbers and Divide two numbers (16/8, 16/16, 8/8)
7	Write 8086 Assembly language program (ALP) to add array of N hexadecimal numbers stored in the memory. Accept input from the user.
8	To write & execute Assembly Language program to search a number in a string of N numbers.
9	To write & execute Assembly Language program to sort out even and odd numbers from the given data string
10	To write & execute Assembly Language program to transfer block of data from one memory block to another.
11	Study of Logic Gates – Discrete version & IC version: AND, OR, NOT, NAND, NOR Gates – To construct and verify the Truth Tables.
12.	Study and configure of flip-flop, registers and counters using digital ICs. Design digital system using these circuits.
13.	3. Study of Half Adder and Full Adder circuits – To Construct and verify the Truth Table.

IV SEMESTER
23IT1404: Computer Network

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Students will able to explain and visualize the different aspects of networks, protocols and network design models.
2. Students will able to illustrate the different of hardware, software and types of transmission media used in computer networks.
3. Students will able to analyze various Data Link layer design issues and select appropriate routing algorithms for a network.
4. Students will able to analyze the important aspects and functions of transport layer, application layer and Cryptography in computer networking.

Unit I	**(6 Hrs.)**
The use of computer networks, LAN"s, MAN"s, WAN"s. topologies and their characteristics, wireless networks, protocol hierarchies, design issues for layers, interfaces and services, connection oriented and connectionless services, service primitives relationship of services to protocols.The Network Core ,Packet Switching, Circuit Switching, A Network of Networks Delay, Loss, and Throughput in Packet-Switched Networks , Overview of Delay in Packet-Switched Networks, Queuing Delay and Packet Loss,End-to-End Delay,Throughput in Computer Networks, Protocol Layers and Their Service Models, Layered Architecture Encapsulation The OSI reference model. TCP/IP reference model, Comparison of OSI & TCP/IP reference model	
Unit II	**(6Hrs.)**
Physical layer: theoretical basis for data communication, Guided transmission media, wireless transmission: electromagnetic spectrum, radio transmission, infrared transmission. Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.	
Unit III	**(6 Hrs.)**
Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Switched Local Area Networks, Link-Layer Addressing and ARP, Ethernet, Link-Layer Switches, Virtual Local Area Networks (VLANs).	
Unit IV	**(7 Hrs.)**
Network layer: design issues, Classful and classless Internet Addresses, subnet addressing, implementation of subnet with mask, supernetting, Address block and CIDR notation, examples. Routing algorithms, congestion control algorithms, quality of service, internetworking, network layer in Internet: IP protocol, Input Processing ,Switching ,Output Processing, Where Does Queuing Occur, The Routing Control Plane ,The Internet Protocol (IP): Forwarding and Addressing in the Internet ,Datagram Format,IPv4 Addressing, Internet Control Message Protocol (ICMP) ,IPv6 ,A Brief Foray into IP Security.	
Unit V	**(7 Hrs.)**
Transport Layer: Connection-Oriented Transport: TCP , The TCP Connection Segment Structure , Round-Trip Time Estimation and Timeout , Reliable Data Transfer, Flow Control Connection Management , Principles of Congestion Control, The Causes and the Costs of Congestion, Approaches to Congestion Control , Network-Assisted Congestion, Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm. Performance issues: performance problems in networks, network performance measurement.	

Unit VI	**(7 Hrs.)**
Application Layer: Principles of Network Applications , Network Application Architectures Processes Communicating 88, Transport Services Available to Applications ,Transport Services Provided by the Internet , Application-Layer Protocols, The Web and HTTP, Overview of HTTP, Non-Persistent and Persistent Connections , HTTP Message Format, User-Server Interaction: Cookies , Web Caching ,The Conditional GET, Firewalls, Network security: cryptography, introduction to symmetric and public key algorithms, digital signatures, authentication protocols, e-mail and web security.	
Total Lecture	**39 Hours**

Textbooks:	
1.	Kurose & Ross computer networking a top-down approach Pearson Prentice Hall 6th Edition
2.	Andrew Tanenbaum Computer Networks Pearson Prentice Hall 5th Edition.
3.	Behrouz Forouzan Data Comminication & Networking TMH 4th Edition (2007).

Reference Books:	
1.	William Stallings Data & Computer Communication PHI 8th Edition.
2.	Douglas Comer Internetworking with TCP/IP Prentice Hall of India 5th Edition.
3.	Behrouz Forouzan TCP/IP protocol Suite TMH 4th Edition.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=uSKdjjw5zow
2.	https://www.youtube.com/watch?v=wvPe4Zb0tUA
3.	https://www.youtube.com/watch?v=LdSAaSHfK3M

IV SEMESTER
23IT1405: Lab.: Computer Network

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand and describe the services and features of the Computer networks. 2. Detect Errors in data transfer and configure the DNS and DHCP Servers

SN	Experiments based on
1	To Study different types of network & networking commands in Linux.
2	To Configure DNS Server using CISCO Packet Tracer
3	To implement client-server application using java network programming.
4	Write a program to perform Bit stuffing.
5	Write a program to implement CRC.
6	Write a program to implement Hamming Code.
7	To Configure DHCP using CISCO Packet Tracer
8	To Configure RIP server using CISCO Packet Tracer.
9	To Configure Simple VLAN server using CISCO Packet Tracer.
10	To Study campus networking of YCCE.
11	To Study different types of network & networking commands in Linux.
12.	To Configure DNS Server using CISCO Packet Tracer
13.	To implement client-server application using java network programming.

IV SEMESTER
23IT1406: Lab.: Software Lab2

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand the concept of XML and develop programs using it. 2. Understand the concept of Node Js and develop programs. 3. Develop Angular JS programs using basic features. 4. Gain knowledge on server side scripting.

Unit I	**(6 Hrs.)**
Basics of XML, Understanding Markup Languages, XML Structure and Syntax, Valid vs. Well-formed XML, DTD Classes, Element Type Declarations, Attribute Declarations, Limitations of DTDs. Implement all above concepts using AI tools.	
Unit II	**(6Hrs.)**
Introduction to XML Schema, Complex Types in Schema, Extensible Stylesheet Language Transformations (XSLT) Implement all above concepts using AI tools.	
Unit III	**(6 Hrs.)**
The Importance of Being Asynchronous, Blocking vs. Non-blocking Code, What is Node.js?, Why Use Node.js? Features and Process Model, Setting up the Node.js Development Environment, Node.js BasicsNode.js Modules, File System Module Implement all above concepts using AI tools.	
Unit IV	**(7 Hrs.)**
Introduction to AngularJS, AngularJS Expressions, AngularJS Modules, Directives: Data binding directives: ng-init, ng-repeat ,App and model directives: ng-app, ng-model ,Custom directives, Two-way Data Binding, User Input Validation, AngularJS Controllers, Scope in AngularJS Implement all above concepts using AI tools.	
Unit V	**(7 Hrs.)**
Introduction and history ,Why use React.js? Key features and benefits, Comparison with other frameworks (Angular, Vue.js), Setting Up the Development Environment,React Components: Functional and class components, JSX syntax and rules, Rendering components , Component lifecycle methods (for class components) Implement all above concepts using AI tools.	
Unit VI	**(7 Hrs.)**
Server Programming :Introduction to to client server programmng, Basics of Server Configuration and Hosting, Setting up a Local Server Environment (XAMPP/WAMP or Node.js with Express.js), Basics of Database Connectivity and socket programming.	
Total Lecture	**39 Hours**

Textbooks:	
1.	Brad Dayley ,Brendan Dayley , Caleb Dayley Node.Js, Mongodb and Angular Web Development, Second Edition
2.	Sukesh Marla Journey to Angular Development Learn Angular Fundamentals, TypeScript, Webpack, Routing, Directives, Components, Forms, and Modules with Practical Examples (English Edition) Kindle Edition

Reference books:	
1.	Asim Hussain Angular: From Theory To Practice:Build the web applications of tomorrow using the Angular web framework from Google. Kindle Edition
2.	Wilken Angular in Action Paperback – Illustrated

MOOCs Links and additional reading, learning, video material	
1.	https://www.google.com/search?q=swayam+nptel+video+on+nodejs&sca_esv=1ad7256b324010b7&sca_upv=1&rlz=1C1CHBD_enIN1074IN1074&sxsrf=ADLYWILD6ivE94rn8-aQYHVqQuAO2qmYHw%3A1723186680742&ei=-L21Zoj1LJHZ4-EPgansuQI&ved=0ahUKEwiI0fLPqueHAxWR7DgGHYEUOycQ4dUDCBA&uact=5&oq=swayam+nptel+video+on+nodejs&gs_lp=Egxnd3Mtd2l6LXNlcnAiHHN3YXlhbSBucHRlbCB2aWRlbyBvbiBub2RlanMyCBAAGIAEGKIEMggQABiABBiiBDIIEAAYgAQYogQyCBAAGIAEGKIESOqYAVDOGVjMjAFwAngBkAEAmAGLAqABlQ6qAQUwLjguMrgBA8gBAPgBAZgCDKAC4g7CAgoQABiwAxjWBBhHmAMAiAYBkAYIkgcFMi43LjOgB_Yj&sclient=gws-wiz-serp#fpstate=ive&vld=cid:d64b7cc5,vid:f2EqECiTBL8,st:0
2.	https://onlinecourses.swayam2.ac.in/nou24_cs09/preview
3.	https://youtu.be/XWYE2E38r8A

IV SEMESTER
23IT1407: Lab.: Adv. Python Programming

Course Outcomes
Upon successful completion of the course the students will be able to 1. Utilize advanced Python constructs such as decorators, context managers, and metaclasses to write more efficient and reusable code. 2. Students will gain expertise in handling, analyzing, and visualizing large datasets using Python libraries such as NumPy, pandas and Matplotlib 3. applying Python for machine learning and artificial intelligence projects using libraries such as scikit-learn 4. Practical understanding of advanced Python programming techniques and their applications in various domains.

SN	**Experiments based on**
1	Assertion
2	Decorators
3	Generators, meta classes
4	Threading in Python
5	Introduction to GUI building libraries
6	Widgets
7	Basic image processing using Python
8	Basic numerical processing using Python
9	Basing data analysis using Python
10	Basic data visualization using Python

IV SEMESTER
23IT1408: Cyber Laws

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Classify Intellectual property like copyright, patents and trademark and understand cyber privacy
2. Understand and Identify cyber laws and regulatory.
3. learn conversant with the social and intellectual property issues emerging from cyberspace
4. Acquire deep knowledge of Information Technology act and legal framework of Right to privacy

Unit I	**(7 Hrs.)**
Introduction, Protection of Intellectual Property Copyright, Related Rights, Patents, industrial Designs, Trademark, Unfair Competition. Information Technology Act2000 : ,Information Technology Act-2000-1 (Sec 1 t0 13),Information Technology, Act-2000-2 (Sec 14 to 42),Certifying, Technology Rules), Information Technology Act -2003-3 (Sec 43 to 45 and Sec 65 to 78), Information Technology Act-2000-4(Sec 46 to Sec 64 to 78), Information Technology Act-2000-4(Sec 46 to Sec 64 and CRAT Rules), Information Technology Act-2000-5 (Sec 79 to 90), Information Technology Act-2005-6 (Sec 91-94) Amendments in 2008.	
Unit II	**(7 Hrs.)**
Information Technology Related Intellectual Property Rights Computer Software and Intellectual Property-Objective, Copyright Protection, Reproducing, Defenses, Patent, Protection, Database and Data Protection – Objective, Need for Protection, UK Data Protection Act, 1998, Us Safe Harbor Principle, Enforcement. Protection of Semi-conductor Chips-Objectives Justification of protection, Criteria, Subject, matter of Protection, WIPO Treaty, TRIPs, SCPA. Domain Name Protection – Objectives, domain name and Intellection property, registration of domain name, disputes under Intellectual Property Rights, Jurisdictional Issues, and International Perspective.	
Unit III	**(6 Hrs.)**
Patents (Ownership and Enforcement of Intellectual Property) Patents – Objective, Rights, Assignments, Defenses in case of Infringement Copyright – Objective, Right, Transfer of Copyright, work of employment Infringement, Defenses for infringement Trademarks-Objectives, Rights, Protection of good will, Infringement, Passing off, Defenses. Of Design Infringement, Enforcement of Intellectual Property Rights-Civil Remedies, Criminal Remedies, Border Security measure. Practical Aspects of Licensing – Benefits, Determinative factors, Important clauses, licensing clauses.	
Unit IV	**(6 Hrs.)**
Basic Concepts of Technology and Law : Understanding the Technology of Internet, Scope of Cyber Laws, Cyber Jurisprudence. Law of Digital Contracts: The Essence of Digital Contracts, The System of Digital Signatures. The Role and Function of Certifying Authorities, The Science of Cryptography. Intellectual Property Issues, Copyright in the Digital Media, Patents in the Cyber World, Rights of Netizens and E-Governance: Privacy and Freedom Issues the Cyber World, E-Governance, Cyber Crimes and Laws.	
Total Lecture	**26 Hours**

Textbooks:	
1.	K.Kumar Cyber Laws: Intellectual property and E-Commerce Security, Dominant Publisher,2011
2.	Rondey D. Ryder Guide to Cyber Laws Second Edition Wadhwa and Company, New Delhi,2007

Reference Books:	
1.	Vakul Sharma Handbook of Cyber Laws Macmillan India Ltd, 2nd Edition, PHI,2003.
2.	Justice Yatindra Singh Cyber Laws Universal Law Publishing, 1st Edition ,New Delhi,2003.
3.	Augastine Paul T. Cyber Crimes and Legal Issues Crecent Publishing Corporation,2007

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=cQYACLLAPOw
2.	https://www.youtube.com/watch?v=d2kSE3Vdkx0

MANDATORY LEARNING COURSES (MDM)

TRACK1

Cloud Computing

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

IV SEMESTER
MDM2IT102: Cloud Security

Course Outcomes :
Upon successful completion of the course the students will be able to
1. Describe the fundamental concepts of statics and dynamics.
2. Apply the basic concepts of applied mechanics for solution of problems on planar force system.
3. Determine the properties of surface like centroid, moment of inertia, etc. for planar surfaces and mass moment of inertia for rigid body.
4. Analyze pin jointed truss frame structure and beam structure analytically and graphically.
5. Evaluate the dynamic variables of kinetics of particles and simple lifting machine

Unit I:	**(6 Hrs.)**
Isolation-Compute, Network and Storage, Common attack vectors and threats, Secure Isolation Strategies, Multitenancy, Virtualization strategies, Inter-tenant network segmentation strategies, Storage isolation strategies, Understand the Cloud based Information Life Cycle, Data protection for Confidentiality and Integrity, Common attack vectors and threats, Encryption, Data Redaction, Tokenization, Obfuscation, PKI and Key Management, Assuring data deletion, Data retention, deletion and archiving procedures for tenant data ,Data Protection Strategies	
Unit II:	**(7 Hrs.)**
Understand the access control requirements for Cloud infrastructure, Common attack vectors and threats, Enforcing Access, Control Strategies-Compute, Network and Storage Authentication and Authorization,Roles-based Access Control, Multi-factor authentication ,Host, storage and network access control options ,OS Hardening and minimization, securing remote access, Verified and measured boot ,Firewalls, IDS, IPS and honeypots	
Unit III:	**(7 Hrs.)**
Proactive activity monitoring, Incident Response, Monitoring for unauthorized access, malicious traffic, abuse of system privileges, intrusion detection, events and alerts, Auditing – Record generation, Reporting and Management, Tamper-proofing audit logs, Quality of Services, Secure Management-User management, Identity management, Security Information and Event Management	
Unit IV:	**(6 Hrs.)**
User Identification, Authentication, and Authorization in Cloud Infrastructure, concepts of Identity & Access Management -Single Sign on, Identity Federation, Identity providers and service consumers, The role of Identity provisioning, Security Patterns for Cloud Computing-Trusted Platform, Geo-tagging, Cloud VM Platform Encryption, Trusted Cloud Resource Pools, Secure Cloud Interfaces ,Network Security	
Total Lecture	**26 Hours**

Textbooks:	
1.	Zeal Vora, Enterprise Cloud Security and Governance, ed 2009, Tata Mc. Grew Hill Education Pvt. Ltd., New Delhi, 2009.
2.	Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance by Tim Mather, Subra Kumaraswamy, and Shahed Latif.
3.	The Cloud Security Ecosystem: Technical, Legal, Business, and Management Issues by Ryan Ko and Kim-

	Kwang Raymond Choo

Reference Books:	
1.	Chris Dotson, Practical Cloud Security: A Guide for Secure Design and Deployment,2019
2.	Vic J.R. Winkler, Securing the Cloud: Cloud Computer Security Techniques and Tactics,2011

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
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MOOCs Links and additional reading, learning, video material	
1.	https://www.google.com/search?q=youtube+video+on+cloud+security&sca_esv=587603400&rlz=1C1CHBD_enIN1074IN1074&sxsrf=AM9HkKmDcOIQb-4VQkP8j1iztWSZIvZ3Yg%3A1701676163551&ei=g4RtZc2kIZOu4-EP48-1IA&ved=0ahUKEwiN8oDapfWCAxUT1zgGHeNnDQQQ4dUDCBA&uact=5&oq=youtube+video+on+cloud+security&gs_lp=Egxnd3Mtd2l6LXNlcnAiH3lvdXR1YmUgdmlkZW8gb24gY2xvdWQgc2VjdXJpdHkyCBAhGKABGMMESP4yUABYxSFwAHgBkAEAmAHeAaABvw6qAQYwLjEyLjG4AQPIAQD4AQHCAggQABgIGAcYHsICCxAAGIAEGIoFGIYDwgIKECEYoAEYwwQYCuIDBBgAIEGIBgE&sclient=gws-wiz-serp#fpstate=ive&ip=1&vld=cid:ff0ae11f,vid:jI8IKpjiCSM,st:0
2.	https://www.google.com/search?q=youtube+video+on+cloud+security&sca_esv=587603400&rlz=1C1CHBD_enIN1074IN1074&sxsrf=AM9HkKmDcOIQb-4VQkP8j1iztWSZIvZ3Yg%3A1701676163551&ei=g4RtZc2kIZOu4-EP48-1IA&ved=0ahUKEwiN8oDapfWCAxUT1zgGHeNnDQQQ4dUDCBA&uact=5&oq=youtube+video+on+cloud+security&gs_lp=Egxnd3Mtd2l6LXNlcnAiH3lvdXR1YmUgdmlkZW8gb24gY2xvdWQgc2VjdXJpdHkyCBAhGKAB GMMESP4yUABYxSFwAHgBkAEAmAHeAaABvw6qAQYwLjEyLjG4AQPIAQD4AQHCAggQABgIGAcYHsICCxAAGIAEGIoFGIYDwgIKECEYoAEYwwQYCuIDBBgAIEGIBgE&sclient=gws-wiz-serp#fpstate=ive&vld=cid:1e7db26c,vid:BBqEetIIVlw,st:0

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech SoE and Syllabus 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Information Technology)

B.Tech in Information Technology

SoE No. 23IT-101

TRACK2

Cyber Security

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

IV SEMESTER
MDM1IT202: Cyber Security Fundamentals

Course Outcomes
Upon successful completion of the course the students will be able to 1. Provide a solid foundation for individuals pursuing careers in cyber security or seeking to enhance their understanding of cyber security principles and practices.

Unit I Cyber Space	**(6 Hrs.)**
Fundamental definitions -Interface of Technology and Law – Jurisprudence and-Jurisdiction in Cyber Space - Indian Context of Jurisdiction - Enforcement agencies – Need for IT act - UNCITRAL – E-Commerce basics .	
Unit III Introduction to Cyber Crime Investigation	**(6 Hrs.)**
Firewalls and Packet Filters, password Cracking, Keyloggers and Spyware, Virus and Warms, Trojan and backdoors, Steganography, DOS and DDOS attack, SQL injection, Buffer Overflow, Attack on wireless Networks.	
Unit IV: Cr.P.C and Indian Evidence Law	**(7 Hrs.)**
Cybercrimes under the Information Technology Act,2000 - Cybercrimes under International Law - Hacking Child Pornography, Cyber Stalking, Denial of service Attack, Virus Dissemination, Software Piracy, Internet Relay Chat (IRC) Crime, Credit Card Fraud, Net Extortion, Phishing etc - Cyber TerrorismViolation of Privacy on Internet - Data Protection and Privacy – Indian Court cases.	
Unit V: Electronic Governance	**(7 Hrs.)**
Legal Recognition of Electronic Records and Electronic Evidence -Digital Signature Certificates - Securing Electronic records and secure digital signatures - Duties of Subscribers - Role of Certifying Authorities - Regulators under the Act -The Cyber Regulations Appellate Tribunal - Internet Service Providers and their Liability– Powers of Police under the Act – Impact of the Act on other Laws . Cyber Crimes -Meaning of Cyber Crimes –Different Kinds of Cyber crimes – Cyber crimes under IPC	
Total Lecture	**26Hours**

Textbooks:	
1.	Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication Mc Graw Hill. 2
2.	Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and Sunit Belpure, Publication Wiley.
3	Farouq Ahmed, Cyber Law in India, New Era publications, New Delhi
4	Pawan Duggal: Cyber Law- the Indian perspective Universal Law Publishing Co.New Delhi

Reference books:	
1.	Justice Yatindra Singh: Cyber Laws, Universal Law Publishing Co., New Delhi
2.	S.R.Myneni: Information Technology Law(Cyber Laws), Asia Law House, Hyderabad
3	Chris Reed, Internet Law-Text and Materials, Cambridge University Press.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology/

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=OYsY5B9pqYU
2.	http://acl.digimat.in/nptel/courses/video/106106248/L26.html

TRACK3

Web Development

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

IV SEMESTER

MDM2IT302: Dynamic web Programming

Course Outcomes :
Upon successful completion of the course the students will be able to 1. To introduce the fundamentals of web technologies and the structure of web applications. 2. To enable students to design responsive web pages using HTML and CSS. 3. To teach dynamic and interactive content creation using JavaScript. 4. To introduce client-side scripting techniques and form validation. 5. To prepare students to develop interactive and user-friendly web interfaces.

Unit I: Introduction to Web Development	**(7 Hrs.)**
Basics of Web Architecture, Client-Server Model, HTML Elements & Structure, Forms, Introduction to CSS and Styling Basics	
Unit II: Styling with CSS	**(6 Hrs.)**
CSS Syntax, Selectors, Colors, Fonts, Box Model, Layouts (Flexbox, Grid), Responsive Design, Media Queries	
Unit III: JavaScript Programming Basics	**(7 Hrs.)**
JavaScript Syntax, Variables, Operators, Control Structures, Functions, Arrays, Objects, Events, DOM Manipulation	
Unit IV: **Java script in web application**	**(6 Hrs.)**
Form Validation, Timers, JavaScript and HTML DOM, Event Handling, JSON, Introduction to AJAX, Basics of jQuery	
Total Lecture	**26 Hours**

Textbooks:	
1.	Jon Duckett, HTML and CSS: Design and Build Websites, Wiley, 1st Edition.
2.	David Flanagan, JavaScript: The Definitive Guide, O'Reilly Media.

Reference Books:	
1.	Robin Nixon, Learning PHP, MySQL & JavaScript, O'Reilly Media.
2.	Thomas A. Powell, HTML & CSS: The Complete Reference, McGraw-Hill.
3.	Brown, Learning JavaScript: JavaScript Essentials for Modern Application Development, O'Reilly Media.

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=5-OE4WZF_80

IV SEMESTER

Open Elective -II : Basket

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject
1	4	OE2	GE	23OE2401	OE-II : Combinatorics
2	4	OE2	GE	23OE2402	OE-II : Fuzzy Set Theory, Arithmetic And Logic
3	4	OE2	GE	23OE2403	OE-II : Green Chem. & Sustainability
4	4	OE2	GE	23OE2404	OE-II : Hydrogen Fuel
5	4	OE2	GE	23OE2405	OE-II : Electronic Materials And Applications
6	4	OE2	GE	23OE2406	OE-II : Laser Technology And Applications
7	4	OE2	MGT	23OE2407	OE-II : Finance And Cost Management
8	4	OE2	MGT	23OE2408	OE-II : Operation Research Techniques
9	4	OE2	MGT	23OE2409	OE-II : Project Evaluation & Management
10	4	OE2	MGT	23OE2410	OE-II : Total Quality Management
11	4	OE2	MGT	23OE2411	OE-II : Value Engineering
12	4	OE2	MGT	23OE2412	OE-II : Maintenance Management
13	4	OE2	MGT	23OE2413	OE-II : Industrial Safety
14	4	OE2	MGT	23OE2414	OE-II : Industry 4.0
15	4	OE2	MGT	23OE2415	OE-II : Operation Management
16	4	OE2	MGT	23OE2416	OE-II : Material Management
17	4	OE2	MGT	23OE2417	OE-II : Hospitality Management
18	4	OE2	MGT	23OE2418	OE-II : Human Resource Management & Organizational Behaviour
19	4	OE2	MGT	23OE2419	OE-II : Agri-Business Management
20	4	OE2	MGT	23OE2420	OE-II : Rural Marketing
21	4	OE2	MGT	23OE2421	OE-II : Marketing Management
22	4	OE2	MGT	23OE2422	OE-II : Health Care Management

Link for Open Electives syllabus: https://ycce.edu/syllabus/

IV SEMESTER

Mandatory Learning Course (MLC)

MLC2124 : YCAP4

Nagar Yuwak Shikshan Sanstha's

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(Accredited 'A++' Grade by NAAC with a score of 3.6)

Hingna Road, Wanadongri, Nagpur - 441 110



Bachelor of Technology

SoE & Syllabus 2023

5th Semester

(Department of Information Technology)

B. Tech in Information Technology

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B.TECH SCHEME OF EXAMINATION 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Information Technology)

B. Tech. in Information Technology

SoE No. 23IT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
FIFTH SEMESTER															
1	5	PC	IT	23IT1501	Theory of Computation	T	3	0	0	3	3	30	20	50	3
2	5	PC	IT	23IT1502	Database and Information System	T	3	0	0	3	3	30	20	50	3
3	5	PC	IT	23IT1503	**Lab :** Database and Information System	P	0	0	2	2	1		60	40	
4	5	PC	IT	23IT1504	Machine Learning	T	3	0	0	3	3	30	20	50	3
5	5	PC	IT	23IT1505	**Lab :** Machine Learning	P	0	0	2	2	1		60	40	
6	5	PC	IT	23IT1506	Operating System	T	3	0	0	3	3	30	20	50	3
7	5	PC	IT	23IT1507	**Lab :** Operating System	P	0	0	2	2	1		60	40	
8	5	PE	IT		**Professional Elective-I**	T	3	0	0	3	3	30	20	50	3
9	5	MDM	IT		**MD Minor Course-III**	T	3	0	0	3	3	30	20	50	3
10	5	OE-3	OE		**Open Elective-III**	T	3	0	0	3	3	30	20	50	3
11	5	STR	IT	23IT1508	Internship, Seminar and Report	P	0	0	1	1	1		60	40	
					TOTAL		**21**	**0**	**7**	**28**	**25**				
List of Mandatory Learning Course (MLC)															
1	5	HS	T&P	MLC2125	**YCAP5 :** YCCE Communication Aptitude Preparation	**A**	3	0	0	3	**0**				
Professional Elective - I															
1	5	PE-I	IT	23IT1521	**PE-I :** Mobile Communication										
2	5	PE-I	IT	23IT1522	**PE-I :** Advance Computer Architecture										
3	5	PE-I	IT	23IT1523	**PE-I :** Digital Image Processing										
4	5	PE-I	IT	23IT1524	**PE-I :** Embeded Systems										
6	5	PE-I	IT	23IT1525	**PE-I :** Graphics Design										
7	5	PE-I	IT	23IT1526	**PE-I :** Mobile Operating Systems										
8	5	PE-I	IT	23IT1527	**PE-I :** Data Analytics and Statistics										
9	5	PE-I	IT	23IT1529	**PE-I :** Deep Learning										
Coursera Elective															
1	5	PE-I	IT	23IT1528	**PE-I :** Software Testing and Automation										

Open Elective - III

SN	Sem	Type	BoS/Deptt	Sub. Code	Subject	FACULTY
1	5	OE3	CSE	23OE3501	OE-III : Social Reformers in Modern Maharashtra	ARTS
2	5	OE3	CSE	23OE3502	OE-III : Independent India 1948-2010	ARTS
3	5	OE3	CT	23OE3503	OE-III : Introduction To Cognitive Psychology	ARTS
4	5	OE3	CT	23OE3504	OE-III : Introduction To Engineering Psychology	ARTS
5	5	OE3	CT	23OE3505	OE-III : Introduction To Behavioural Psychology	ARTS
6	5	OE3	CT	23OE3506	OE-III : Introduction To Emotional Psychology	ARTS
7	5	OE3	EL	23OE3507	OE-III : Elements of Public Administration	ARTS
8	5	OE3	ETC	23OE3508	OE-III : Ancient Indian History	ARTS
9	5	OE3	IT	23OE3509	OE-III : Consciousness Studies	ARTS
10	5	OE3	IT	23OE3510	OE-III : Psychology for Professionals	ARTS
11	5	OE3	IT	23OE3511	OE-III : Introduction to Sociology and Human Behavior	ARTS
12	5	OE3	GE	23OE3512	OE-III : Economics of Money and Banking	ARTS
13	5	OE3	GE	23OE3513	OE-III : Economics of Capital Market	ARTS
14	5	OE3	GE	23OE3514	OE-III : Digital Humanities	ARTS
15	5	OE3	GE	23OE3515	OE-III : Introduction to Political Science	ARTS
16	5	OE3	CT	23OE3516	OE-III : Bhagwat Geeta - An Engineer's Interpretation	ARTS - IKS
17	5	OE3	CT	23OE3517	OE-III : Artha shastra by Kautiliya	ARTS - IKS
18	5	OE3	CSD	23OE3518	OE-III : Glimpses of Ancient science and Technology	ARTS - IKS
19	5	OE3	CV	23OE3519	OE-III : Indian taxation system	COMMERCE
20	5	OE3	CV	23OE3520	OE-III : Elements of share trading	COMMERCE
21	5	OE3	EE	23OE3521	OE-III : Introduction to Fintech	COMMERCE
22	5	OE3	EE	23OE3522	OE-III : Financial Analytics	COMMERCE
23	5	OE3	ETC	23OE3523	OE-III : Fundamentals of Investments	COMMERCE
24	5	OE3	EE	23OE3524	OE-III : Lifestyle Diseases	HEALTHCARE & MEDICINE
25	5	OE3	EE	23OE3525	OE-III : Holistic Nutrition	HOME SCIENCE
26	5	OE3	EL	23OE3526	OE-III : Community Organization & Development	HOME SCIENCE
27	5	OE3	CSE	23OE3527	OE-III : Human Rights & International Laws	LAW
28	5	OE3	CSE	23OE3528	OE-III : Cyber Crime Administration	LAW
29	5	OE3	MATHS	23OE3529	OE-III : Finite Differences & Numerical Methods	SCIENCE
30	5	OE3	MATHS	23OE3530	OE-III : Business Statistics	SCIENCE
31	5	OE3	PHY	23OE3531	OE-III : Crystalline Solids: Properties and Applications.	SCIENCE
32	5	OE3	PHY	23OE3532	OE-III : Nanotechnology: Fundamental to Applications	SCIENCE
33	5	OE3	CHE	23OE3533	OE-III : Chemistry in daily life	SCIENCE
34	5	OE3	CHE	23OE3534	OE-III : Battery Systems and Management	SCIENCE
35	5	OE3	NPTEL	23OE3535	OE-III : Designated approved online NPTEL Course	NPTEL

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V SEMESTER
23IT1501: Theory of Computation

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Understand Formal Languages and Automata theory.
2. Evaluate and asses the powers of different models.
3. Analyze whether a problem is computable or not.
4. Design regular expression, context free grammar, Finite Automata, Push Down Automata, Turing Machine and other Computational Models.

Unit I:	**(7 Hrs.)**
Introduction: Alphabet, Symbols, Sets, Strings, Language, Operations, Relations, Finite Automata: Design of Finite Automata, Acceptance of strings and languages, Deterministic Finite Automation , Non-Deterministic Finite Automation, Equivalence between NFA and DFA , NFA with ε-transition, Minimization of FA.	
Unit II	**(7 Hrs.)**
Regular sets, Regular expressions, Manipulation of regular expressions, Equivalence between RE and FA. Pumping Lemma for regular languages, closure properties of regular sets, properties of regular languages, Chomsky hierarchy of languages, Regular grammars, Right linear and left linear regular grammars, interconversion, Equivalence between regular grammar and FA, Interconversion between RE and RG.	
Unit III	**(8 Hrs.)**
Context free grammar, Derivation trees (Parse tree), Syntax tree , Ambiguous Grammar, Context Free Language (CFL), Closure properties of CFL, Simplification of CFG, Normal Forms of grammar: Chomsky Normal Form (CNF), Greibach Normal Form (GNF), CYK algorithm.	
Unit IV	**(9 Hrs.)**
Push down automata, definition and model, acceptance of CFL by empty Stack and by final state, Design of PDA for the CFL, equivalence CFG and PDA, Inter conversion, DPDA & NDPDA.	
Unit V	**(8 Hrs.)**
Turing machine, Definition, Model of TM, Design of Turing Machine, Computable functions, Recursive enumerable language, Recursive Language, Properties of Recursive enumerable language, Variants of Turing machines, non-deterministic TMs and equivalence with deterministic TMs, context sensitive language (CSG), Linear bounded automata.	
Unit VI	**(6 Hrs.)**
Undecidability: Church-Turing thesis, Undecidable Problems related to Recursive enumerable language and Turing Machine, post correspondence problem (PCP), Universal Turing Machine, The universal and diagonalization languages, reduction between languages and Rice's theorem, Recursive function: Basis functions and operations on them. Bounded minimization, unbounded minimization, preemptive recursive function and μ recursive function.	
Total Lecture	**45 Hours**

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Textbooks:	
1.	John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman: Introduction to Automata Theory, Languages and computation Pearson Education Asia 2nd edition, 2000
2.	John C. Martin: Introduction to languages and the Theory of Automata Tata McGraw Hill 3rd edition, 2003.

Reference books:	
1.	Harry R. Lewis and Christos H. Papadimitriou: Elements of the Theory of Computation Pearson Education Asia
2.	Michael Sipser: Introduction to the Theory of Computation PWS Publishing
3.	O.G. Kakde: Theory of Computation USP 2008

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MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=xgyI7K6mkAc
2.	https://www.youtube.com/watch?v=9idnQ2C6HfA
3.	https://www.youtube.com/watch?v=G_mCqJakvYk

V SEMESTER
23IT1502: Database and Information System

Course Outcomes :
Upon successful completion of the course the students will be able to 1. To obtain sound knowledge in the theory, principles and applications of database management system concepts, its structures and query language. 2. Apply various techniques of SQL Query writing, Normalization techniques, query processing and techniques involved in query optimization useful in transaction. 3. To Analyse the given problem statement and give robust and cost effective solution. 4. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

Unit I:	**(8 Hrs.)**
Introduction to Database Management System: General File System vs. DBMS, Data Abstraction, Data Independence, Keys, Data Modelling using the Entity Relationship(ER) Model, The enhanced Entity Relationship(EER) model.	
Unit II:	**(8 Hrs.)**
Relational Model: Structure of Relational Databases, The Relational Algebra and Relational), Calculus (TRC &DRC Introduction to SQL Programming: (DDL, DML, Joins, Nested Queries/Sub Queries/Inner Queries) Integrity Constraints, NoSQL: MongoDB, installation, CRUD operation.	
Unit III:	**(8 Hrs.)**
Database Design: Functional Dependency and Normalization for Relational Databases, Desirable properties of decomposition.	
Unit IV:	**(7 Hrs.)**
Query Processing: Overview, Measures of Query Cost, Selection Operation, Sorting, Join Operation, Other Operations, Evaluation of Expressions. Query Optimization: Overview, Transformation of Relational Expressions, Estimating Statistics of Expression Results.	
Unit V:	**(7 Hrs.)**
Transaction Processing: Introduction to Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity, Transaction Isolation Levels, Implementation of Isolation Levels.	
Unit VI:	**(7 Hrs.)**
Concurrency control Techniques: Lock-Based Protocols, Deadlock Handling, Multiple Granularity, and Timestamp-Based Protocols. Data Control Language: GRANT, REVOKE; Concept of Triggers and Views.	
Total Lecture	**45 Hours**

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Textbooks:	
1.	Elmasri & Navathe "Fundamentals of Database System" 5th Edition, Addison Wesely.
2.	Abraham Silberschatz, Henry F. Korth and S. Sudarshan "Database System Concepts" 6th Edition
3.	Raghu Ramakrishnan, Johannes Gehrke Database Management Systems Second Edition, McGraw-Hill,2002

Reference Books:	
1.	C.J. Date; "Database in Depth – Relational Theory for Practitioners"; O`Reilly Media, 2005
2.	Michael Mannino "Database design, Application Development and Administration", 4th Edition(2008)

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1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/106/105/106105175
2.	https://www.youtube.com/watch?v=OWX4RvijwLw

V SEMESTER

23IT1503: - Lab: Database and Information System

Course Outcomes
Upon successful completion of the course the students will be able to 1. To obtain sound knowledge in the theory, principles and applications of database management system concepts, its structures and query language. 2. Apply various techniques of SQL Query writing, Normalization techniques, query processing and techniques involved in query optimization useful in transaction. 3. To Analyze the given problem statement and give robust and cost effective solution. 4. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

Expt. No.	Name of Experiment / Problem Statement
1.	Creation of Tables using DDL (Data Definition Language). Use DML commands – insert and select
2.	Modification of Database objects using DDL and DML (Data Manipulation Language).Use Alter, update, delete, drop ,truncate commands.
3.	Querying the database based on various inbuilt functions and aggregate functions.
4.	Querying the database based on Set, Arithmetic and Logical operator.
5.	Querying the Database based on Join operation.
6.	Querying the Database based on nesting and applying various clauses.
7.	To create & manipulate various database objects of the table using Views.
8.	Querying the database to create triggers for various events such as insertion, updating etc.
9.	To study & implement PL/SQL stored Procedure.
10.	To study & implement NO SQL(Mongo DB)
11.	To design and develop a mini project that implements a database management system integrated with an AI-powered assistant to facilitate intelligent data retrieval, management, and interaction system.

SEMESTER
23IT1504: Machine Learning

Course Outcomes :
Upon successful completion of the course the students will be able to 1. understand supervised and unsupervised machine learning algorithms 2. analyze a problem and identify the machine learning algorithm appropriate for its solution 3. apply supervised/ unsupervised learning for the given set of labelled samples and design the model to achieve the desired performance 4. evaluate the performance of ML models using appropriate performance measures

Unit I	**(6 Hrs.)**
Introduction to machine learning. What Is Machine Learning, Examples of Machine Learning Applications, Learning Associations, Classification, Regression, Supervised and Unsupervised Learning, Reinforcement Learning, linear Models for regression and classification, logistic regression.	
Unit II	**(6 Hrs.)**
Supervised Learning-1: Concept of gradient descent, k-Nearest Neighbors (KNN) for classification and regression, Naive Bayes Classifiers, Generalization, Bias and Variance, Over-fitting, and Under-fitting	
Unit III	**(7 Hrs.)**
Supervised Learning-2: Decision Trees, Kernelized Support Vector Machines, classification and regression using SVM, Multiclass Classification using One-vs-Rest (OvR), and One-vs-One (OvO)	
Unit IV	**(6 Hrs.)**
Unsupervised Learning: k-Means Clustering, Hierarchical Clustering: agglomerative and divisive clustering, dendrogram, Choosing the Number of Clusters, semi supervised learning.	
Unit V	**(7 Hrs.)**
Design and Analysis of Machine Learning Experiments: Factors, Response, and Strategy of Experimentation, Randomization, Replication, and Blocking, Guidelines for Machine Learning Experiments, Cross-Validation and Resampling Methods, K-Fold Cross-Validation, Comparing Two Classification Algorithms.	
Unit VI	**(7 Hrs.)**
Advances in Machine Learning: Introduction to learning using Neural networks, Models of neurons: McCulloch Pit's Model, discrete and continuous perceptron, neuron activation functions, concept of feedforward and feedback neural networks, backpropagation training algorithm, introduction to deep learning, Convolutional Neural Networks.	
Total Lecture	**39 Hours**

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Textbooks:	
1.	Ethem Alpaydın, Introduction to Machine Learning, Second Edition, The MIT Press
2.	Applied Machine Learning, M. Gopal, Mc Graw Hill

Reference Books:	
1.	Deep Learning, M. Gopal, Pearson
2.	Andreas C. Müller and Sarah Guido Introductionto Machine Learning with Python, A Guide for Data Scientists ORIELLY

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=fC7V8QsPBec

V SEMESTER
23IT1505: Lab: Machine Learning

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Develop a ML model for solving a given real-world problem
2. Evaluate the performance of ML Models using appropriate performance measures

Expt.	Name of Experiment / Problem Statement	Task	CO Mapped
	MSPA-I		
1	a) Linear Univariate regression with Ordinary least squares method (implementing from scratch) b) Using Linear Multivariate regression with Ordinary least squares method (using library function)	Regression	1,2
2	Implementing linear classifier using Linear Machine concept.	Classification	1,2
3	Program for Classification using KNN algorithm.	Classification	1,2
	MSPA-II		
4	KNN algorithm for regression implemented from scratch (without using a library).	Regression	1,2
5	Implementing Naïve Bayes Classification.	Classification	1,2
	MSPA-III		
6	Implementing multi-class classifier using Decision Trees	Classification	1,2
7	Implementing K-means clustering or Hierarchical clustering.	Clustering	1,2
8	Implementing SVM Classification with k-fold cross validation.	Classification	1,2
	MSPA-IV		
9	Implementing a multi-layer feed forward Neural Network based estimation.	Regression	1,2
10	Experiment on classification using deep network.	Classification	1,2

Note: Project Based Learning is recommended as a part of the Lab. assessment

V SEMESTER
23IT1506: Operating System

Course Outcomes :
Upon successful completion of the course the students will be 1. Demonstrate fundamental concepts of operating system and its functions. 2. Analyze various algorithms and techniques for managing OS resources 3. Apply and evaluate the performance of algorithms for managing various OS resources based on the given data about processes and resources. 4. Simulate algorithms/techniques for managing various OS resources using computer programs.

Unit I: Introduction to OS	**(7 Hrs.)**
Evolution of OS, basic hardware support necessary for modern operating systems, Layered Structural of OS, Services provided by OS, system calls, Dual mode of operation. Input-output Management: Basics of I/O hardware, Polling, Interrupts and DMA.	
Unit II: Process management	**(7 Hrs.)**
Introduction, process control block, process states, process context switch, introduction to threads, CPU scheduling, goals of scheduling, Algorithmic evaluation of CPU scheduling algorithms.	
Unit III: Inter-process communication	**(8 Hrs.)**
Process cooperation and synchronization, race condition, critical region, mutual exclusion and implementation, semaphores, classic problems of Synchronization using semaphores. **Deadlocks**: necessary conditions, deadlock detection, deadlock avoidance, deadlock prevention, recovery from deadlock.	
Unit IV: File systems	**(7 Hrs.)**
Access methods, Directory Structure disk space management and space allocation strategies, disk arm scheduling strategies: FCFS, SSTF, SCAN, CSACN, LOOK, CLOOK, Selecting a disk scheduling algorithm.	
Unit V: Memory management techniques	**(8 Hrs.)**
Contiguous allocation, static and dynamic partitioning, and non-contiguous, paging and segmentation, translation look aside buffer (TLB) and overheads.	
Unit VI: Virtual memory and File System	**(8 Hrs.)**
Demand paging, page replacement algorithms (LRU, Optimal, and FIFO), thrashing, and working set model. File System: File Concepts, access methods, file allocation methods, directory structure.	
Total Lecture	**45 Hours**

Textbooks:	
1.	Silberchatz & galvin Operating system concepts 8th Edition Wiley Student Edition
2.	William Staling Operating System 5th Edition Pearson

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Reference books:	
1.	A.S. Tanenbaum Modern operating systems 2nd Edition
2.	Milan MilenKovic Operating system concepts 2nd Edition McGraw-Hill Education (ISE Editions)

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MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=YwqexcfbucE&list=PLmXKhU9FNesSFvj6gASuWmQd23Ul5omtD
2.	https://www.youtube.com/watch?v=UDPYpf-nsDY
3.	https://www.youtube.com/watch?v=KjTea8sFDiI

V SEMESTER
23IT1507: Lab.: Operating Systems

Course Outcomes
Upon successful completion of the course the students will be able to 1. Explain fundamental concepts of operating system and its functions. 2. Explain various algorithms and techniques for managing OS resources 3. Apply and evaluate the performance of algorithms for managing various OS resources based on the given data about processes and resources. 4. Simulate algorithms/techniques for managing various OS resources using computer programs.

SN	**Experiments based on**
1	Study of Advanced Linux shell commands (Process management, Memory management, Networking, etc.)
2	Study of Window task manager (about its applications, processes, services, networking, performance etc.)
3	Write a program that illustrates the creation of child process using fork system call. Each child and parent Processes perform different task.
4	Write a multithreaded program to multiply two given matrices.
5	Simulate any two of the following CPU Scheduling Algorithms (One each from preemptive and non-preemptive types) : FCFS, SJF, SRTN, Round Robin, Preemptive priority, Non-preemptive priority
6	Simulate any one of the following Dynamic Memory allocation algorithms First Fit, Best Fit, Worst Fit.
7	Simulate any one of the following Page replacement algorithms: FIFO, LRU, Optimal
8	Write a program to perform Inter-Process-Communication using shared memory OR, pipes OR message queues.
9	Write a program that gives a deadlock and starvation free solution to the Dining philosophers problem using semaphores
10	Write a program to simulate Banker's Deadlock avoidance algorithm.

V SEMESTER
23IT1521: PE I-Mobile Communication

Course Outcomes :
Upon successful completion of the course the students will be 1. Understand different wireless mobile architecture. 2. Understand control mechanism and Radio Interfaces. 3. Understand the concepts of Adhoc Network. 4. Understand the need and the trend toward mobility.

Unit I: Introduction to the cellular concept	**(8 Hrs.)**
Review of radio transmission, antennas, modulation & demodulation, Radio propagation. Multiplexing in space, frequency and time, CDMA,TDMA and FDMA, Spread spectrum medium access methods, Evolution of mobile radio communication. Cellular telephone system, frequency reuse, channel assignment and handoff strategies, interference and system capacity, trunking and grade of service, improving capacity in cellular system.	
Unit II: The mobile radio environment	**(7 Hrs.)**
Causes of propagation path loss, causes of fading-long and short term, definition of sample average , statistical average, probability distribution, level crossing rate and average duration of fade, delay spread, coherence bandwidth, inter-symbol interference,	
Unit III: Mobile Radio Propagation	**(8** Hrs.)
Reflection, Diffraction, Fading. Multipath propagation. Statistical characterization of multipath fading. Diversity Techniques, Rayleigh Fading and statistical characterization, properties of Rayleigh distribution, BER in fading, narrowband vs wideband channels, characterization of multipath fading channels, choice of modulation	
Unit IV: GSM	**(8 Hrs.)**
Global system for mobile: services and features, GSM system architecture, GSM radio subsystem, GSM channel type, GSM frame structure, signal processing in GSM, introduction to CDMA digital cellular standard, Third generation wireless networks, introduction to 3G technology,4G and 5 technology and their difference	
Unit V: Introduction to Wireless Networking	**(7 Hrs.)**
Difference between wireless and fixed telephone networks, development of wireless network, traffic routing in wireless networks. Mobile IP and wireless access protocol, mobile IP, operation of mobile IP, collocated address, Registration, Tunneling, WAP Architecture, overview, WML scripts,WAP service, WAP session protocol.	
Unit VI: Wireless LAN Technology	**(7 Hrs.)**
Infrared LANs, Spread spectrum LANs, Narrow bank microwave LANs, IEEE 802 protocol, Architecture, IEEE802 architecture and services, 892.11 medium access control, 802.11 physical layer. Wireless Application Protocol: architecture, WDP,WTLS, WTP, WSP, WAE,WML scripts.	
Total Lecture	**45 Hours**

Textbooks:

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1.	Mobile Communications, J.Schiller, Pearson Education
2.	Mobile and Personal Communication Systems & Services, Raj Pandya, Prentice Hall
3.	Wireless Communications, Principles, Practice – Theodore, S. Rappaport, PHI, 2nd Edn.

Reference Books:	
1.	Mobile Ad Hoc Networking , Stefano Basagni,Marco Conti, Wiley India Edition

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MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=4R1qHE0E8lE

V SEMESTER
23IT1522: PE I: Advanced Computer Architecture

Course Outcomes :
Upon successful completion of the course the students will be 1. Analyze different computer architecture and its parallelism. 2. Apply different pipelining techniques in an application. 3. Discuss the basic concept of array processor and SIMD architecture. 4. Apply the knowledge of Multiprogramming/Multiprocessing processing for improvement of system performance 5. Analyze different data flow dependent and it effects on parallelism 6. Apply different parallelism techniques and its

Unit I	**(8 Hrs.)**
Introduction to parallel processing : memories and IO subsystem : Evolution of computer system, parallelism in uniprocessor system, parallel computer structure, architecture classification schemes, parallel processing application, Hierarchical memory structure, virtual memory system, memory allocation and , management, I/O subsystem.	
Unit II	**(8 Hrs.)**
Pipelining and vector processing : Pipeline, overlapped pipelining, instruction and arithmetic pipelining, pipelined processor, vector processing, vector processor, architecture of cray-1, parallel memory organization.	
Unit III	(**7** Hrs.)
Array Processor : SIMD array processor, (organization and inter connection networks), Parallel algorithms for array processor, SIMD matrix multiplication, parallel sorting on array processor, associative array processing, associative memory organization associative processors.	
Unit IV	**(7 Hrs.)**
SIMD Computer and Multiprocessor Architecture : Performance enhancement methods, parallel memory allocation, array processing, languages, multiprocessors, loosely and tightly coupled multiprocessor, time shared and crossbar interconnection networks, parallel memory organization, interleaved memory configuration.	
Unit V	**(8 Hrs.)**
Multiprocessing control and Data Flow Computers: Intercrosses communication mechanisms system deadlocks and protection parallel algorithms for multiprocessors, classifications of parallel algorithms data driven computing, data flow computer architecture.	
Unit VI	**(6 Hrs.)**
Evolution of Graphics Processing Units, GPU vs CPU architecture comparison, Applications of GPU computing, GPU Architecture, Introduction to Cluster Computing, Node structure: compute nodes, storage nodes, and head node, Operating systems for clusters (Linux, Windows HPC), Message Passing Interface (MPI) basics	
Total Lecture	**45 Hours**

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Textbooks:	
1.	Advanced Computer Architecture, Kai Hwang, McGraw-Hill, 2nd edition

Reference Books:	
1.	Computer Architecture and Parallel Processing, Hwang & Briggs, Mc-Graw Hill Pub, 1st edition
2.	Computer Architecture :A Quantitative Approach, John Hennessy David Patterson, Morgan Kaufmann

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2.	https://www.youtube.com/watch?v=msqxkEKFg8I

V SEMESTER
23IT1523: PE I- Digital Image Processing

Course Outcomes :
Upon successful completion of the course the students will be 1. Understand basic concepts of image processing, in the spatial and frequency domain 2. Understand basics of image representation and description. 3. comprehend the basics of color image processing, image segmentation and morphological operations on images 4. understand various algorithms for image processing and apply them on given image data

Unit I	**(7 Hrs.)**
Introduction: Fundamental Steps in Image Processing, Elements of DIP systems, Elements of Visual Perception. Fundamentals of Image processing: A Simple Image Model, Sampling and Quantization, Basic Image operations: Subtraction, Averaging, multiplication, etc., Basic Relationships between Pixels	
Unit II	**(8 Hrs.)**
Image Enhancement in the Spatial Domain: Introduction to Spatial and Frequency methods, Basic Gray Level Transformations, Histogram Equalization, Histogram Processing, Local Enhancement, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters.	
Unit III	**(8 Hrs.)**
Image Enhancement in the Frequency Domain: Introduction to the Fourier Transform, Discrete Fourier Transformation, Properties of DFT, Filtering in the Frequency Domain, Correspondence between Filtering in the Spatial and Frequency Domain, Smoothing Frequency-Domain Filters, Sharpening Frequency-Domain Filters, Homomorphic Filtering.	
Unit IV	**(8 Hrs.)**
Image Segmentation: Point Detection, Line Detection, Edge Detection, Gradient Operator, Edge Linking and Boundary Detection, Hough transform, Thresholding Region-oriented Segmentation.	
Unit V	**(7 Hrs.)**
Image Representation and description: Chain Codes, Polygonal Approximations, Signatures, Boundary Segments, Skeleton of a Region, Description: Boundary Descriptors, Shape Numbers, Fourier Descriptors, Regional Descriptors, Simple Descriptors, Topological Descriptors.	
Unit VI	**(7 Hrs.)**
Basics of morphological Image Processing, Introduction to colour image processing: colour models, pseudo colour image processing, introduction to image file formats: TIFF, JPEG, BMP, etc.	
Total Lecture	**45 Hours**

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Textbooks:	
1.	Digital Image Processing Rafael C. Gonzalez and Richard E. Woods Prentice Hall, 2007

Reference Books:	
1.	Image Processing Principles & Applications Tinku Acharya & Ajoy K. Ray Willey Inter-Science, 2005

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MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=CVV0TvNK6pk

V SEMESTER
23IT1524: PE-I: Embedded Systems

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand connections of various peripherals with microcontroller based system 2. Design embedded based system. 3. Design embedded system based on RTOS and communication protocols.

Unit I: EMBEDDED SYSTEM INTRODUCTION	**(6 Hrs.)**
Introduction to Embedded systems, Categories of embedded systems , Overview of embedded system architecture, ,Harvard vs Van Neumen architecture, Application Areas, , Specialties of embedded systems, recent trends in embedded systems, Design Challenges, Common Design Metrics, Embedded systems Design flow. Processor Technology, IC Technology, Trade-offs.	
Unit II : Embedded Hardware: Hardware Building Blocks	**(6 Hrs.)**
The Embedded Board and the Von-Neumann Model - Basic Hardware Materials: Embedded Processors - ISA Architecture Models - Internal processor design - Processor Performance - Memory - Board I/O - Board Buses - Component Interfacing.	
Unit III: Embedded Software: Device Drivers	**(7 Hrs.)**
Interrupt - Handling - Memory Device Drivers - On-board Bus Device Drivers - Examples - Embedded Operating Systems - Process - Multitasking and Process Management - I/O and File System Management.	
Unit IV : : ARM PROCESSOR	**(7 Hrs.)**
Introduction to ARM processors, Evolution of ARM processors, pipeline organization, ARM Processor cores and CPU cores. Introduction to ARM Cortex-M Processors, ARM CortexM4 processor 's architecture, Programmer's model, Special registers, Operation Modes, Memory map, Memory access attributes and overview of Interrupts and exceptions. Keil Microcontroller Development Kit for ARM, Typical program compilation flow, Sample arithmetic and logical assembly language programs	
Unit V: PROTOCOLS	**(7 Hrs.)**
Bluetooth, IEEE 802.11 and IEEE 802.16, GPRS, MODBUS CAN, I2C and USB, AMBA bus protocols, Serial Peripheral Interface (SPI), Inter-Integrated Circuit (I2C).	
Unit VI: OS for Embedded Systems	**(6 Hrs.)**
Process - Multitasking and Process Management - POSIX - OS Performance Guidelines - selecting right OS's and Board Support Packages (BSPs) - Middleware and Application Software - Development Tools for Embedded System - Embedded C programming.	
Total Lecture	**39 Hours**

Textbooks:	
1.	Tammy Noergaard, "Embedded Systems Architecture: A Comprehensive Guide for Engineers and Programmers", Second Edition, Elsevier Embedded Technology Series, Newnes Publication, 2012.
2.	Krzysztof Iniewski, "Embedded Systems: Hardware, Design, and Implementation", Wiley & Sons, Inc. Edited, 2013

			July,2023	1.00	Applicable for AY 2023-24 Onwards
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3	Raj Kamal, "Embedded Systems: Architecture, Programming and Design", Third Edition, McGraw Hill Education (India), 2014.

Reference Books:	
1.	Dr. K.V.K.K. Prasad , "Embedded / Real Time Systems", Dreamtech Publications
2.	Iyer, Gupta , "Embedded Real systems programming", TMH Publications.
3.	Steve Heath, "Embedded System Design", Neuwans Publications
4.	Jonathan,W. Valvano, " Embedded Microcomputer System Realtime Interfacing", Cenage Publications, 3 rd Edition

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=uFhDGagZzjs
2.	https://archive.nptel.ac.in/courses/106/105/106105193/

V SEMESTER
23IT1525: PE-I Graphics Design

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Understand the concept of Graphics and graphics designing
2. Understand and analyze the concept of denotative and connotative messages, process involved in making and controlling typography.
3. Understand the concepts of visual contrast, color, rhythm and pattern in design.
4. Apply concepts of Digital imaging and printing also understands basics of Photoshop.

Unit I: Fundamentals of Image Making	**(6 Hrs.)**
Introduction to Image making, Denotative Image making, Techniques of Image making Process, Generation, Iteration, image making- (Printing with an Object, Duct Tape Prints, Improvised "Light Table"), Explorations in Image making, Connotative Image making.	
Unit II: Fundamentals of Typography	**(6 Hrs.)**
Introduction to Typography, The Anatomy of Letters, Words and Spacing, Type Size: The Point System, Typesetting Text, Typefaces, Fonts and Type Families, Typeface Categories, Denotation in Type, Connotation in Type, Looking at Letterforms, Experimenting with Letterforms, Typographic Composition.	
Unit III: Fundamentals of shape and color	**(6 Hrs.)**
Introduction to Shape & Color, Graphic Shapes, Visual Contrast, Marks, Icons, and Symbols, Negative/Positive, Figure/Ground, Working with Color, The Color Wheel, Mixing Color: Paint, Print and Screen, Rhythm and Pattern.	
Unit IV: Fundamentals of compositions	**(6 Hrs.)**
Introduction to Composition, Principles of Composition, Visual Contrasts, Single Contrasts, Multiple Contrasts, Type Contrasts, Image Contrasts, Composition in a Single Image, Cropping and Hierarchy, Composition in Context.	
Unit V: Digital Imaging and Printing	**(7 Hrs.)**
Digital Imaging and Printing- Types of Digital Images, Digital image Editing, Digital Printing. Advertising Design -What is Media Planning. Campaign Design-Kinds of Campaign, Planning a Campaign, Research & Data Collection, Creative Aspects, Developing a Concept, Departments of an Advertising Agency. Integrated Methods of Advertising- Kinds of Events, Public Relations, Media, Visual Communication and its Impact.	
Unit VI: Graphic Design for Interactive Media	**(8 Hrs.)**
Graphic Design for Interactive Media-Basic Concepts, Types of Websites, The Website Development and Management Process, Graphic Design Approach, Designing Navigation **Photoshop:** Introduction to Photoshop Interface, Raster graphics & vector graphics, Image formats, Operations on image. Manipulation of Image: The marquee tool, the lasso tool, magic Wand tool, Inverting Selection, Layers, Brush tool, Eraser tool, Fill tool, Blur tool, Smudge tool, Sharpen tool, Dodge tool, Sponge tool, Darken tool.	
Total Lecture	**39 Hours**

Textbooks:

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1.	Great Graphic Design Course for Beginners
2.	Best Graphic Design Course for Beginners (CalArts)

Reference Books:	
1.	The Story of Graphic Design, for Class XI, NCERT Publication.
2.	Towards a New Age Graphic Design, A Text Book in Graphic Design for Class XII, NCERT Publication.
3.	Best Graphic Design Course for Beginners (CalArts)

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MOOCs Links and additional reading, learning, video material	
1.	https://onlinecourses.swayam2.ac.in/ntr20_ed15/preview
2.	https://www.coursera.org/learn/fundamentals-of-graphic-design

V SEMESTER
23IT1526: PE-I Mobile Operating System

Course Outcomes
Upon successful completion of the course the students will be able to 1. Compare different flavors of mobile operating system and their specific features. 2. Create an application using different controls. 3. Prepare a project which can manage data and can communicate with native application 4. Publish the designed application which can handle multiple devices with different configurations

Unit I	**(8 Hrs.)**
Mobility Technology Trends, Mobile Ecosystem Overview, Mobile Devices Overview, Mobile Development, Methodology, Wireless Networks Overview, Proximity Technologies	
Unit II	**(8 Hrs.)**
Introduction to Android: Android Overview, Introduction to activities/Fragments, Introduction to services, broadcast receivers and content providers, Android Application Structure, Source Files, Resources, Assets and Manifest. IDE Usage: Basic IDE Operation (Eclipse), Project Creation and Handling (App Creation through Wizard), Running App on AVD and Device, DDMS and Debugging. User Interface Designing-1: Layout Overview, Linear Layout, Relative Layout, Frame Layout, Widgets (UI Controls) Overview and Text View, Image View, Button	
Unit III	**(7 Hrs.)**
User Interface Designing-2: Notification Bar, Toast and DSialog, Listview, and Adapter, View Reusability, Spinner and Comples View. Broadcast Receivers: Broadcast receivers overview, Manifest Registration vs Component Registration, Unregistration, SMS Event Receiver, Boot Event Receiver and NetworkEvent Receiver. Service: Service Overview, Service Lifecycle, Service Usage Applicability and Message Binder, Action Bar and Context Menu.	
Unit IV	**(7 Hrs.)**
Data Management: Data Storage Overview, Persistent v/s Local, Shared Preferences, Internal Storage and SQLite Database, Threads and Processes: Thread, Process overview, Async Task, Loaders, Handlers, Intent: Intent, Intent Filters and Intent Resolution, Component Activations: Activity Stack, Launch Modes and Activity Flags	
Unit V	**(8 Hrs.)**
Inter Application Communication: Inter app Communication requirement overview and Intents Based. Communication with Native application: Gallery, Camera, SMS App and Contacts, Content Providers: Content Provider Overview, Need and Usage, Content Provider Structure. Network Communication: Network Communication basics and Connecting to server/request creation, Response Formats XML/JSON and Rest/Web Services. URI Permissions, Views, Triggers	
Unit VI	**(7 Hrs.)**
User Interface Designing-3: Style and Themes, View and Layout animation Application Configuration: Localization, Orientation and Config Change Handling, Handling multiple resolution devices, Device and Tablet consideration, Support Library. Application Publishing: Application	

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Signing, Application Distribution, Application Publishing, Google Play	
Total Lecture	**45 Hours**

Textbooks:	
1.	Professional Android Application Development, Reto Meier, Wiley Publishing Inc

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MOOCs Links and additional reading, learning, video material	
1.	http://digimat.in/nptel/courses/video/106106147/L38.html

V SEMESTER
23IT1527: PE-I Data Analytics and Statistics

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Understand and apply key statistical concepts
2. Conduct hypothesis testing and regression analysis
3. Analyze time series and trends
4. Perform exploratory data analysis (EDA)
5. Interpret and communicate data-driven insights effectively

Unit I	**(6 Hrs.)**
Introduction to Statistics: Descriptive vs. Inferential, Types of data and variables, Measures of central tendency and dispersion (mean, median, mode, variance, SD, IQR),Skewness, kurtosis, Basic Probability Rules, Conditional Probability & Bayes' Theorem, Discrete & Continuous Distributions: Binomial, Poisson, Uniform, Normal.	
Unit II	**(6 Hrs.)**
Sampling methods: simple random, stratified, cluster, systematic, Bias, variability, representativeness, Sampling distribution of the mean and proportion, Central Limit Theorem ,Point estimation vs. Interval estimation, Confidence intervals for means and proportions (z and t-distributions),Determining sample size.	
Unit III	**(7 Hrs.)**
Statistical hypotheses: null and alternative, Type I and Type II errors, Significance level and p-values, One-tailed vs. two-tailed tests, Z-test and t-test (1-sample and 2-sample),Chi-square tests: goodness of fit, test of independence, ANOVA: One-way analysis of variance.	
Unit IV	**(7 Hrs.)**
Correlation: Pearson and Spearman, Simple Linear Regression: Least squares estimation, Interpreting coefficients, R^2 and residual analysis, Multiple Linear Regression: Assumptions and diagnostics, Multicollinearity basics.	
Unit V	**(7 Hrs.)**
Components of a time series: trend, seasonality, cyclicity, irregularity, Time series decomposition, Smoothing methods: Moving average, exponential smoothing (concept only),Basic forecasting and visualization, Seasonality detection using plots.	
Unit VI	**(6 Hrs.)**
Exploratory Data Analysis (EDA) process, Handling missing values, outliers, data cleaning, Data transformation: normalization, standardization, Data visualization techniques: histograms, box plots, scatter plots, heatmaps, pair plots. Introduction to feature engineering.	
Total Lecture	**39 Hours**

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Textbooks:	
1.	Richard I. Levin & David S. Rubin, Statistics for Management, 7th edition Pearson Education
2.	James T. McClave, P. George Benson, and Terry Sincich, "Statistics for Business and Economics", Global Edition, Pearson.

Reference Books:	
1.	Murray R. Spiegel, John J. Schiller, R. Srinivasan Probability and Statistics, Mc Graw Hill
2.	Hands-On Exploratory Data Analysis with Python, Suresh Kumar Mukhiya & Usman Ahmed, Packt Publishing (released March/April 2020)
3.	Data Analytics Made Accessible by Anil Maheshwari, Amazon Kindle edition.

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MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=-ETQ97mXXF0
2.	https://www.youtube.com/playlist?list=PLeo1K3hjS3us_ELKYSj_Fth2tIEkdKXvV
3.	https://www.youtube.com/playlist?list=PLWKjhJtqVAblQe2CCWqV4Zy3LY01Z8aF1

SEMESTER V
23IT1529: Deep Learning

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Illustrate the fundamental concepts of deep learning, including neural networks, activation functions, and backpropagation. 2. Able to perform hyperparameter tuning. 3. Able to analyze and design neural network for real work problem. 4. Use various frameworks required for creating neural networks along with their functionalities

Unit I : Introduction and Fundamentals	**(8 Hrs.)**
Introduction to Deep Learning, Scope and evolution, Biological vs Artificial Neurons,Perceptron, MLP, Activation Functions: Sigmoid, ReLU, Softmax, Loss Functions: MSE, Cross Entropy, Gradient Descent and Backpropagation	
Unit II : Deep Neural Networks	**(8 Hrs.)**
Multi-layer architectures, Forward and backward propagation in DNNs, Overfitting & Underfitting , Regularization: Dropout, L1, L2, Batch Normalization, Introduction to Keras/TensorFlow	
Unit III: Deep Learning Model Optimization	**(8 Hrs.)**
Hyperparameter Tuning (Grid/Random Search), Learning Rate Scheduling, Early Stopping, Evaluation Metrics: Accuracy, Precision, Recall, F1-Score, AUC, Model Compression: Pruning, Quantization, Introduction to Deployment Considerations	
Unit IV: Convolutional Neural Networks	**(8 Hrs.)**
Image Data Basics (Pixels, Channels), Convolution Operations: Filters, Padding, Stride, Pooling: Max & Avg, CNN Architectures: LeNet, VGG, ResNet, Applications: Object Recognition, Face Detection	
Unit V: Recurrent Neural Networks and LSTM	**(7 Hrs.)**
Sequential Data and Time-Series, RNNs: Architecture and Challenges, LSTM, GRU: Concepts and Gates, Applications: Text Generation, Sentiment Analysis	
Unit VI: Generative Models and Transfer Learning	**(7 Hrs.)**
Autoencoders: Concept and Applications, Generative Adversarial Networks (GANs): Generator vs Discriminator, Transfer Learning: Fine-tuning Pre-trained Models (VGG, MobileNet), Applications in IT: Image Enhancement, Speech Generation	
Total Lecture	**46 Hours**

Textbooks:	
1.	Ian Goodfellow, Yoshua Bengio, and Aaron Courville – *Deep Learning*, MIT Press
2.	Francois Chollet – *Deep Learning with Python*, Manning Publications

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Reference Books:	
1.	Aurelien Geron – *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow*, O'Reilly
2.	Michael Nielsen – *Neural Networks and Deep Learning* (Online Book)
3.	Andrew Ng – *Deep Learning Specialization*, Coursera

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MOOCs Links and additional reading, learning, video material	
1.	https://onlinecourses.nptel.ac.in/e-learning/preview/noc20_cs62
2.	https://www.youtube.com/watch?v=W3_yaf3HvHU

V SEMESTER
23OE3509: Open Elective -III Consciousness Studies

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Analyze the basics of Psychology and its applications. 2. Develop knowledge about the sensory processes 3. Apply various theories of classical conditioning. 4. Integrate the theories of memory and behaviour of mind.

Unit I	**(7 Hrs.)**
An introduction to Psychology Introduction to Psychology, Definition of psychology, history, methods in Psychology, Subfields of Psychology and its applications.	
Unit II	**(6 Hrs.)**
Basic Cognitive Processes Sensory processes-general characteristics of senses, visual sense, auditory sense, other senses Perceptual organization-principles of perceptual organization, object perception and perceptual constancies, influences upon perception, extrasensory perception.	
Unit III:	**(6 Hrs.)**
Classical conditioning, theories about classical conditioning, Reinforcement and Punishment.	
Unit IV	**(6 Hrs.)**
Theories about memory, brain and memory, long term memory, forgetting.	
Unit V	**(7 Hrs.)**
Theories of Consciousness: Dualism vs. materialism, Theories by Freud, William James, and contemporary perspectives, The role of neuroscience in studying consciousness, Applications of Consciousness Studies: Role of meditation and mindfulness in enhancing awareness Applications in mental health and stress management.	
Unit VI	**(7 Hrs.)**
Brain and Behavior: Neural mechanisms underlying behaviour, Relationship between brain regions and cognitive functions Consciousness and Cognitive Processes: The interplay between attention, perception, andconsciousness, Theories of decision-making and problem-solving. Disorders of Consciousness: Conditions such as coma, vegetative state, and locked-in syndromeAdvances in medical neuroscience for consciousness recovery.	
Total Lecture	**39 Hours**

Reference Books:	
1.	Clifford T. Morgan, King, Weisz and Schopler, Introduction to Psychology, McGraw Hill Education (India) Private Limited
2.	Hilgard, Atkinson and Atkinson(1977). Introduction to Psychology. Tata McGraw Hill

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

V SEMESTER
23OE3510: Open Elective -III Psychology for Professionals

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Analyze the basics of Psychology and its applications. 2. Develop knowledge about the sensory processes . 3. Apply various theories of classical conditioning. 4. Integrate the theories of memory and behaviour of mind.

Unit I	**(6 Hrs.)**
• Overview of psychology: Definition, branches, and its significance in the workplace. • Role of psychology in professional settings, particularly IT and engineering. • Key psychological concepts: Perception, motivation, emotion, and cognition. • Case studies: Real-world applications of psychology in team management	
Unit II	**(7 Hrs.)**
• Fundamentals of team behavior: Stages of team development (Forming, Storming, Norming, Performing, Adjourning). • Group dynamics and decision-making processes. • Managing conflicts within teams: Psychological approaches to conflict resolution. • Building trust and psychological safety in teams.	
Unit III:	**(6 Hrs.)**
• Theories of leadership: Transformational vs. transactional leadership. • Emotional intelligence (EQ): Understanding and managing emotions in professional settings. • Role of empathy, active listening, and feedback in leadership. • Leadership styles and their psychological impact on teams.	
Unit IV	**(7 Hrs.)**
• Basics of user behavior: How people interact with technology. • Human-Computer Interaction (HCI): Psychological principles in design. • Behavioral economics: How biases influence user decisions. • Designing IT systems for user-centric experiences: Usability and accessibility.	
Unit V	**(6 Hrs.)**
• Understanding workplace stress: Causes, symptoms, and impact on productivity. • Coping mechanisms and stress management strategies. • Role of mindfulness, work-life balance, and resilience-building.	

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• Promoting mental health in IT work environments.	
Unit VI	**(7 Hrs.)**
• Understanding workplace ethics through psychology. • Ethical decision-making models. • Addressing workplace biases: Gender, cultural, and cognitive. • Building a culture of inclusivity and respect.	
Total Lecture	**39 Hours**

Reference Books:	
1.	Clifford T. Morgan, King, Weisz and Schopler, Introduction to Psychology, McGraw Hill Education (India) Private Limited
2.	Hilgard, Atkinson and Atkinson(1977). Introduction to Psychology. Tata McGraw Hill
3.	Organizational Behavior" by Stephen P. Robbins and Timothy A. Judge Focus on team behavior, leadership, and workplace psychology.

V Semester

23OE3511: Introduction to Sociology and Human Behavior

Course Outcomes :
Upon successful completion of the course the students will be 1. Understand the basic concepts, scope, and importance of sociology and human behavior. 2. Explain how society, culture, and socialization influence individual behavior. 3. Analyze social interaction, group behavior, and the role of social institutions in shaping conduct. 4. Apply sociological and behavioral concepts to everyday life and contemporary social issues.

UNIT I: Introduction to Sociology and Human Behavior	**(6 Hrs.)**
Meaning, nature, scope, and importance of sociology. Meaning of human behavior, its social and psychological dimensions, and the relationship between the individual and society. Sociology as the study of social life, social interaction, and patterned human conduct.	
UNIT II: Society, Culture, and Social Structure	**(7 Hrs.)**
Concepts of society, community, institution, association, social group, status, and role. Culture, norms, values, beliefs, customs, and traditions. Influence of culture and social structure on human behavior, identity, and relationships functions, Functional analysis: Functional Analysis System Technique (FAST), Case studies.	
UNIT III: Socialization and Personality	**(6 Hrs.)**
Meaning, stages, and agencies of socialization. Family, school, peer group, religion, media, and workplace as agencies of behavior formation. Personality development, self-concept, learning, imitation, identification, and internalization.	
Unit IV: Social Interaction and Group Behavior	**(7 Hrs.)**
Forms of social interaction such as cooperation, competition, conflict, accommodation, and assimilation. Primary and secondary groups, reference groups, in-groups, and out-groups. Group influence on behavior, conformity, leadership, and decision-making.	
Unit V : Individual Behavior in Society	**(6 Hrs.)**
Basic ideas of perception, motivation, attitude, learning, and emotional behavior in social life. How people respond to rules, expectations, rewards, and pressures from society. Deviance, obedience, social control, and the role of social sanctions in shaping conduct.	
UNIT VI: Social Institutions and Contemporary Issues	**(7 Hrs.)**
Human behavior in family, education, religion, economy, and political life. Social change, urbanization, technology, globalization, and media influence on behavior. Contemporary issues such as stress,	

prejudice, discrimination, alienation, and changing gender roles in modern society.	
Total Lecture	**39 Hours**

Textbooks:	
1.	Haralambos and Holborn, Sociology: Themes and Perspectives.
2.	N. Jayaram, Introductory Sociology.

Reference Books:	
1.	Bottomore, T.B., Sociology: A Guide to Problems and Literature.
2.	Zastrow and Kirst-Ashman, Understanding Human Behavior and the Social Environment

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	http://digimat.in/nptel/courses/video/109104074/L31.html

V SEMESTER

Mandatory Learning Course (MLC)

MLC2125 : YCAP5

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

(Accredited 'A++' Grade by NAAC with a score of 3.6)

Hingna Road, Wanadongri, Nagpur - 441 110



Bachelor of Technology

SoE & Syllabus 2023

6th Semester

(Department of Information Technology)

B. Tech in Information Technology

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B.TECH SCHEME OF EXAMINATION 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Information Technology)

B. Tech. in Information Technology

SoE No. 23IT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
SIXTH SEMESTER															
1	6	PC	IT	23IT1601	Design and Analysis of Algorithm	T	3	0	0	3	3	30	20	50	3
2	6	PC	IT	23IT1602	**Lab :** Design and Analysis of Algorithm	P	0	0	2	2	1		60	40	
3	6	PC	IT	23IT1603	Artificial Intelligence	T	3	0	0	3	3	30	20	50	3
4	6	PC	IT	23IT1604	**Lab :** Artificial Intelligence	P	0	0	2	2	1		60	40	
10	6	PC	IT	23IT1605	Design Thinking in Information Technology & Research Methodology	T	2	0	0	2	2	30	20	50	3
5	6	PE	IT		**Professional Elective-II**	T	3	0	0	3	3	30	20	50	3
6	6	PE	IT		**Professional Elective-III**	T	3	0	0	3	3	30	20	50	3
7	5	PE	IT		**Lab : Professional Elective - III**	P	0	0	2	2	1		60	40	
11	6	MDM	IT		**MD Minor Course-IV**	T	3	0	0	3	3	30	20	50	3
8	6	VSEC-4	IT	23IT1606	Lab : Customer Relationship Management	P	0	0	4	4	2		60	40	
9	6	STR	IT	23IT1607	Project Phase-I	P	0	0	4	4	2		60	40	
					TOTAL		**17**	**0**	**14**	**31**	**24**				

List of Mandatory Learning Course (MLC)															
1	6	HS		MLC126	**YCAP6 :**YCCE Communication Aptitude Preparation	**A**	3	0	0	3	**0**				

Professional Elective - II					
1	6	PE-II	IT	23IT1621	**PE-II :** Wireless Sensor Network
2	6	PE-II	IT	23IT1622	**PE-II :** Distributed Systems
3	6	PE-II	IT	23IT1623	**PE-II :** Neural Networks and Fuzzy Logic
4	6	PE-II	IT	23IT1624	**PE-II :** Industry 5.0
5	6	PE-II	IT	23IT1625	**PE-II :** Software Security
6	6	PE-II	IT	23IT1626	**PE-II :** Motion Graphics
7	6	PE-II	IT	23IT1627	**PE-II :** Sensors & Actuators
8	6	PE-II	IT	23IT1628	**PE-II :** Business Intellegience
9	6	PE-II	IT	23IT1629	**PE-II :** Quantum Computing
10	6	PE-II	IT	23IT1630	**PE-II :** Natural Language Processing

Professional Elective - III					
1	6	PE-III	IT	23IT1641	**PE-III :** Network Security and Cryptography
2	6	PE-III	IT	23IT1642	**PE-III : Lab :** Network Security and Cryptography
3	6	PE-III	IT	23IT1643	**PE-III :** Cloud Computing
4	6	PE-III	IT	23IT1644	**PE-III : Lab :** Cloud Computing
5	6	PE-III	IT	23IT1645	**PE-III :** Computer Vision
6	6	PE-III	IT	23IT1646	**PE-III : Lab :** Computer Vision
7	6	PE-III	IT	23IT1647	**PE-III :** Internet of Things
8	6	PE-III	IT	23IT1648	**PE-III : Lab :** Internet of Things
9	6	PE-III	IT	23IT1649	**PE-III :** Design Patterns
10	6	PE-III	IT	23IT1650	**PE-III : Lab :** Design Patterns
11	6	PE-III	IT	23IT1651	**PE-III :** Game theory
12	6	PE-III	IT	23IT1652	**PE-III : Lab :** Game theory
13	6	PE-III	IT	23IT1653	**PE-III :** Data Aquision & Hardware Interfaces
14	6	PE-III	IT	23IT1654	**PE-III : Lab :** Data Aquision & Hardware Interfaces
15	6	PE-III	IT	23IT1655	**PE-III :** Data Mining
16	6	PE-III	IT	23IT1656	**PE-III : Lab :** Data Mining
17	6	PE-III	IT	23IT1657	**PE-III :** Java Fullstack Development
18	6	PE-III	IT	23IT1658	**PE-III : Lab :** Java Fullstack Development
19	6	PE-IV	IT	23IT1661	**PE-III :** Dot Net Fullstack Development
20	6	PE-IV	IT	23IT1662	**PE-III : Lab :** Dot Net Fullstack Development
21	6	PE-IV	IT	23IT1663	**PE-III :** Generative AI
22	6	PE-IV	IT	23IT1664	**PE-III : Lab :** Generative AI
Coursera Elective					
19	6	PE-III	IT	23IT1659	**PE-III :** Mobile App Development
20	6	PE-III	IT	23IT1660	**PE-III : Lab :** Mobile App Development

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Chairperson	**Dean (Acad. Matters)**	**Date of Release**	**Version**

Applicable for AY 2023-24 Onwards

VI SEMESTER
23IT1601: Design & Analysis of Algorithms

Course Outcomes
Upon successful completion of the course the students will be able to
1. Understand asymptotic analysis of iterative and recursive algorithms, complexity of algorithms.
2. Apply important algorithmic design techniques for problem solving.
3. Analyze the performance of algorithms.
4. Synthesize and design efficient algorithms for real world problems.

Unit I	**(8 Hrs.)**
Mathematical foundations, summation of arithmetic and geometric series, recurrence relations, solutions of recurrence relations using technique of characteristic equation and generating functions.	
Unit II	**(7 Hrs.)**
Asymptotic notations of analysis of algorithms, analysing control structures, worst case and average case analysis, amortized analysis, External Sorting, lower bound proof.	
Unit III	**(8 Hrs.)**
Divide and conquer basic strategy, quick sort, merge sort, Min Max Problem, etc. Greedy method – basic strategy, application to job sequencing with deadlines problem, Knapsack Problem, minimum cost spanning trees, single source shortest path etc.	
Unit IV	**(8 Hrs.)**
Dynamic Programming basic strategy, multistage graphs, all pair shortest path, optimal binary search trees, Matrix-chain Multiplication, traveling salesman problem.	
Unit V	**(7 Hrs.)**
Connected components, Branch and bound, Backtracking basic strategy, sum of subset, 8 – Queen's problem, graph colouring, Hamiltonian cycles etc.	
Unit VI	**(7 Hrs.)**
NP-hard and NP-complete problems, basic concepts, non-deterministic algorithms, NP-hard and NP-complete, Cook's Theorem, decision and optimization problems, polynomial reduction	
Total Lecture	**45 Hours**

Textbooks:	
1.	Computer Algorithms, Horowitz, Sahani, Rajsekharan, 2nd Edition, Silicon Press
2.	Introduction to Algorithm, Thomas H. Cormen, 3rd Edition, 2009, MIT press

Reference Books:	
1.	Algorithms, S. Dasgupta, C. H. Papadimitriou, and U. V. Vazirani, 1st Edition, 2006

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1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=QEtWL4lWlL4
2.	https://www.youtube.com/watch?v=uUhOEj4z8Fo

VI Semester
23IT1602 - : Lab- Design & Analysis of Algorithms

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand asymptotic analysis of iterative and recursive algorithms, complexity of algorithms 2. Apply important algorithmic design techniques for problem solving 3. Analyse the performance of algorithms 4. Synthesize and design efficient algorithms for real world problems

List of Practical's

Sr. No.	Problem Statements
1	Implement and analyze different sorting algorithms.
2	Practical Based on Amortized Analysis.
3	Practical Based on Minimum Cost Spanning Tree.
4	Practical Based on An Activity Scheduling Problem.
5	Practical Based on Single Source Shortest Path.
6	Practical Based on Dynamic Programming.
7	Practical Based on divide and conquer.

VI SEMESTER
23IT1603: Artificial Intelligence

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Explain the basics of artificial intelligence, uninformed and informed search algorithms to solve complex problems efficiently.
2. Comprehend propositional and first-order logic to represent knowledge and perform logical inference in AI systems.
3. Explain adversarial search algorithms, approaches to deal with constraint satisfaction problems, and reasoning with uncertainty.
4. Explain reinforcement learning algorithms for performing intelligent action in real world environments
5. Apply the AI techniques and generative AI to solve complex problems efficiently.

Unit I	**(7 Hrs.)**
Introduction: -: What is AI?, History, Overview, Intelligent Agents, Performance Measure, Rationality, structure of agents, problem solving agents, Problem Formulation, searching for solutions – uniformed search.	
Unit II	**(8 Hrs.)**
Informed (Heuristic) Search and Exploration, Greedy best first search, A* search, Memory bounded heuristic search, Heuristic functions, inventing admissible heuristic functions, Local Search algorithms, Hill-climbing, Simulated Annealing.	
Unit III	**(7 Hrs.)**
Constraint Satisfaction Problems, Backtracking Search, variable and value ordering, constraint propagation, intelligent backtracking, local search for CSPs, Adversarial Search, Games, The minimax algorithm, Alpha-Beta pruning.	
Unit IV	**(8 Hrs.)**
Knowledge Based Agents: Logic, Propositional Logic, Inference, Equivalence, Validity and Satisfiability, Resolution, Forward and Backward Chaining, Local search algorithms, First Order Logic, Models for first order logic, Symbols and Interpretations, Terms, Atomic sentences, complex sentences, Quantifiers, Inference in FOL, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution..	
Unit V	**(8 Hrs.)**
Reinforcement learning: agents, environments, rewards, and Markov Decision Processes. Core algorithms: Q-learning, SARSA, Deep Q-Learning and Policy Gradient methods. Exploration vs. exploitation, RL applications in real-world systems, ethical considerations.	
Unit VI	**(7 Hrs.)**
Introduction to Generative AI : What is Generative AI, Difference between Discriminative and Generative Models, Applications of Generative AI (Text, Images, Music, Code, etc.), **Basic Architectures in Generative AI :** Variational Autoencoders (VAEs), Generative Adversarial Networks (GANs), Transformer-based Models (GPT, BERT, etc.) **Prompt Engineering Basics** (Structured vs. Unstructured Prompts), Crafting effective prompts for AI models (text, images, code), **Training and Challenges in Generative AI:** Data requirements and training process, Mode	

collapse in GANs **Ethical concerns:** Bias, Deepfakes, and Copyright Issues	
Total Lecture	**45 Hours**

Textbooks:	
1.	Russel and Norvig Artificial Intelligence a Modern Approach Pearson Education, 2nd edition
2.	Patterson Artificial Intelligence – A Practical Approach Tata McGraw Hill, 3rd edition

Reference Books:	
1.	E. Rich and K. Knight Artificial Intelligence McGraw-Hill, 2nd edition
2.	D.W Patterson Introduction to Artificial Intelligence & Expert System PHI, 2nd edition

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MOOCs Links and additional reading, learning, video material	
1.	https://nptel.ac.in/courses/106106226
2.	https://nptel.ac.in/courses/106102220

SEMESTER VI
23IT1604: Lab.: Artificial Intelligence

Course Outcomes
Upon successful completion of the course the students will be able to 1. Apply graph traversal, optimization algorithms, and heuristic search methods to solve complex computational problems. 2. Represent knowledge using languages like Prolog for solving real-world Problems.

List of Experiments

1	Python Program to Represent a graph and perform depth-first search (DFS) in AI.
2	Program to Implement Travelling Salesman Problem using Python.
3	Python Program to implement A* Search Algorithm
4	Write a Program to Implement 8-Puzzle problem using Python.
5	Program Based on Knowledge Representation with Facts and Rules using Prolog.
6	Use Prolog's logical capabilities to solve a Sudoku puzzle.
7	Create a simple Tic-Tac-Toe game with Prolong.
8	Solve the N-Queens problem using Prolog.
9	Create an expert system that diagnoses diseases based on symptoms
10	Create a simple Chabot in Prolog that can respond to user input.

VI SEMESTER
23IT1605: Design Thinking and Research Methodology

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Comprehend the foundational concepts of design thinking & research methodology
2. Identify and formulate research problems and conduct effective literature reviews and adhere to ethical research practices
3. Collect and analyze data using appropriate methods.
4. Interpret research findings and write scientific reports

Unit:1	Introduction to design thinking:	6 Hrs

Fundamental of Design Thinking: Definition, Origin and evolution of design thinking, Importance of design thinking in IT, Software and digital innovations, design thinking Vs traditional problem solving.

Five stage design process: Empathize-Understanding user through interviews, observations, Define- Framing the problem, Ideate- Brainstorming, SCAMPER, mind mapping techniques, Prototype-low fidelity and high fidelity prototyping in IT(e.g. Wireframes, mockup),

Test- Usability testing, feedback integration, agile loops.

Unit:2	Tools & Techniques:	7 Hrs

Empathy maps, customer journey maps, personas, Brainstorming, storyboarding, rapid prototyping, Wireframing with tools like Figma, Adobe XD.

Application to IT Projects: Case Studies-Design Thinking in UI/UX, app development, Cloud Systems, Agile+ Design thinking, Digital transformation projects using design thinking, Capstone Projects: Group project applying the full design thinking cycle to solve an IT challenge

Unit:3	Research Fundamentals, Research Problem and Design, Literature Review	6 Hrs

Research Fundamentals: Definition, objectives, and significance of research, Types of research: Basic, Applied, Descriptive, Analytical, Quantitative, and Qualitative.

Research Problem and Design: Criteria of good research, Techniques for defining and identifying a research problem, Features of good research problem/design, Necessity of defining the problem, Meaning of research design, Types of research design – Exploratory, Descriptive, Diagnostic, and Experimental .

Literature Review: Importance and methods of conducting a literature review, Sources of information: Journals, conferences, patents, etc., Technical reading strategies.		
Unit:4	**Sampling and Data Collection, Data Analysis and Interpretation, Technical Writing, Research Ethics**	**7 Hrs**
Sampling and Data Collection: Sampling techniques: Probability and Non-probability sampling, Characteristics of a good sample, Sample size determination, Data types: Primary and Secondary, Methods of primary data collection: Observation, Interview, Questionnaire, Schedule, Secondary data sources. Data Analysis and Interpretation: Processing and analyzing data, Statistical tools: Measures of central tendency, Dispersion, Correlation, Regression, Hypothesis testing: Null and alternative hypothesis, Type I and II errors, Use of software tools (e.g., Excel/SPSS/MATLAB for analysis), Interpretation of results. Technical Writing, Research Ethics: Publication ethics and responsibilities of researchers, Structure and components of research report, Types of technical reports and papers, Writing thesis and dissertations, Referencing and citation styles (APA, IEEE, etc.), Ethical considerations in engineering research., Plagiarism and research ethics.		
	Total Lecture Hours	**26 Hrs**

Text Books:

1. E Balgurusamy, Bindu Vijaykumar – Design Thinking: A Beginner's Perspecive. Mc Graw Hill.
2. C.R. Kothari – Research Methodology: Methods and Techniques, New Age International.
3. Ranjit Kumar – Research Methodology: A Step-by-Step Guide for Beginners, Sage Publications.

Reference Books:

1. R. Panneerselvam – Research Methodology, PHI Learning.
2. Dawson, C. – Practical Research Methods, UBS Publishers.
3. Trochim, W.M.K. – Research Methods: The Concise Knowledge Base.

VI SEMESTER
23IT1621: PE II: Wireless Sensor Network

Course Outcomes :
Upon successful completion of the course the students will be 1. Understand challenges and technologies for wireless networks and architecture and sensors 2. Describe the communication, energy efficiency, computing, storage and transmission, communication, energy efficiency, computing, storage and transmission 3. Establishing infrastructure and simulations 4. Explain the concept of programming the in WSN environment

Unit I:	**(8 Hrs.)**
OVERVIEW OF WIRELESS SENSOR NETWORKS : Single Node Architecture Hardware Components Network Characteristics unique constraints and challenges, Enabling Technologies for Wireless Sensor Networks Types of wireless sensor networks.	
Unit II	**(8 Hrs.)**
ARCHITECTURES: Network Architecture Sensor Networks Scenarios Design Principle, Physical Layer and Transceiver Design Considerations, Optimization Goals and Figures of Merit, Gateway Concepts, Operating Systems and Execution Environments introduction to Tiny OS and nesC Internet to WSN Communication.	
Unit III	**(7 Hrs.)**
NETWORKING SENSORS : MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts – SMAC, BMAC Protocol, IEEE 802.15.4 standard and ZigBee, the Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols Energy Efficient Routing, Geographic Routing.	
Unit IV	**(7 Hrs.)**
INFRASTRUCTURE ESTABLISHMENT : Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control	
Unit V	**(7 Hrs.)**
SENSOR NETWORK PLATFORMS AND TOOLS : Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node level software platforms, Node level Simulators, State centric programming.	
Unit VI	**(8 Hrs.)**
Naming and addressing : Fundamentals, address and name management, Assignment of MAC address, Distributed assignment of locally unique addresses, content based and geographic addressing. Naming and addressing :Fundamentals, address and name management, Assignment of MAC address, Distributed assignment of locally unique addresses, content based and geographic addressing.	
Total Lecture	**45 Hours**

Textbooks:

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1.	Protocols And Architectures for Wireless Sensor Networks , Holger Karl & Andreas Willig John Wiley
2.	Wireless Sensor Networks An Information Processing Approach, Feng Zhao & Leonidas J.Guibas, Elsevier
3.	Fundamentals of Wireless Sensor Networks Theory and Practice, Waltenegus Dargie Christian Poellabauer, John Wiley & Sons Publications

Reference Books:	
1.	Wireless Sensor Networks Technology, Protocols, and Applications Kazem Sohraby, Daniel Minoli, & Taieb Znati John Wiley

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MOOCs Links and additional reading, learning, video material	
1.	https://www.digimat.in/nptel/courses/video/106105160/L01.html
2.	https://www.youtube.com/watch?v=GUSrkWJ_Z2g

VI SEMESTER
23IT1622: PE VI- Distributed Systems

Course Outcomes :

Upon successful completion of the course the students will be

1. Identify the advantages and challenges in designing distributed algorithms for different primitives like mutual exclusion, deadlock detection, agreement, etc.
2. Design and develop distributed programs using sockets and RPC/RMI.
3. Differentiate between different types of faults and fault handling techniques in order to implement fault tolerant systems.
4. Analyze different algorithms and techniques for the design and development of distributed systems subject to specific design and performance constrain

Unit I	**(6 Hrs.)**
Architecture of Distributed Systems: Characteristics of Distributed System, Motivation, challenges /Issues in the design & development of Distributed System. System Models: Architecture Model, System Architecture, Types of Architectural Model: Client server model, Search engine, Proxy server & caches, Variation on client server model: mobile code, mobile agents. Fundamental Models: Interaction model, failure model, Security model.	
Unit II	**(6 Hrs.)**
Distributed Objects & Distributed file system :Inter-process communication, Sockets, middle ware, Group communication, and Remote procedure calls. CORBA, RMI, Distributed file system, Name services, Directory services, File Service types, download/upload model, File sharing semantics, session semantics, Server design: stateless & stateful server, Cache update policies. Case studies on Distributed file system: NFS, AFS.	
Unit III	**(7 Hrs.)**
Theoretical Foundations: Inherent limitations of distributed systems, Timing issues, clock synchronization, Network time protocol, Lamport's logical clocks, Vector clocks, Casual ordering of messages, Global state, Cuts of Distributed computation, Termination detection.	
Unit IV	**(7 Hrs.)**
Distributed Mutual Exclusion: Leader election: Chang Robert Ring based leader election algorithm, Bully algorithm. Classification of mutual exclusion algorithms, Requirements and performance measures of mutual exclusion algorithms, Non Token Based Algorithms: Lamport's Algorithm, The Ricart-Agrawala Algorithm, Maekawa's Algorithm. Token Based Algorithms: Suzuki-Kasami's Algorithm, Raymond's Algorithm, Comparative performance analysis.	
Unit V	**(7 Hrs.)**
Distributed Deadlock Detection & Agreement Protocols: Resource vs Communication deadlocks, graph theoretic model, deadlock prevention, avoidance, detection, Issues in deadlock detection and resolution, Centralized deadlock detection algorithms, distributed deadlock detection algorithms Agreement Protocols: Synchronous vs. asynchronous computations, model of process failures, authenticated vs. non-authenticated messages. A classification of Agreement problems, Solutions to Byzantine Agreement problem, Applications of Agreement algorithms.	
Unit VI	**(6 Hrs.)**
Failure recovery and Fault Tolerance: Classification of failures. Backward and forward error recovery, Basic	

approaches of backward error recovery, recovery in concurrent systems, consistent set of checkpoints, synchronous check pointing and recovery, asynchronous check pointing and recovery. Fault Tolerance: Atomic actions and committing, commit protocols, non-blocking commit protocols, Voting protocols, Dynamic voting protocols, Dynamic Vote Reassignment Protocols.
Total Lecture 39 Hours

Textbooks:	
1.	Advanced Concepts In Operating Systems: Distributed, Multiprocessor and Database Operating Systems, Mukesh Singhal and Niranjan G. Shivaratri McGraw Hill
2.	Distributed Operating Systems Concepts and Design G Coulouris, Jean Dollimore, Tim Kindberg Addison Wesley

Reference Books:	
1.	Distributed Algorithms **Nancy Lynch** Morgan Kaufman
2.	Modern Operating Systems **Andrew S. Tanenbaum** Pearson Education

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MOOCs Links and additional reading, learning, video material	
1.	https://www.digimat.in/nptel/courses/video/106104182/L01.html
2.	https://archive.nptel.ac.in/courses/106/102/106102237/

VI SEMESTER
23IT1623: PE II- Neural Network and Fuzzy Logic

Course Outcomes :
Upon successful completion of the course the students will be able to 1. To understand the working of Neural Networks as pattern classifier. 2. Comprehend the Neural Networks as means for computational learning and to analyze the basic network architectures and algorithms. 3. Effectively use existing software tools to solve real problems using a neural network approach. 4. Apply the basics of fuzzy sets, its operations, fuzzy logic and fuzzy relation to model linguistic knowledge in human experts and to build systems based on fuzzy control and to understand the basics of fuzzy inference and reasoning.

Unit I	**(7 Hrs.)**
Neural Networks: History, overview of biological neuro-system, mathematical models of neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, Learning Tasks, Applications of Artificial Neural Networks	
Unit II	**(8 Hrs.)**
Feed forward and feedback networks, Single-layer perceptron classifiers, Discriminant functions, linear machine and minimum distance classification, training and classification using the discrete perception - ANN training Algorithms-Single layer perceptron, multi-layer perceptron, RDPTA algorithm	
Unit III	**(7 Hrs.)**
Multilayer feed forward networks, linearly non-separable pattern classification, delta learning rule, Feed forward recall and error back-propagation training, Hopfield learning algorithm, Self-organizing Map, Deep Learning	
Unit IV	**(7 Hrs.)**
Fuzzy Logic: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation. Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.	
Unit V	**(8 Hrs.)**
Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations. Application of Fuzzy Logic: Medicine, Economics etc.	
Unit VI	**(8 Hrs.)**
Implementing fuzzy IF-THEN rules, Introduction of Neuro-Fuzzy Systems, Architecture of Neuro Fuzzy Networks, Hybrid neural network	
Total Lecture	**45 Hours**

Textbooks:	
1.	John Hertz, Anders Krogh, Richard Palmer Introduction to the theory of Neural Computation Addison Wesley
2.	Timothy Ross Fuzzy Logic with Engineering Applications McGraw-Hill

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Reference Books:	
1.	Roger Jang, Tsai Sun, EijiMizutani Neuro-Fuzzy and Soft Computing: A computational Approach to Learning & Machine Intelligence PHI
2.	George J. Klir and Bo Yuan Fuzzy sets and Fuzzy logic, Theory and Applications Prentice Hall
3.	R.A. Aliev, R.R. Aliev Soft Computing and Its Applications World Scientific
4.	Kishan Mehrotra, C. K. Mohan, S. Ranka Elements of Artificial Neural Networks Penram International Publishing (India)
5.	Bar Kosko Neural Networks and Fuzzy Systems Prentice-Hall
6.	B. Yegnanarayana Artificial Neural Network PHI
7.	Simon Haykin Neural Networks: A Comprehensive Foundation PHI

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MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=xwUKQcT1bKc&list=PLbRMhDVUMngeASctgzkLEIpgFNZmWwqRl

VI SEMESTER
23IT1624: PE II- Industry 5.0

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Demonstrate the understanding and need of Industry 5.0.
2. Employ the concepts of Industry 5.0 in practical world for setting up industry using latest technology.
3. Focus on the various systems used in a manufacturing plant and study their role in an Industry 5.0 world
4. Compile the information regarding opportunities, challenges brought about by Industry 5.0 and how organizations and individuals should prepare to reap the benefits

Unit I	**(8 Hrs.)**
Introduction, Benefits, Downside Technologies, How will Industry 4.0 help the Supply Chain? ,How Will the Industry 4.0 Affect the Future of Work?, Which Jobs Are Most Likely to Be Affected? ,Jobs that are Less Likely to be Affected ,Recognizing the Impact of Industry 4.0 on Society and Individuals, Human-centricity, Sustainability, Resilience	
Unit II	**(7 Hrs.)**
Human-Robot Interaction, What would Industry 5.0 mean for Human Workforce, How Industry 5.0 Will Affect Manufacturing Systems, Concept of Industry 4.0 and 5.0, Literature review, Relation with the concept of Society 5.0, Research and Investigation evidence base, Defining Industry 5.0, How to Get Ready for Industry 5.0, Human-centric approach, New role for the industry worker, Safe and inclusive work environment, Skills, up-skilling and re-skilling	
Unit III	**(7 Hrs.)**
Concept of Industry 4.0 and 5.0, Literature review, Relation with the concept of Society 5.0, Research and Investigation evidence base, Defining Industry 5.0, How to Get Ready for Industry 5.0 Cyber Physical Systems and Next Generation Sensors, Collaborative Platform and Product Life-cycle Management, Augmented Reality and Virtual Reality, Introduction to Artificial Intelligence, Big Data and Advanced Analysis. IIoT-Business Models, IIoT Reference Architecture, Industrial IoT- Layers: IIoT Sensing, IIoT Processing, IIoT Communication, IIoT Networking.	
Unit IV	**(8 Hrs.)**
The (R) evolutionary Foundations of Industry 5.0, Human-centric approach, New role for the industry worker, Safe and inclusive work environment, Skills, up-skilling and re-skilling IIoT case studies, Big Data Analytics in IIoT IIoT Analytics using machine learning, deep learning, and data sciences Cloud computing in IIoT Fog Computing in IIoT Data Management with Hadoop Data Centre Networks Software Defined Networks (SDN) in IIoT Security in IIoT.	
Unit V	**(7 Hrs.)**
A More Human-Centric Approach to Emerging Technologies ,Attracting and retaining talents, Resource efficiency for sustainability and competitiveness, Increased resilience, advantages and disadvantages of industry 5.0 Security in IOT: Introduction, Purpose, Issues, Challenges. IOT Threats to Individual and Organizations, Challenges to Secure IOT Development, Recommended Security Controls. Cybersecurity and IOT. Layered	

Security Protections to Defend IOT Assets.	
Unit VI	**(8 Hrs.)**
The Evolution of More Beneficial Outcomes , Human-centricity, Sustainability, Resilience, Next steps, Mapping Of Past And On-Going Projects, case study, Application domain: Milk Processing and Packaging Industries, Manufacturing Industries, Virtual Reality Lab, Steel Technology Lab. Facility Management, Oil, chemical and pharmaceutical industry, Applications of UAVs in Industries. Facility Management.	
Total Lecture	**45 Hours**

Textbooks:	
1.	Industry 5.0, European Commission, First edition., January 2021

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MOOCs Links and additional reading, learning, video material	
1.	https://www.digimat.in/nptel/courses/video/106105195/L01.html

VI SEMESTER
23IT1625: PE II- Software Security

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand the security challenges in software systems 2. Apply threat modeling techniques such as STRIDE, DREAD, and OCTAVE to identify and assess software security risks. 3. Identify and analyze common software vulnerabilities 4. Assess software security using Static Application Security Testing (SAST) techniques

Unit I	**(7 Hrs.)**
The security problems with software, use cases of vulnerable software and associated losses, Introduce software assurance, Secure Software Development Life Cycle.	
Unit II:	**(6 Hrs.)**
Threat modeling for software, STRIDE and DREAD models for threat modelling, OCTAVE model for threat modelling.	
Unit III	**(7 Hrs.)**
Software Vulnerabilities: Common Weakness Enumeration (CWE) and Bugs Framework (BF), the CWE and BF vulnerability framework, 6 categories of software vulnerabilities with example.	
Unit IV	**(7 Hrs.)**
Static Application Security Testing (SAST): static code analysis techniques, Describe test cases for software vulnerability analysis, tools for static analysis of software, Evaluate software security and vulnerabilities using different static analysis tools.	
Unit V	**(7 Hrs.)**
Coordinated Vulnerability Disclosure: the Coordinated Vulnerability Disclosure process, steps in the Coordinated Vulnerability Disclosure Process: Collection, 2) Analysis, 3) Mitigation Coordination, 4) Application of Mitigation, 5) Disclosure, the integration of the Coordinated Vulnerability Disclosure process into the SDLC.	
Unit VI	**(6 Hrs.)**
Regulations on Software Assurance and Security, the regulations for software, impact of regulations: 1) HIPAA, 2) FERPA, and 3) GDPR. ,Study the impact of these regulations on software with case studies	
Total Lecture	**39 Hours**

Reference books:	
1.	Software Security: Building Security In" by Gary McGraw, Addison-Wesley Professional,1st Edition, November 21, 2006
2.	"Threat Modeling: Designing for Security" by Adam Shostack, Wiley publication, 1st Edition
3.	The Art of Software Security Assessment: Identifying and Preventing Software Vulnerabilities" by Mark Dowd, John McDonald, and Justin Schuh, Publisher: Addison-Wesley Professional, 1st Edition

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MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=R4VGU8afp7Q

SEMESTER VI
23IT1626: PEII: Motion Graphics

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Understand and apply foundational principles of motion graphics and design.
2. Demonstrate proficiency in industry-standard motion graphics software and tools.
3. Integrate visual effects, 3D elements, and sound design to create comprehensive motion graphics projects.
4. Plan, develop, and present a complete motion graphics project, showcasing the ability to manage a project from concept to final product.

Unit I: Foundations of Motion Graphics and Design Principles	**(8 Hrs.)**
Introduction to Motion Graphics: Definition and scope, Historical overview and evolution. - Principles of Animation: The twelve principles of animation, Timing and spacing, Key frames and tweening. - Design Principles for Motion Graphics: Composition and layout, Color theory and application, Typography in motion graphics.	
Unit II: Storyboarding and Planning for Motion Graphics	**(8 Hrs.)**
- Concept Development: Idea generation and brainstorming. - Storyboard Creation: Visualizing and organizing concepts. - Scriptwriting for Motion Graphics: Crafting scripts for effective storytelling.	
Unit III: Industry-Standard Software Basics	**(7 Hrs.)**
- Introduction to Motion Graphics Software: Overview of industry-standard tools (e.g., Adobe After Effects, Cinema 4D), Interface and basic functionalities. - Basic Techniques in Motion Graphics Software: Creating and managing compositions, Working with layers and masks, Basic animation techniques. -Introduction to unity software : Basics of Unity, Unity vs. other game engines(Unreal, Godot,etc)	
Unit IV: Advanced Motion Graphics Techniques	**(7 Hrs.)**
- Advanced Techniques in Motion Graphics Software: Effects and presets, Motion tracking and stabilization, Expressions and automation. - 3D Motion Graphics: Introduction to 3D concepts, Integrating 3D elements with 2D compositions, Lighting and rendering techniques.	
Unit V:Integration of Visual Effects, 3D Elements, and Sound Design	**(8 Hrs.)**
Visual Effects (VFX): Basics of visual effects, Compositing techniques, Green screen and Chroma keying. - 3D Motion Graphics: Advanced 3D techniques, Texturing and shading, Camera movement and scene management. - Sound Design and Integration: Basics of sound design, Synchronizing audio with visuals, Audio effects and enhancement	
Unit VI: Advanced Concepts and Trends in Motion Graphics	**(7 Hrs.)**
Exploration of Advanced Motion Graphics Trends: Emerging styles, techniques, and tools in motion graphics. - Interactive Motion Graphics: Creating user-engaging graphics using interactive elements. - Innovations in 3D Motion Graphics: Real-time rendering, virtual production techniques, and advanced texturing.	

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Total Lecture	**45 Hours**

Textbooks:	
1.	The Animator's Survival Kit" by Richard Williams
2.	"Motion Graphics: Principles and Practices from the Ground Up" by Ian Crook and Peter Beare
3.	After Effects Apprentice: Real-World Skills for the Aspiring Motion Graphics Artist" by Trish and Chris Meyer

Reference Books:	
1.	"The Art of Motion: Motion Graphics Design Projects and Techniques" by Austin Shaw
2.	"Creating Motion Graphics with After Effects" by Chris and Trish Meyer
3.	"Motion Graphic Design: Applied History and Aesthetics" by Jon Krasner

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=5tQ0hf2SCeo

SEMESTER VI
23IT1627: PEII: Sensors & Actuators

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Analyze and select appropriate sensory devices and actuators, and interface them to computer systems for monitoring and control purposes.
2. Describe the main features of different sensors and actuators, understanding their relative merits and appropriate applications.
3. Identify and compute instrument rating parameters.
4. Apply methods of estimations from measurements to well-defined problems

Unit I	**(7 Hrs.)**
Introduction to Sensors and Actuators: Definitions and classifications of sensors and actuators, Differences between sensors, transducers, and actuators, Overview of energy transformation principles, Characteristics and selection criteria: range, resolution, sensitivity, accuracy, linearity, repeatability, response time, and impedance,Signal transmission methods: pneumatic, hydraulic, and electronic signals.	
Unit II	**(7 Hrs.)**
Unit II: Sensor Technologies and Applications-Physical sensors: principles and applications of potentiometers, strain gauges, and accelerometers, Chemical sensors: operating principles and applications in environmental monitoring and medical diagnostics, Optical sensors: photodetectors and their applications, Temperature sensors: thermistors, thermocouples, and resistance temperature detectors (RTDs).Proximity and displacement sensors: inductive, capacitive, and ultrasonic sensors.	
Unit III	**(7 Hrs.)**
Actuator Technologies and Applications -Classification and principles of actuators: electromagnetic, piezoelectric, and electrostatic actuators, Electric actuators: DC and AC motors, stepper motors, and servomotors, Hydraulic and pneumatic actuators: operating principles and applications. Microactuators: design and applications in microsystems, Selection criteria for actuators based on application requirements.	
Unit IV	**(6 Hrs.)**
Micro fabrication Techniques for Sensors and Actuators -Overview of microfabrication processes: photolithography, etching, and thin-film deposition. Chemical Vapour Deposition (CVD) and Physical Vapour Deposition (PVD) techniques. Fabrication of microsensors and microactuators: design considerations and process steps. Applications of micro fabricated sensors and actuators in various industries.	
Unit V	**(6 Hrs.)**
Interfacing and Signal Conditioning -Basics of signal conditioning: amplification, filtering, and analog-to-digital conversion. Interfacing sensors and actuators with microcontrollers and microprocessors. Design of signal conditioning circuits for different types of sensors. Noise reduction techniques and shielding methods. Case studies on sensor and actuator integration in mechatronic systems.	
Unit VI	**(6 Hrs.)**
Simulation, Characterization, and Calibration-Introduction to simulation tools for sensor and actuator modeling. Performance characterization: static and dynamic parameters. Calibration methods and standards for	

sensors and actuators. Reliability and testing procedures. Overview of standards and protocols related to sensors and actuators.	
Total Lecture	**39 Hours**

Textbooks:	
1.	Clarence W. de Silva, Sensors and Actuators: Control Systems Instrumentation, CRC Press, 2007.
2.	Nathan Ida, Sensors, Actuators, and Their Interfaces: A Multidisciplinary Introduction, SciTech Publishing, 2014.

Reference Books:	
1.	Robert H. Bishop, Mechatronic Systems, Sensors, and Actuators: Fundamentals and Modeling, CRC Press, 2007.
2.	Jacob Fraden, Handbook of Modern Sensors, Springer.

MOOCs Links and additional reading, learning, video material	
1.	NPTEL Course on Sensors and Actuators: https://onlinecourses.nptel.ac.in/noc19_ee41/preview
2.	Lecture notes on Actuators and Sensors in Mechatronics: https://engineering.nyu.edu/mechatronics/Control_Lab/Criag/Craig_RPI/SenActinMecha/Comprehensive.pdf

VI SEMESTER
Code (23IT1628) Subject Name: PE II- Business Intelligence

Course Outcomes :

Upon successful completion of the course the students will be

1. Assemble BI as a Process, identify its application in various domains and functional area, its roles and responsibilities, Identify functions of building blocks in N_ tier BI ecosystem, Identify different stages in Lifecycle of a BI project, Differentiate between traditional BI and self-service BI (PO1-2)
2. Apply SQL as a universal language for BI (PO23)
3. Model a business scenario; identify the metrics, indicators, various dimensions, and aggregation strategies and make recommendations to achieve the business goal (PO3-3)
4. Obtain hands on experience with some popular BI software for analysis, reporting, visualization of results

Unit I	**(7 Hrs.)**
Introduction to Business Intelligence What is business intelligence, why do we need BI, EIS, MIS, DSS& BI, information pyramid-data, information, Knowledge & intelligence? Basis For operational, tactical & strategic decision making, OLTP vs. OLAP, Requirement gathering in BI through business question BI in various domains and functional area.	
Unit II	**(7 Hrs.)**
SQL the universal language for Business Intelligence ,Introduction to RDBMS, Language for retrieving data from a database, various clauses in a SQL retrieving data from multiple tables- joins filtering, sorting & grouping datasets, Introduction to DDL & DML statements, various built- in functions in SQL, Use of sub- queries, data dictionary and dynamic SQL.	
Unit III	**(7 Hrs.)**
Principles of Dimensional modeling ,Foundation for fact based decision making, star and snowflake schema, Pros& cons of the star/snowflake schema dimensional model, Slowly changing dimension tables, Fact-less fact strategy, Time dimension.	
Unit IV	**(8 Hrs.)**
Business Intelligence system architecture Need for enterprise class business intelligence infrastructure, The BI ecosystem, Building blocks of a n- tier BI system-servers & communication protocols, The central repository-metadata, Information consumption user interfaces-desktop vs. web vs. Mobile. Open architecture, Scalability, performance in BI-in memory analytics.	
Unit V	**(8 Hrs.)**
BI Project Lifecycle Typical BI project lifecycle, Requirements gathering & analysis-functional & non- functional requirements, reports and dashboards design- mock – up and storyboarding, Testing in a BI project, BI project deployment, Post production support, Applications of BI, BI best practices.	
Unit VI	**(8 Hrs.)**
Self-service Analytics What is Self-service Analytics, What are the use cases of self-service analytics, Business Paradigm vs IT paradigm and the Paradigm Shift with self-service analytics, Challenges of Self-service	

Analytics, Introduction to MicroStrategy Desktop – Overview.	
Total Lecture	**45 Hours**

Textbooks:	
1.	Ralph Kimball and Margy Ross, Data Warehousing ETL toolkit, Indian edition.
2.	R. N. Prasad, Seema Acharya, Fundamentals of Business Analytics2nd edition
3.	Business Intelligence: The Savvy Manager's Guide,2nd Edition

Reference Books:	
1.	Mike Biere, Business intelligence for the enterprise, IBM

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=Ol8D69VKX2k
2.	https://www.youtube.com/watch?v=4nEr2Z2tItg
3.	https://www.youtube.com/watch?v=-Bwiv5EGucs

VI Semester
23IT1629: PE II Quantum Computing

Course outcomes:
Upon completion of this course the student will be able to: 1. Understand the concept behind quantum physics and the mathematical computations lies in it. 2. Explain the postulates and representation of a Qubit. 3. Explain the different basis in Quantum phenomena and its measurements. 4. Explain the working model of Quantum computing as teleportation and function finding 5. Explain the various factors that affect Qubit and handling methods

Unit I Physical Properties of Quantum Particles and basic Mathematics of Quantum Computing	**6(Hrs)**
Physical properties: Double Slit Experiment; Light: Particle Vs Wave; Heisenberg Uncertainty Principle. Linear Algebra: Vector spaces – basis; Inner product; Outer product; Tensor product; Linear operators.	
Unit II Quantum Mechanics for Quantum Computing	**6(Hrs)**
Review of postulates, Bloch sphere, Single qubit states and gates, superposition; Two Qubit States and Gates - Bell States, Entanglement, CNOT gate, Phase oracles, Phase kickback, Entanglement generation	
Unit III Notation and Basis in QC Quantum gates and circuits	**6(hrs)**
Detailed exposure of one and two qubit gates and states, Examples of Dirac's notation for quantum computing, Computational Basis, Orthonormality, Pauli Gates, Hadamard and Phase Gates- building quantum circuits.	
Unit IV : Fundamental Algorithms in QC-1	**8(Hrs)**
Teleportation Algorithm, Deutsch–Josza Algorithm, Grover search algorithm: Problem definition, Amplitude amplification, Grover oracle, diffuser, multiple solutions in the search space.	
Unit V: Fundamental Algorithms in QC-2	**8(Hrs)**
Quantum Fourier Transform (QFT), and efficient representation of QFT as a quantum circuit. Application of the QFT to enable Quantum Phase Estimation (QPE). Order-finding problem – eigenvalue estimation approach to order finding – Shor's algorithm for order finding/factoring.	
UNIT-VI: Measurements and Errors	**8(Hrs)**
Computational complexity – black-box model – lower bounds for searching – general black-box lower bounds – polynomial method – block sensitivity – adversary methods – classical error correction – classical three-bit code – fault tolerance – quantum error correction – three- and nine-qubit quantum codes – fault-tolerant quantum computation.	
Total Lectures :42	

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

Reference Books :
1.Qiskit basic Quantum Computation course - https://qiskit.org/learn/intro-qc-qh/
2. Kasirajan, Venkateswaran. Fundamentals of quantum computing. Springer International Publishing, 2021.
3. Chris Bernhardt, Quantum Computing for Everyone, The MIT Press, Cambridge, 2020
4. Nielsen, Michael A., and Isaac L. Chuang, "Quantum Computation and Quantum Information" Cambridge University Press (5 April 2013)

Text Book	
1.	Chuck Easttom, "Quantum Computing Fundamentals", 1st edition, Published by Addison-Wesley Professional (June 1st 2021)
2.	2 Qiskit TextBook - https://qiskit.org/textbook/preface.html (2022)

VI SEMESTER
23IT1630: PE II: Natural Language Processing

Course Outcomes
Upon successful completion of the course the students will be able to
1. Understand approaches to syntax and semantics in NLP. 2. Understand the concepts behind n-gram models. 3. Understand approaches to POS tagging, Word sense disambiguation, summarization and information retrieval within NLP. 4. Understand machine learning techniques used in NLP, including hidden Markov models.

Unit I	**(6 Hrs.)**
Introduction: What is Natural Language Processing, Brief history of the NLP, Applications of NLP, Challenges for NLP, introduction to word tokenization, sentence segmentation, stemming, word normalization.	
Unit II	**(6 Hrs.)**
Language Models: The role of language models. Simple N-gram models. Estimating parameters and smoothing. Evaluating language models.	
Unit III	(**6** Hrs.)
Part Of Speech Tagging and Sequence Labeling: Lexical syntax. Hidden Markov Models.	
Unit IV	**(7 Hrs.)**
Word sense Disambiguation: Supervised and unsupervised methods.	
Unit V	**(7 Hrs.)**
NLP and Information retrieval and ranked information retrieval, word net and other corpus for NLP.	
Unit VI	**(7 Hrs.)**
Machine translation and automatic text summarization.	
Total Lecture	**39 Hours**

Textbooks:	
1.	Speech and Language processing, Daniel Jurafsky and James H. Martin (ISBN13: 978-0131873216), 2nd edition, Prentice Hall, 2008.
2.	Introduction to Information Retrieval, Christopher Manning, Prabhakar Raghavan, and Hinrich Schuetze, 3rd edition, Cambridge University Press, 2008

Reference Books:	
1.	Natural Language Processing with Python, Steven Bird, ewan Klein, and Edward Loper, Reilly Media, 2009, First edition

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

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1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=02QWRAhGc7g
2.	https://kristujayanti.digimat.in/nptel/courses/video/106101007/L01.html

VI SEMESTER
23IT1641: PE-III: Network Security & Cryptography

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Understand cryptography and network security concepts and application
2. Apply security principles to system design
3. Identify and investigate network security threat
4. Analyze and design network security protocols

Unit:1	**Introduction**	**8 Hrs**
Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies – Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography).- Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.		
Unit:2	**Symmetric cryptography**	**7Hrs**
Algebraic structures – Modular arithmetic-Euclid's algorithm- Congruence and matrices – Groups, Rings, Fields-Finite fields- SYMMETRIC KEY CIPHERS: SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis – Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Advanced Encryption Standard – RC4 – Key distribution.		
Unit:3	**Public key cryptography**	**8 Hrs**
Mathematics of asymmetric key cryptography: Primes – Primality Testing – Factorization – Euler's totient function, Fermat's and Euler's Theorem - Chinese Remainder Theorem – Exponentiation and logarithm - Asymmetric key ciphers: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange - ElGamal cryptosystem – Elliptic curve arithmetic-Elliptic curve cryptography.		
Unit:4	**Message authentication and integrity**	**7 Hrs**
Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA –Digital signature and authentication protocols – DSS- Entity Authentication: Biometrics, Passwords, Challenge Response protocols- Authentication applications – Kerberos, X.509		
Unit:5	**Security practice and system security**	**7 Hrs**
Authentication applications-Kerberos, Directory authentication service, E-mail security-pretty good privacy, S/MIME, IP security-overview, architecture, authentication header, encapsulating security pay load, combining security associations, key management		
Unit :6	**Web security**	**8 Hrs**
Web security-requirements, secure sockets layer, secure electronic transaction, network management security-SNMP, System security-intruders, viruses and related threats, firewall-design principles, trusted systems.		
Total		**45 Hrs**

Textbooks:

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

1.	Cryptography and Network security Principles and Practices, William Stallings, 4th, Pearson/PHI.

Reference Books:	
1.	Introduction to Cryptography with coding theory" Wade Trappe, Lawrence C Washington 3rd Pearson .
2.	Modern Cryptography: Theory and Practice, by Wenbo Mao, Prentice Hall PTR.
3.	Network Security Essentials: Applications and Standards, by William Stallings. Prentice Hall.
4.	Cryptography: Theory and Practice by Douglas R. Stinson, CRC press.

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1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=AN5I6fFxyfs
2.	https://www.youtube.com/watch?v=w0LQh0vCeqI

VI SEMESTER

23IT1642: PE-III: Lab-Network Security & Cryptography

Course Outcomes :
Upon successful completion of the course the students will be able to
1. Understand cryptography and network security concepts and application
2. Apply security principles to system design
3. Identify and investigate network security threat
4. Analyze and design network security protocols

Experiments based on theory syllabus

VI SEMESTER
23IT1643: PE-III - Cloud Computing

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand different computing paradigm, analyze and apply cloud computing services, deployment model for building cloud. 2. Apply concepts and techniques in cloud computing. 3. Analyze the problems and apply design considerations for cloud application. 4. Design the appropriate cloud computing solutions for building cloud applications.

Unit I	**(7 Hrs.)**
Overview of Computing Paradigm, Recent trends in Computing, Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing, Evolution of cloud computing, Business driver for adopting cloud computing, Introduction to Cloud Computing, Cloud Computing (NIST Model), History of Cloud Computing, Cloud service providers, Properties, Characteristics & Disadvantages of Cloud Computing, Benefits of Cloud Computing, Role of Open Standards.	
Unit II	**(7 Hrs.)**
Cloud Computing Architecture, Cloud computing stack, Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services, Service Models (XaaS), Infrastructure as a Service(IaaS), Platform as a Service(PaaS), Software as a Service(SaaS). Deployment Models, Public cloud Private cloud, Hybrid cloud, Community cloud.	
Unit III	**(6 Hrs.)**
Virtualization Technology: Fundamental concepts of compute, storage, networking, desktop and Application virtualization. Types of Virtualization, Virtualization benefits, server virtualization, Block and file level storage virtualization, Hypervisors, Hypervisor management software, Infrastructure Requirements, Virtual LAN (VLAN) and Virtual SAN (VSAN) and their benefits.	
Unit IV	**(6 Hrs.)**
Service Management in Cloud Computing, Service Level Agreements(SLAs), Billing & Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling: Benefitting enormously, Managing Data: Looking at Data, Scalability & Cloud Services, Database & Data Stores in Cloud, Large Scale Data Processing	
Unit V	**(7 Hrs.)**
Cloud Security, Infrastructure Security: Network level security, Host level security, Application level security, Data security and Storage: Data privacy and security Issues, Jurisdictional issues raised by Data location, Identity & Access Management, Access Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations	
Unit VI	**(6 Hrs.)**
Case Study on Open Source & Commercial Clouds: Google App Engine, Microsoft Azure, Amazon EC2.	
Total Lecture	**39 Hours**

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

Textbooks:	
1.	Barrie Sosinsky, Cloud Computing Bible Wiley-India, 2010
2.	Rajkumar Buyya, James Broberg, Andrzej M. Goscinski Cloud Computing: Principles and Paradigms WileY, 2011.

Reference Books:	
1.	Nikos Antonopoulos, Lee Gillam, Cloud Computing: Principles, Systems and Applications, Springer, 2012
2.	Ronald L. Krutz, Russell Dean Vines Cloud Security: A Comprehensive Guide to Secure Cloud Computing Wiley-India, 2010
3.	Kumar Saurabh Cloud Computing Wiley Pub

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MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=lOh2xUACaU&list=PLShJJCRzJWxhz7SfG4hpaBD5bKOloWx9J&index=3
2.	https://www.youtube.com/watch?v=4xrYN2Ecmas&list=PLShJJCRzJWxhz7SfG4hpaBD5bKOloWx9J&index=5

VI SEMESTER
23IT1644: Lab: PE-III - Cloud Computing

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand different computing paradigm, analyze and apply cloud computing services, deployment model for building cloud. 2. Apply concepts and techniques in cloud computing. 3. Analyze the problems and apply design considerations for cloud application. 4. Design the appropriate cloud computing solutions for building cloud applications.

Experiments Based on Theory Contents Covered

VI SEMESTER
23IT1645: PE-III - Computer Vision

Course Outcomes
Upon successful completion of the course the students will be able to 1. understand and explain image processing in the spatial and frequency domain 2. understand and apply image and video processing knowledge for solving real world problems 3. develop Computer Vision applications using OpenCV

Unit I	**(7 Hrs.)**
Digital Image Formation and low-level processing Overview and State-of-the-art, Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, etc; Fourier Transform, Convolution and Filtering, Image Enhancement, Restoration, Histogram Processing.	
Unit II	**(7 Hrs.)**
Depth estimation and Multi-camera views Perspective, Binocular Stereopsis: Camera and Epipolar Geometry; Homography, Rectification, DLT, RANSAC, 3-D reconstruction framework; Auto-calibration.	
Unit III	**(8 Hrs.)**
Feature Extraction Edges - Canny, LOG, DOG; Line detectors (Hough Transform), Corners - Harris and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis- Image Pyramids and Gaussian derivative filters, Gabor Filters and DWT.	
Unit IV	**(7 Hrs.)**
Image Segmentation Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation; Object detection	
Unit V	**(8 Hrs.)**
Pattern Analysis Clustering: K-Means, K-Medoids, Mixture of Gaussians, Classification: Discriminant Function, Supervised, Un-supervised, Semi-supervised; Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA; Non-parametric methods.	
Unit VI	**(8 Hrs.)**
Motion Analysis Background Subtraction and Modeling, Optical Flow, KLT, Spatio-Temporal Analysis, Dynamic Stereo; Motion parameter estimation.	
Total Lecture	**45 Hours**

Textbooks:

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

1.	1 Digital Image Processing ,Third edition , Rafael C. Gonzalez, Richard E. Woods
2.	Open CV Tutorials: https://docs.opencv.org/master/d9/df8/tu torial_root.html

Reference Books:	
1.	Computer Vision: Algorithms and Applications Second Richard Szeliski Springer

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
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MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/108/103/108103174/

VI SEMESTER
23IT1646:Lab : Computer Vision

Sr. No.	Problem Statement
1	Basic OpenCV Operations a) Installing OpenCV (pip install opencv-python) b) Reading & Displaying Images (cv2.imread(), cv2.imshow()) c) Resizing & Cropping Images (cv2.resize(), cv2.rectangle()) d) Color Spaces (cv2.cvtColor(), BGR to Grayscale/HSV) e) Drawing Shapes & Text (cv2.line(), cv2.circle(), cv2.putText())
2	Image Processing a) Blurring & Smoothing (cv2.GaussianBlur(), cv2.medianBlur()) b) Edge Detection (cv2.Canny(), cv2.Sobel()) c) Thresholding & Binarization (cv2.threshold(), cv2.adaptiveThreshold()) d) Morphological Operations (cv2.dilate(), cv2.erode(), cv2.morphologyEx())
3	Feature Detection & Extraction a) Contour Detection (cv2.findContours(), cv2.drawContours()) b) Corner Detection (Harris, Shi-Tomasi) (cv2.cornerHarris(), cv2.goodFeaturesToTrack()) c) ORB, SIFT, SURF Feature Detection (cv2.ORB_create(), cv2.SIFT_create())
4	Object Detection a) Face Detection (Haarcascade, DNN) (cv2.CascadeClassifier()) b) YOLO Object Detection (Using Pre-trained YOLO model) c) HOG + SVM for Object Recognition (cv2.HOGDescriptor())
5	Image Segmentation a) Watershed Algorithm (cv2.watershed()) b) GrabCut Foreground Extraction (cv2.grabCut())
6	Video Processing a) Reading & Writing Videos (cv2.VideoCapture(), cv2.VideoWriter()) b) Background Subtraction (MOG, KNN) (cv2.createBackgroundSubtractorMOG2()) c) Optical Flow (Lucas-Kanade, Farneback) (cv2.calcOpticalFlowPyrLK(), cv2.calcOpticalFlowFarneback())
7	Machine Learning with OpenCV a) Handwritten Digit Recognition using KNN b) Face Recognition using LBPH c) Object Tracking (Meanshift & Camshift)
8	Deep Learning with OpenCV a) Loading Pretrained Models (DNN module) (cv2.dnn.readNet())

	b) Custom Model Integration (TensorFlow, PyTorch) c) Pose Estimation (OpenPose, MediaPipe)
9	Augmented Reality (AR) a) Homography & Perspective Transform (cv2.findHomography()) b) AR with Marker Detection (ArUco markers) (cv2.aruco.detectMarkers()) c) Virtual Object Overlaying
10	Case study based on real time dataset.

VI SEMESTER
23IT1647: PE-III Internet of Things

Course Outcomes :
Upon successful completion of the course the students will be 1. Students will able to describe various communication protocol and its building blocks. 2. Students will able to describe relevance of IoT with cloud and the application areas of IOT. 3. Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor 4. Able to understand building blocks of Internet of Things and characteristics. 5. The students will study and implement IoT project by studying different IoT components, electronic board and their uses.

Unit I	**(6 Hrs.)**
Introduction to IoT: History of IOT, Concepts, Products and Examples. IOT Paradigm, The Layering concepts of IOT, IOT Communication Model, IOT Architecture, The 6LoWPAN,Domains of IOT, M2M vs IOT, Management of IOT, IOT Platforms, IOT Languages, IOT Physical Systems, Tools for IOT	
Unit II	**(7 Hrs.)**
IoT Communication Protocols: Protocol Standardization for IOT, Issues with IOT Standardization, M2M and WSN Protocols, SCADA and RFID Protocols, IEEE 802.15.4, BACNet Protocol, Modbus, KNX, Zigbee Architecture, Unified Data Standards.	
Unit III	(**6** Hrs.)
Web of Things: Web of Things versus Internet of Things, The Two Pillars of the Web, Architecture Standardization for Web of Things, Platform Middleware for Web of Things, Unified Multitier Web of Things Architecture, Web of Things Portals and Business Intelligence	
Unit IV	**(6 Hrs.)**
Cloud of Things: Grid/SOA and Cloud Computing, Cloud Middleware, Cloud Standards, Cloud Providers & Systems, Mobile Cloud Computing, Cloud of Things Architecture. Models of Implementation, Service Level Agreement (SLA), Examples of Applications.	
Unit V	**(7 Hrs.)**
Security Aspects: Security in IOT: Introduction, Purpose, Issues, Challenges. IOT Threats to Individual and Organizations, Challenges to Secure IOT Development, Recommended Security Controls. Cybersecurity and IOT. Layered Security Protections to Defend IOT Assets	
Unit VI	**(7 Hrs.)**
IoT Applications: IOT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IOT electronic equipment. Use of Big Data and Visualization in IOT. Role of IOT for Increased Autonomy and Agility in Collaborative Production Environments, Resource Management in the IOT.	
Total Lecture	**39 Hours**

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

Textbook:	
1.	Arshdeep Bahga & Vijay Madisetti, Internet of Things: A Hands-on-Approach, Orient Blackswan Publisher
2.	Olivier Hersent, David Boswarthick & Omar Elloumi, The Internet of Things: Key Applications and Protocols, Wiley publication

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/106/105/106105166/

VI SEMESTER
23IT1648: PE-III: LAB. : Internet of Things

Course Outcomes :

Upon successful completion of the course the students will be

1. Students will able to describe relevance of IoT with cloud and the application areas of IOT
2. The students will study and implement IoT project by studying different IoT components, electronic board and their uses.

Sr.	Problem Statements Based on
1	Study of Arduino Kit
2	Study of Raspberry Pi Kit
3	Study of different electronics components
4	Study of different sensors in IoT
5	Case study: Smart Irrigation System using IoT and cloud
6	Case Study: IOT Car Parking System
7	Case Study: IOT Based ICU Patient Monitoring System
8	Case Study: Smart Dustbin With IOT Notifications
9	Project: Designing of Home Automation System
10	Mini Project

VI SEMESTER
23IT1649: PE-III: Design Patterns

Course Outcomes :
Upon successful completion of the course the students will be 1. Understand the fundamental concepts and classifications of design patterns. 2. Apply appropriate design patterns to solve real-world software problems. 3. Analyze and critique software designs based on design patterns. 4. Design scalable, reusable, and maintainable software systems.

Unit I	**(8 Hrs.)**
Definition and Need: What are design patterns?, Principles: SOLID principles and their role in patterns, Classification of Patterns: Creational, Structural, and Behavioral patterns,Pattern Catalogs: Overview of Gang of Four (GoF) design patterns.	
Unit II	**(7 Hrs.)**
Introduction to object creation mechanisms:Patterns: Singleton Pattern,Factory Method Pattern,Abstract Factory Pattern,Prototype Pattern,Builder Pattern,Real-world examples and use cases.	
Unit III	(**8** Hrs.)
Simplifying relationships between objects:Patterns: Adapter Pattern,Bridge Pattern,Composite Pattern,Decorator Pattern,Facade Pattern,Flyweight Pattern, Proxy Pattern.	
Unit IV	**(8 Hrs.)**
Defining communication between objects:Patterns: Chain of Responsibility Pattern,Command Pattern,Iterator Pattern,Mediator Pattern,Memento Pattern,Observer Pattern,State Pattern,Strategy Pattern,Template Method Pattern,Visitor Pattern	
Unit V	**(7 Hrs.)**
Refactoring with Design Patterns:Patterns in Enterprise Applications ,Patterns in Emerging Technologies (e.g., Cloud Design Pattern),Application of Patterns in Frameworks like Spring, Hibernate, and React.	
Unit VI	**(7 Hrs.)**
Analysis of large-scale software systems and mapping patterns. Implementation of a project with multiple integrated patterns. Design pattern usage in real-world software systems (e.g., e-commerce, gaming, and enterprise systems).	
Total Lecture	**45 Hours**

Textbook:	
1.	Design Patterns: Elements of Reusable Object-Oriented Software" by Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides (GoF), Addison-Wesley Professional

Reference Books:	
1.	Head First Design Patterns" by Eric Freeman and Elisabeth Robson, O'Reilly Media,second edition
2.	Refactoring: Improving the Design of Existing Code" by Martin Fowler, Addison-Wesley Professional first

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	edition.
3.	Patterns of Enterprise Application Architecture" by Martin Fowler, Addison-Wesley Professional second edition.

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MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=1xUz1fp23TQ

VI SEMESTER
23IT1650: PE-III: Lab: Design Patterns

Course Outcomes :
Upon successful completion of the course the students will be 1. Understand the fundamental concepts and classifications of design patterns. 2. Apply appropriate design patterns to solve real-world software problems. 3. Analyze and critique software designs based on design patterns. 4. Design scalable, reusable, and maintainable software systems.

List of Experiments based on:

Creation of a singleton class and demonstrate control of object creation.
Creational Patterns
Structural Patterns
Flyweight and Proxy Patterns
Behavioral Patterns
Patterns in Real-World Frameworks
Mini Project Using Multiple Patterns

Note: Practical's based on the patterns covered in theory should be conducted.

VI SEMESTER
Code 23IT1651: PE III: Game Theory

Course Outcomes :
Upon successful completion of the course the students will be able to
1. Understand the core concepts of Game Theory and its applications in diverse fields like economics, politics, biology, and game design. 2. Apply Game Theory concepts in strategic decision-making and analyze game scenarios, including cooperative and non-cooperative games in game design. 3. Synthesize Game Theory and game design principles to create practical applications, analyzing player behavior, strategy formulation, and optimal payoffs. 4. Evaluate the impact of Game Theory principles on game design elements such as physics, layout, and audio, and how they affect player behavior and the overall game experience.

Unit I Introduction To Game Theory And Types Of Games	**(8 Hrs.)**
Motivation: Elements of Game theory, Why game theory is important in economics, politics, biology, and other fields.Types of Games: Cooperative vs. Non-cooperative, Symmetric vs. Asymmetric, and Simultaneous vs. Sequential games, examples, Strategic Games, 2 Player Strategy Games. Elements of a Game: Players, strategies and information.Examples of Games: Battle, Coordination Games.	
Unit II Types Of File Formatting	**(7 Hrs.)**
Different image formats, Different Audio formats, Different video formats, Polygon file formats, equilibrium Concepts for Games.	
Unit III Games with Communication	(7 Hrs.)
Repeated Games Strategies, payoffs, folk theorems. Recursive and stochastic games: stationary trategies, Shapley's theorem, Games with Communication Correlated equilibrium, Two-person bargaining.Game Scenes & Tiles, Navigation and Path finding.	
Unit IV Physics in Game Theory	**(7 Hrs.)**
Physics Engines, Gravity Simulation, Rigid Body Interaction, Collisions, Rigid Body & Components, scripting Collision Events.	
Unit V Game Layouts	**(8 Hrs.)**
Menu System and Visual Components, Event System and Skins, Canvas.	
Unit VI Audio Assets in Game Theory	**(8 Hrs.)**
Strategic Decision-Making, Payoff Structures, Game States and Information Asymmetry, Decision Trees and Game States, Signaling and Audio Cues, Mixed Strategies in Audio Design Coordination Games and Player Behavior	
Total Lecture	**45 Hours**

Textbooks:

1.	An Introduction to Game Theory" Martin J. Osborne, Oxford University Press 2004 (2nd Edition)
2	"Game Theory: An Introduction" Steven Tadelis, Pearson 2013

Reference Books:	
1.	"Strategy: An Introduction to Game Theory", Joel Watson, W.W. Norton & Company 2008.
2.	"The Theory of Games and Economic Behavior" John von Neumann, Oskar Morgenstern, Princeton University Press, 1944 (60th Anniversary Edition, 2004)
3	M. J. Osborne, "An Introduction to Game Theory", Oxford University Press, 2003

MOOCs Links and additional reading, learning, video material	
1.	https://www.gametheory.net/
2.	https://www.youtube.com/watch?v=QnFPZUPr658
3.	https://www.youtube.com/user/gametheoryonline
4.	https://enine.digimat.in/nptel/courses/video/106101237/L29.html

VI SEMESTER
23IT1652: PE III: Lab: Game Theory

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Understand the core concepts of Game Theory and its applications in diverse fields like economics, politics, biology, and game design.
2. Apply Game Theory concepts in strategic decision-making and analyze game scenarios, including cooperative and non-cooperative games in game design.
3. Synthesize Game Theory and game design principles to create practical applications, analyzing player behavior, strategy formulation, and optimal payoffs.
4. Evaluate the impact of Game Theory principles on game design elements such as physics, layout, and audio, and how they affect player behavior and the overall game experience.

List of Experiments:

Introduction to Game Theory and Types of Games
Demonstrate basic understanding by writing a simple C# program With variables and conditions.
Write a Program of C# by using Loops, Arrays, Enums.
Install Unity and Visual Studio, set up for game design, review documentation, and conceptualize the game theme.
To create and animate 2D characters.
To Implement movement and character control mechanics, enabling interactive gameplay through actions like walking, jumping.
Case Study

VI SEMESTER

23IT1653: PE III: Data Acquisition and Hardware Interfaces

Course Outcomes :
Upon successful completion of the course the students will be able to
1. Understand the Basics of Data Acquisition Systems.
2. Apply Signal Conditioning Techniques:
3. Analyze and Implement Conversion Techniques.
4. Design Advanced Data Acquisition and Error-Handling Systems:

UNIT-I: Introduction to Data Acquisition Systems (DAS)	**(6 Hrs.)**
Amplifiers-Instrumentation amplifiers-isolation-chopper and low drift amplifier -Lock- in amplifiers electrometer and trans-impedance amplifiers-modulation-filters-Constant voltage and constant current regulators, DC-DC converter, SMPS. D/A converters, Comparator, PLL.	
UNIT-II: Sensor Signal Conditioning Circuits	**(6 Hrs.)**
Signal conditioning for resistive sensors, Reactive variation sensors and Self generating sensors-Error budget analysis.	
UNIT-III: Basic Signal Conversion and Communication	**(7 Hrs.)**
RS232 interface standard, S485 interface standard. Distributed and stand alone data loggers, IEEE488 standard. Methods of frequency-to-code conversion-standard, indirect and combined counting method, two wire transmission-four wire, six wire sensing.	
UNIT-IV: Data Acquisition Methods for Multi-Channel Sensor Systems	**(7 Hrs.)**
Data acquisition method with time-division channeling, data acquisition with space- division channeling, and main errors of multi-channel data-acquisition systems, data transmission and error protection.	
UNIT-V: Data Acquisition with Microcontrollers and Hardware Interfaces	**(6 Hrs.)**
Interfacing Sensors with Microcontrollers (Analog and Digital Sensors),Memory Interfacing for Data Storage, Implementation of LVDT, Thermocouples, RTDs, and Speed Sensors Examples of Data Acquisition Using Microcontroller Platforms (8051, Arduino, or ARM Cortex)	
UNIT-VI: Advanced Data Acquisition and Error Handling	**(7 Hrs.)**
Multi-Channel Data Acquisition Systems, Time-Division and Space-Division Multiplexing Error Detection and Correction Techniques, Data Logging and Storage Systems.	
Total Lecture	**39 Hours**

Reference Books:	
1.	Taylor H Rosemary, "Data Acquisition for Sensor Systems", Kluwer Academic Publishers Group, 1997

Textbooks:	
1.	Pallas Areny. R, Webster. J. G, "Sensors and Signal conditioning", 2nd ed. John Wiley and Sons, 2001.

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MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/108/105/108105062/
2.	https://www.youtube.com/watch?v=-0LzMfhoSts&t=4s

VI SEMESTER

23IT1654: PE III Lab: Data Acquisition and Hardware Interfaces

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand the Basics of Data Acquisition Systems. 2. Apply Signal Conditioning Techniques: 3. Analyze and Implement Conversion Techniques. 4. Design Advanced Data Acquisition and Error-Handling Systems:

List of Experiments:

1.	Study and Implementation of Instrumentation Amplifier using OP-AMP.
2.	Design of Signal Conditioning Circuit for Self-generating Sensors (Piezo/Seismic Sensor)
3.	Design of Low Pass and High Pass Filters for Sensor Signals
4.	Interfacing of DAS with RS232 Communication
5.	Interfacing of DAS with RS485 Communication
6.	Demonstration of IEEE488 Standard Interface (GPIB)
7.	Implementation of Error Detection and Error Correction in Data Transmission (CRC/Parity Checks)
8.	Interfacing Analog Sensor (LDR/Thermistor/RTD) with Arduino/8051
9.	Memory Interfacing for Data Storage (EEPROM interfacing with Microcontroller)
10.	Implementation of LVDT Measurement System using Arduino
11.	Implementation of Multi-Channel Data Acquisition System (Arduino/STM32 with Multiplexer)
12.	Time-Division and Space-Division Multiplexing Demonstration

VI SEMESTER
23IT1655: PE III: Data Mining

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Describe and explain the fundamentals of data mining, data warehouse, OLAP, OLTP. Data pre-processing, data cleaning, performance evaluation and visualization methods. Apply different data mining algorithms on given data set. 2. Describe and explain the concepts related to data preparation, data modelling, classification, clustering, association rule mining, and anomaly detection for extraction of knowledge. 3. Apply supervised and unsupervised data mining techniques for knowledge extraction based on different types of data. 4. Analyze the data to apply appropriate data modelling and mining techniques to retrieve an appropriate result.

Unit I:	**(7 Hrs.)**
Introduction to data mining: Data mining definitions & task, data mining on what kind of data, Knowledge Discovery vs. Data mining, DBMS vs. Data Mining, Data mining functionalities, data mining task primitives , Major issues in data mining , Data Preprocessing(Data cleaning, integration, transformation, Feature selection and dimensionality reduction, Handling missing, noisy, and outlier data, Normalization and discretization)	
Unit II:	**(8 Hrs.)**
Association Rule Mining: what is Frequent item sets, closed item sets, and association rules, frequent pattern mining, applications of Association Rule mining, Market Basket Analysis. The Apriority algorithm for finding frequent item set using candidate generation, generating association rules from frequent item sets. Improving efficiency of Apriority, FP- growth algorithm.	
Unit III:	**(7 Hrs.)**
Cluster Analysis: What is cluster analysis, its applications, clustering paradigms, Partioning algorithms: K-means, K-medoids, Hierarchical clustering: Agglomerative and Divisive hierarchical clustering, Density based clustering -DBSCAN	
Unit IV:	**(7 Hrs.)**
Web Mining: Introduction, web content mining, web structure mining, web usage mining, mining, Link analysis: HITS, PageRank, Graph-based models, Clickstream analysis, Session identification and user profiling.	
Unit V:	**(8 Hrs.)**
Text mining: Text data analysis and Information retrieval, Unstructured texts, text mining approaches, text pre-processing, Feature Representation, Text Mining Techniques (Text classification, Clustering of documents, Sentiment Analysis and Opinion Mining, Topic Modeling)	
Unit VI:	**(8 Hrs.)**
Social Data Mining: Introduction to Social Data and its Challenges, *Social Network Analysis (SNA)* (Graph theory: nodes, edges, degree, centrality Community detection) *Mining Social Media Platforms (*data extraction via APIs, Hashtag and trend analysis, Sentiment and emotion mining in social platforms), *Ethical and Legal*	

Considerations (Data privacy, misinformation, bias in social data), *Tools for Social Mining*	
Total Lecture	**45 Hours**

Textbooks:	
1.	Jiawei Han, Micheline Kamber and Jian Pei Data Mining: Concepts and Techniques, 3rd ed. Morgan Kaufmann Publishers
Reference Books:	
1.	Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining First impression Pearson Addison Wesley
2.	Daniel T. Larose Discovering Knowledge in Data An Introduction to Data Mining Wiley
3.	Chapman and Hall Data mining with R 2nd CRC press
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1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information
MOOCs Links and additional reading, learning, video material	
1.	httpshttps://www.outube.com/watch?v=_mSkA-wA2Wk

VI SEMESTER
23IT1656: Lab.: Data Mining

Course Outcomes
Upon successful completion of the course the students will be able to 1. Use popular data mining tool and apply the principle algorithms and techniques used in data mining, on different types of dataset, analyze their results, interpret the results using different visualization techniques. Apply various techniques of SQL Query writing, Normalization techniques, query processing and techniques involved in query optimization useful in transaction.

Minimum Eight Practical's to be performed from the list as below

SN	**Experiments based on**
1	Introduction to R - fundamentals and basic data types, import / export data and Pre-processing on data set using R
2	Implementation of association rule mining in R
3	Implementation of Data Classification using Bayes classification in R
4	Implementation of Data Classification using decision tree in R
5	Implementation of Data Clustering using K-means in R
6	Implementation to PREDICT DATA using linear regression methods.
7	Mining text data using R
8	Data exploration and visualization
9	Develop one Application (eg sentiment analysis)

VI SEMESTER
23IT1657: PE III: Java Full Stack Development

Course Outcomes :
Upon successful completion of the course the students will be 1. Understand the core, advance java, cloud and virtualization concepts. 2. Apply the concepts for full stack development. 3. Design different web applications using UI components and Spring framework. 4. Develop fully functional web applications using different frameworks and tools. 5. Implementation of web application using different tools.

Unit I	**(6 Hrs.)**
Java Basics OOP Concepts, Data Structures, Collection Framework, File handling, JDBC, Introduction to JUnit	
Unit II	**(6 Hrs.)**
Advance Java Features Introduction to Java 8 Features, Interface Enhancements, Functional Interfaces, Lambda Expression, ForEach , Method References, Streams API, JavaDocs	
Unit III	**(7 Hrs.)**
User Interface Design Building Responsive Web Pages HTML5, CSS3 and JavaScript, Basic Single Page Applications Using Angular OR React	
Unit IV	**(7 Hrs.)**
Spring Framework Working with Spring Core, Dependency Injection, Spring MVC, Spring Boot, Introduction to Hibernate and Spring Microservices	
Unit V	**(7 Hrs.)**
Cloud and Virtualization Virtualization Basics, Introduction to Cloud, RDB Cloud Fundamentals (SaaS, PaaS, IaaS), Introduction to AWS (S3 Buckets, RDS), AWS Cloudfront	
Unit VI	**(6 Hrs.)**
Full Stack Development Tools:Introduction to Maven, Jacoco, SonarLint,Jira Swagger, Mockito, Docker, Gitrunner	
Total Lecture	**39 Hours**

Textbooks:	
1.	The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Developer Chris Northwood First Edition
2.	Full Stack Web Development For Beginners: Learn Ecommerce Web Development using HTML5,CSS3,Bootstrap, JavaScript, MySQL and PHP By Riaz Ahmed

Reference Books:	
1.	Full Stack Java Development with Spring MVC, Hibernate, jQuery, and Bootstrap Mayur Ramgir First Edition
2.	Java for Web Development: Create Full-Stack Java Applications with Servlets, JSP Pages, MVC Pattern and Database Connectivity Sarika Agarwal and Vivek Gupta First Edition

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MOOCs Links and additional reading, learning, video material	
1.	https://nptel.ac.in/courses/106106156
2.	https://www.coursera.org/learn/introduction-to-web-development-with-html-css-javacript?trk_location=query-summary-list-link
3.	https://ict.iitk.ac.in/product/full-stack-developer-html5-css3-javascript-bootstrap-php-with-mysql-demo/

VI SEMESTER
23IT1658: Lab: PE III Java Full Stack Development

Course Outcomes :

Upon successful completion of the course the students will be

1. Understand the core, advance java, cloud and virtualization concepts.
2. Apply the concepts for full stack development.
3. Design different web applications using UI components and Spring framework.
4. Develop fully functional web applications using different frameworks and tools.
5. Implementation of web application using different tools.

List of Practical's

Sr. No.	Problem Statements
1	Practical based on Collection
2	Practical based on File Handling
3	Practical based on JDBC
4	Practical based on Junit
5	Practical based on Java 8 features
6	Practical based on Streams API
7	Practical based on User Interface Design
8	Practical based on Spring Microservices
9	Web Application Development
10	Web Application Deployment

VI SEMESTER
23IT1661: PE IV Dot Net Full Stack Development

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand the concept of .NET full stack development using C# , MVC Controller 2. Apply the concept in .NET Full stack development. 3. Analysis the concept in .NET full stack development 4. Design various application using .NET framework.

Unit I :Introduction .Net	**(6 Hrs.)**
Introduction .NET, application and structure of application, Object Oriented Programming Concept in C#, Exceptional Handling, Delegates and Events	
Unit II: Introduction to DataBase	**(6 Hrs.)**
LINQ, SQL Sever, DataBase Object introduction, Sql, Triggers	
Unit III: Introduction to Front End	**(6 Hrs.)**
ADO.NET, HTML, CSS, UI and Front End, Java Script	
Unit IV:MVC	**(6 Hrs.)**
What is MVC, components, Interaction among components, Program.cs and StartUp.cs file, Configure Services and Configure Methods, Middleware components, Model View Controllers, Creating first app in MVC.	
Unit V:API	**(6 Hrs.)**
Implementing data validation, annotations and Validation Summary and Exception handling mechanism in MVC, what is API, create project, test API, API Controllers, configure Web API,routing, parameter binding.	
Unit VI: Introduction to DevOps	**(6 Hrs.)**
Introduction to Coding Principle, DevOps, Docker	
Total Lecture	**36Hours**

Textbooks:	
1.	Introducing MICROSOT .NET by David S. Platt
2.	Mastering C# and .NET Framework by Marino Posadas
3	C# and .Net Programming by Uma Priyadarsini. P.S Thamaraiselvi. K, M. Jansi Rani, Karthick. V, Dr. Rinesh. S

Reference Books:	
1.	C# 6.0 and the .NET 4.6 Frameworkby Andrew Troelsen and Philip Japikse

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VI SEMESTER

Code (23IT1662) Subject Name:Lab: PE IV Dot Net Full Stack Development

Sr.No.	Name of Practical
1	Study Compilation Process of Dot NET
2	Program for Student management System Based on object oriented programming concepts in C#
3	a C# program that accepts two numbers from the user and performs division. Handle the case when the denominator is zero using exception handling. Display an appropriate error message if division by zero occurs.
4	Write a program that sorts an array of integers using a delegate for comparison logic.
5	Implement a repository class using generics to perform CRUD operations on different entities (like Student and Employee). Based on Generic
6	Given a list of employees (Id, Name, Department), write a LINQ query to group employees by department and count how many employees are in each department An e-commerce company wants to **automatically track order status changes** in its database. Currently, the Orders table contains all customer orders, and employees update the order status manually (for example, from *Pending → Shipped → Delivered*).

7	However, the management team needs a **detailed history** of every status change for: • Tracking delivery performance, • Customer dispute resolution, and • Generating business reports. Design and implement a solution using **SQL Triggers** to automatically record all order status updates.
8	Write a C# program using ADO.NET to connect to a SQL Server database and display student records**.**
9	Program Based on MVC Validations and Exception Handling
10	project

VI SEMESTER
23IT1663: PE:III Generative AI

Course Outcomes :

Upon successful completion of the course the students will be able to

CO1: Explain the fundamentals of Artificial Intelligence, Generative AI, Transformer architecture, and Large Language Models (LLMs), and analyze their applications in solving real-world problems.

CO2: Apply prompt engineering techniques and Large Language Models to perform text generation, summarization, question answering, code generation, and reasoning tasks.

CO3: Analyze and compare generative models such as Generative Adversarial Networks (GANs), Variational Autoencoders (VAEs), and Large Language Models based on their architecture, working principles, advantages, and applications.

CO4: Design Retrieval-Augmented Generation (RAG) pipelines using vector embeddings, vector databases, and modern Generative AI frameworks for developing intelligent AI applications.

CO5: Develop Generative AI applications using LLM frameworks and AI agents while applying responsible AI principles, ethical practices, and deployment strategies

Unit I:	**(7 Hrs.)**

Introduction to Artificial Intelligence (AI) and Generative AI; Historical Evolution of AI and Generative AI; AI Layers and Relationship among AI, Machine Learning (ML), Deep Learning (DL), Generative AI, Large Language Models (LLMs), GPT, and ChatGPT;

Overview of Deep Learning Architectures including Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), and Generative Models; Limitations of Traditional Neural Networks and Need for Context-Aware Models;

Introduction to Generative AI: Working Principle, Data Collection and Processing, Model Training, Pattern Learning, Content Generation, Refinement and Iteration;
Comparison of Traditional Machine Learning Models and Generative AI Models; Journey from Traditional Programming to Neural Networks and Generative AI;

Applications of Generative AI in Natural Language Processing, Computer Vision, Healthcare,

Education, Software Development, and Business; Challenges and Ethical Issues in Generative AI.
Unit II: **(8 Hrs.)**
Transformer Architecture: Motivation, Need for Transformers, Attention Mechanism, Self-Attention, Cross-Attention, Encoder–Decoder Architecture, Multi-Head Attention, Positional Encoding, Residual Connections, Layer Normalization, Advantages and Applications of Transformers. Large Language Models (LLMs): Architecture, Components (Data, Model Architecture, Training), Working of LLMs, Tokenization, Token Embeddings, Pre-training, Fine-tuning and Reinforcement Learning from Human Feedback (RLHF), Inference Process, Context Window, Popular LLMs and Generative AI Models, Applications of LLMs in Text Generation, Translation, Summarization, Question Answering, Code Generation, and Content Creation
Unit III: **(7 Hrs.)**
Introduction to Prompt Engineering, Prompts and their Components, Importance and Applications of Prompt Engineering, Rise of In-Context Learning, Prompt Design Principles, Elements of a Prompt, Prompt Parameters (Temperature, Top-p, Top-k, Greedy Search and Beam Search), Prompt Design for Text Summarization, Question Answering, Text Classification, Information Extraction, Role Playing, Code Generation and Reasoning. Advanced Prompting Techniques: Zero-shot Prompting, One-shot Prompting, Few-shot Prompting, Chain-of-Thought (CoT) Prompting, Zero-shot Chain-of-Thought, Self-Consistency Prompting, Knowledge Generation Prompting, Program-Aided Language Models (PAL), ReAct (Reasoning and Acting), Prompt Chaining, Prompt Evaluation and Optimization. Prompt Security and Best Practices: Prompt Injection, Prompt Leakage, Jailbreak Attacks, Hallucination-aware Prompting, Safe Prompt Design and Prompt Engineering Best Practices
Unit IV: **(7 Hrs.)**
Introduction to Generative Models, Taxonomy of Generative Models, Latent Space Representation, Generative Adversarial Networks (GANs), Adversarial Training, GAN Architecture, Generator and Discriminator Networks, GAN Loss Function and Training Process, Deep Convolutional GANs (DCGANs), Conditional GANs (cGANs), Text-to-Image Synthesis, Image-to-Image Translation, Advantages, Limitations and Applications of GANs; Variational Autoencoders (VAEs), Encoder–Decoder Architecture, Bayesian Inference, Latent Variable Models, Reparameterization Trick, Types of VAEs (Conditional VAE and Beta-VAE), Image Generation and Representation Learning using VAEs, Applications of VAEs, Comparison between GANs and VAEs.
Unit V: **(8 Hrs.)**
Limitations of Large Language Models (LLMs), LLM Hallucinations and their Types, Hallucination Mitigation Strategies,Retrieval-Augmented Generation (RAG), RAG Architecture and Workflow, RAG Chunking Strategies, Vector Embeddings, Embedding Models, Semantic Search, Similarity Search,

Vector Databases, Traditional Databases vs. Vector Databases, Vector Database Landscape, Fine-tuning vs. RAG	
Unit VI:	**(8 Hrs.)**
Generative AI Developer Stack, LangChain Framework and its Components, LlamaIndex Framework, Hugging Face Ecosystem, Development and Deployment of LLM Applications, Small Language Models (SLMs), Comparison between Large Language Models (LLMs) and Small Language Models (SLMs), AI Agent Architecture, Agentic AI, Model Context Protocol (MCP), Multi-Agent Systems, Responsible and Ethical Use of Generative AI, Best Practices for Responsible AI Development and Deployment, Future Trends in Generative AI.	
Total Lecture	**45 Hours**

Textbooks	
1	Deep Learning: Teaching Machines to Paint, Write, Compose and Play, David Foster, 2023. 2nd edition. O'Reilly Media, Inc.
2	Deep Learning, Ian Goodfellow, Yoshua Bengio, Aaron Courville, MIT Press, 2016.
Reference Books	
1	Hands-on Generative Adversarial Networks with Keras, Rafael Valle. Packt Publisher, 2019
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1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology
MOOCs Links and additional reading, learning, video material	
1	https://www.youtube.com/watch?v=XuW7WBjgNfc

VI SEMESTER

Code (23IT1664) Subject Name:Lab: PE:III Generative AI

Sr. no	List of experiments	
1	Generate text using pre-trained language models. **Tools:** Python, Transformers library	MSPA-1
2	Learn how prompt design affects AI output and evaluate top p and temperature parameters for different prompts. a) Write prompts for: • Story generation • Code generation • Summarization b) Test techniques: • Zero-shot prompting • Few-shot prompting • Role-based prompting	MSPA-1
3	Generate captions for images using vision-language models. Use pretrained model for captioning Example libraries (BLIP, Transformers) • Input: image • Output: generated description	MSPA-1
4	a. Code Generation using Generative AI b. Music Generation using generative models (Ex. MusicGen, Magenta, etc)-Generate short music samples & Experiment with tempo and style.	MSPA-2

5	To understand the architecture and working of GAN. a. Implementation of Simple GAN using Python b. Image Generation using GAN on MNIST Dataset c. Visualization of GAN Training Process d. Deep Convolutional GAN (DCGAN) e. Use Pix2Pix model to convert sketch images to real images. f. Detecting Fake Images Generated by GAN	MSPA-2
6.	a. To implement a simple autoencoder for data compression(Use MNIST dataset)	MSPA-2

VI SEMESTER
23IT1606: Customer Relationship Management *(VSEC-4)*

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand Features of Salesforce CRM 2. Apply the Advanced Features in Salesforce CRM for development of software 3. Analyze and evaluate the security concepts, Automated Business Process and Approval Process of Salesforce CRM. 4. Develop modules using Salesforce CRM

Unit I	**(6 Hrs.)**
Introduction to the Force.com Platform. The Basics of an App's User Interface. The Benefits of a Force.com Data-Centric, Collaborative Apps, The Technologies Behind a Force.com Platform App, Multitenant Architecture, A Metadata-Driven Development Model, Apex . Custom User Interface Mobile, AppExchange.	
Unit II	**(6 Hrs.)**
Introduction to Objects ,The Position Custom Object, Introducing Tabs , Setup Detail Pages and Related Lists ,Introduction to Fields , Advanced Fields, Data Validation, and Page Layouts , Adding Advanced Fields , Introduction to Picklists , Field Dependencies , Dependent Picklist ,Custom Formula Fields , Dynamic Default Values , Validation Rules ,Page Layouts , Page Layout Editor Group Fields Edit Field Properties , Page Layouts , Compact Layouts.	
Unit III	**(6 Hrs.)**
Introduction to Relationship Custom Fields, Page Layout Properties, Record Highlights, Introduction to Search Layouts, Additional Search Layouts Managing Review Assessments, Introduction to Roll-Up Summary Fields, Many-to-Many Relationship, Customizing Related Lists in a Many-to-Many Relationship.	
Unit IV	**(7 Hrs.)**
Controlling Access to Data in App, Data Access Concepts. Controlling Access to Objects, Introduction to Profiles ,Standard Profiles ,Introduction to Permission Sets ,Profiles and Permission Sets ,Introduction to Field-Level Security ,Controlling Access to Records, , Set Org-Wide Defaults, Introduction to Hierarchies ,Comparing Roles, Profiles, and Permission Sets ,Role, Introduction of Sharing Rules , Define a Public Group ,Define Sharing Rules ,Introduction to Manual Sharing , Manual Sharing Rule ,Displaying Field Values and Page Layouts According to Profile ,Overriding Sharing with Object Permissions ,Delegated Administration Groups	
Unit V	**(7 Hrs.)**
Introduction to Process Builder, Process Builder: A Closer Look Creating a Process That Updates Field Values, Introduction to Queues, Introduction to Scheduled Actions, Email Alerts, Introduction to Email Templates, Introduction to Approvals, Planning for Approval Processes. Analyzing Data with Reports and Dashboards, Introduction to Reports, Report Formats.	

			July,2023	1.00	Applicable for AY 2023-24 Onwards
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Unit VI	(7 Hrs.)
Introduction to Apex, Collections, SOQL and SOSL, DML Operations, Controllers In APEX Using Apex Class and Triggers, Asynchronous APEX, Batch APEX, Introduction to Aura component, attributes handling in Aura component.	
Total Lecture	**39 Hours**

Textbooks:	
1.	Phil Choi, Chris McGuire Caroline Roth Force.com Platform Fundamentals An Introduction to Custom Application Development in the Cloud salesforce.com
2.	Wes Nolte, Jeff Douglas Salesforce Handbook Paperback – 20 Mar 2011 Publisher: Lulu.com

Reference Books:	
1.	Paul Goodey Salesforce CRM: The Definitive Admin Handbook Paperback – Second Edition Packt Publishing Limited

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/110/105/110105145/
2.	https://www.youtube.com/watch?v=-JlLoxEc2tk

Conduct Experiments based on theory contents

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech SoE and Syllabus 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Information Technology)

B.Tech. in Information Technology

SoE No. 23IT-101

MDM

Track 1

Cloud Computing

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

V SEMESTER
MDM3IT103: Introduction To Salesforce

Course Outcomes :
Upon successful completion of the course the students will be able to 5. Analyze the components of cloud computing 6. To Understand Cloud Computing Fundamental and Forece.com platform 7. Evaluate information storage management design in a cloud environment and how it relates to the business objectives of an organization 8. Analyze the role technology plays in the design of a storage solution in a cloud architecture

Unit I: Introduction to Sales Cloud	**(7 Hrs.)**
Introduction sales objects, Leads, Account, Contacts , Opportunity, Product , Price books, Quote	
Unit II: Cloud Computing Fundamentals	**(6 Hrs.)**
Cloud Computing definition, private, public and hybrid cloud. Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public vs private clouds, role of virtualization in enabling the cloud; Business Agility: Benefits and challenges to Cloud architecture. Application availability, performance, security and disaster recovery; next generation Cloud Applications	
Unit III: Cloud Applications	**(7 Hrs.)**
Technologies and the processes required when deploying web services; Deploying a web service from inside and outside a cloud architecture, advantages and disadvantages	
Unit IV: Introducing the Force.com Platform	**(6 Hrs.)**
The Basics of an App's User Interface. The Benefits of a Force.com Data-Centric, Collaborative Apps, The Technologies Behind a Force.com Platform App, Multitenant Architecture, A Metadata-Driven Development Model, Apex .Custom User Interface Mobile, AppExchange.	
Unit V: Objects and Tabs	**(7 Hrs.)**
Introduction to Objects , ,Introduction to Fields , Introduction to Picklists , Field Dependencies , Dependent Picklist ,Custom Formula Fields , Dynamic Default Values , Validation Rules, Page Layouts , Page Layout Editor Group Fields Edit Field Properties , Page Layouts , Compact Layouts	
Unit VI: Relationships	**(6 Hrs.)**
Introduction to Relationship Custom Fields, Page Layout Properties, Record Highlights, Introduction to Search Layouts, Introduction to Roll-Up Summary Fields, Many-to-Many Relationship	
Total Lecture	**39 Hours**

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

Textbooks:	
1.	Phil Choi Chris McGuire Caroline Roth Force.com Platform Fundamentals An Introduction to Custom Application Development in the Cloud salesforce.com
2.	Wes Nolte , Jeff Douglas Salesforce Handbook Paperback Publisher: Lulu.com
3.	Jim Webber, Savas Parastatidis, Ian Robinson O'Reilly REST in Practice Media; 1 edition, [ISBN: 978-0596805821] 2010.
4.	Eugenio Pace, Dominic Betts, Scott Densmore, Ryan Dunn, Masashi Narumoto, Matias Woloski Developing Applications for the Cloud on the Microsoft Windows Azure Platform Microsoft Press; 1 edition, [ISBN: 9780735656062] 2010

Reference Books:	
1.	Salesforce CRM: The Definitive Admin Handbook Paperbac Paul Goodey, 2nd edition Publisher: Packt Publishing Limited

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Civil%20Engineering/78.%20Engineering-Mechanics-Statics-and-Dinamics-E-W-Nelson-C-L-Best-W-G-McLean-1st-Ed-1997-Schaum-Outline-McGraw-Hill%20(1).pdf
2	chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Civil%20Engineering/79.%20Engineering%20Mechanics.%20Statics-%20MERIAM%20%20AND%20KRAIGE.pdf
3	chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Civil%20Engineering/81.%20Engineering%20Mechanics%201.pdf

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=CKllqKLOgSI&list=PL-gW8Fj5TGrpoW08kOfbG6yfXbExyL0EB
2.	https://www.youtube.com/watch?v=v6kD9J39dys&list=PL-gW8Fj5TGrpoW08kOfbG6yfXbExyL0EB&index=3
3.	https://www.youtube.com/watch?v=yv1IMYYTnrs&list=PL-gW8Fj5TGrpoW08kOfbG6yfXbExyL0EB&index=3

VI SEMESTER
MDM4IT104: Application Development using Salesforce

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Analyze the Securing and Sharing Data 2. To Understand Cloud Computing Fundamental and Forece.com platform 3. Evaluate information storage management design in a cloud environment and how it relates to the business objectives of an organization 4. Analyze Automating Business Processes, Service Cloud

Unit I: Securing and Sharing Data:	**(7 Hrs.)**
Controlling Access to Data in App, Data Access Concepts. Controlling Access to Objects, Introduction to Profiles ,Standard Profiles ,Introduction to Permission Sets , Profiles and Permission Sets	
Unit II: Security Model In Salesforce	**(8 Hrs.)**
Introduction to Field-Level Security ,Controlling Access to Records, , Set OrgWide Defaults, Introduction to Hierarchies ,Comparing Roles, Profiles, and Permission Sets ,Role, Introduction of Sharing Rules , Define a Public Group ,Define Sharing Rules ,Introduction to Manual Sharing , Manual Sharing Rule ,Displaying Field Values and Page Layouts According to Profile ,Overriding Sharing with Object Permissions ,Delegated Administration Groups.	
Unit III: Automating Business Processes	**(7 Hrs.)**
Introduction to Process Builder, Process Builder: A Closer Look Creating a Process That Updates Field Values, Introduction to Queues, Introduction to Scheduled Actions, Email Alerts, Introduction to Email Templates, Introduction to Approvals, Planning for Approval Processes	
Unit IV: Reports and Dashboards	**(8 Hrs.)**
Analysing Data with Reports and Dashboards, Introduction to Reports, Report Formats	
Unit V: Service Cloud	**(7 Hrs.)**
Case Management, Omni-channel Routing, Social Customer Service,Account and Contact Management ,Custom Reports and Dashboards, Web to case, Email to case ,Escalation Rule .	
Unit VI: Architecture In Salesforce	**(8 Hrs.)**
Salesforce MVC Architecture, Features Of Salesforce MVC Architecture**,** Modules In Salesforce MVC Architecture**,** Benefits Of Using Salesforce MVC Architecture	
Total Lecture	**45 Hours**

Textbooks:	
1.	Phil Choi Chris McGuire Caroline Roth Force.com Platform Fundamentals An Introduction to Custom Application Development in the Cloud salesforce.com
2.	Wes Nolte , Jeff Douglas Salesforce Handbook Paperback Publisher: Lulu.com
3.	Jim Webber, Savas Parastatidis, Ian Robinson O'Reilly REST in Practice Media; 1 edition, [ISBN: 978-0596805821] 2010.
4.	Eugenio Pace, Dominic Betts, Scott Densmore, Ryan Dunn, Masashi Narumoto, MatiasWoloski Developing Applications for the Cloud on the Microsoft Windows Azure Platform Microsoft Press; 1 edition, [ISBN: 9780735656062] 2010

Reference Books:	
1.	Salesforce CRM: The Definitive Admin Handbook Paperbac Paul Goodey, 2nd edition Publisher: Packt Publishing Limited

MOOCs Links and additional reading, learning, video material	
1.	https://youtu.be/AhbSZ8RpneQ
2.	https://youtu.be/H5aDLokMldg
3.	https://youtu.be/_n365oEeMwg

MDM TRACK2

Cyber Security

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

V SEMESTER
MDM3IT203: Cyber Security Technique and Tools

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Analyze and evaluate the cyber security needs of an organization.
2. Understand Cyber Security Regulations and Roles of International Law.
3. Design and develop security architecture for an organization.
4. Understand fundamental concepts of data privacy attacks

Unit I: Introduction to Cyber Security	**(7 Hrs.)**
Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.	
Unit II: Application Security	**(6 Hrs.)**
Application Security :Desktop Security ,Programming Bugs and Malicious Codes, Database Security ,Operating System Security, Disaster Recovery, Digital Signature, Ethical Hacking, Penetration Testing, Computer Forensics ,ISO 27001, cyber law and it act-2000,international standards for cyber sec, security audit and investigation, cyber security solutions	
Unit III: Network security	**(7 Hrs.)**
Network security: E-mail security , web application security , web browser security , e-commerce security , Wireless network security ,security issues in wireless networks, securing a wireless network ,mobile device security	
Unit IV: Network Defence tools	**(6 Hrs.)**
Network Defence tools : Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless Vs Stateful Firewalls, Network Address Translation (NAT) and Port Forwarding.VPN: the basic of Virtual Private Networks. Firewall: Introduction, Linux Firewall, Windows Firewall. Snort: Introduction Detection System.	
Unit V: Web Application Tools	**(7 Hrs.)**
Web Application Tools : Scanning for web vulnerabilities tools: Nikto, W3af, HTTP utilities - Curl, OpenSSL and Stunnel. Application Inspection tools – Zed Attack Proxy, Sqlmap, DVWA, Webgoat. Password Cracking and Brute-Force Tools: John the Ripper, L0htcrack, Pwdump, HTC-Hydra.	
Unit VI: Introduction to Cyber Crime and Investigation	**(6 Hrs.)**

Introduction to Cyber Crime and Investigation : Cyber Crimes, Types of Cybercrime, Hacking, Attack vectors, Cyberspace and Criminal Behavior, Clarification of Terms, Traditional Problems Associated with Computer Firewalls and Packet Filters, password Cracking, Keyloggers and Spyware, Virus and Warms, Trojan and backdoors, Steganography, DOS and DDOS attack, SQL injection, Buffer Overflow, Attack on wireless Networks	
Total Lecture	**39 Hours**

Textbooks:	
1.	Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley.
2.	B.B. Gupta, D.P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335,2018.

Reference Books:	
1.	Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2.	Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&F Group.

VI SEMESTER
MDM4IT204: Introduction to Blockchain Technology

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Contentedly discuss and describe the history, types and applications of blockchain 2. Gains familiarity with cryptography and Consensus algorithms. 3. Create and deploy projects using Web3j. 4. Implement an ICO on Ethereum. 5. Design blockchain based application with Swarm and IPFS

Unit I: Introduction To Blockchain	**(7 Hrs.)**
Distributed DBMS – Limitations of Distributed DBMS, Introduction to Blockchain – History, Definition, Distributed Ledger, Blockchain Categories – Public, Private, Consortium, Blockchain Network and Nodes.	
Unit II: Blockchain Types	**(6 Hrs.)**
Peer-to-Peer Network, Mining Mechanism, Generic elements of Blockchain, Features of Blockchain, and Types of Blockchain. Operation of Bitcoin Blockchain.	
Unit III: Blockchain Architecture	**(7 Hrs.)**
Blockchain Architecture – Block, Hash, Distributer P2P, Structure of Blockchain- Consensus mechanism: Proof of Work (PoW), Proof of Stake (PoS), Byzantine Fault Tolerance (BFT), Proof of Authority (PoA) and Proof of Elapsed Time (PoET).	
Unit IV Decentralization using blockchain	**(6 Hrs.)**
Decentralization Decentralization using blockchain Methods of decentralization , Disintermediation Contest-driven decentralization Routes to decentralization, How to decentralize, The decentralization framework examples.Blockchain and full ecosystem decentralization Storage Communication Computing power and decentralization.	
Unit V: Blockchains In Business And Creating ICO	**(7 Hrs.)**
Public versus private and permissioned versus permission less blockchains- Privacy and anonymity in Ethereum- Why are privacy and anonymity important? - The Ethereum Enterprise Alliance- Blockchainas-a-Service- Initial Coin Offering (ICO).	
Unit VI: Distributed Storage	**(6 Hrs.)**
Ethereum Virtual Machine- Swarm and IPFS,Basic concepts of cryptocurrencies.	
Total Lecture	**39 Hours**

Textbooks:	
1.	Imran Bashir, "Mastering Blockchain: Distributed Ledger Technology, decentralization, and smart contracts explained", 2nd Edition, Packt Publishing Ltd, March 2018.
2.	Bellaj Badr, Richard Horrocks, Xun (Brian) Wu, "Blockchain By Example: A developer's guide to creating

	decentralized applications using Bitcoin, Ethereum, and Hyperledger", Packt Publishing Limited, 2018.

Reference Books:	
1.	Tailor Jacobs ,"Blockchain: A Step-by-step Guide for Beginners to Implementing Blockchain Technology and Leveraging BlockchainProgramming" , 2017.
3.	Stephen P Williams ,"Blockchain : The next Every Thing", 2019.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=orexiRMFJqs
2.	https://www.youtube.com/watch?v=qOVAbKKSH10
3.	https://www.youtube.com/watch?v=SyVMma1IkXM

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech SoE and Syllabus 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Information Technology)

B.Tech. in Information Technology

SoE No. 23IT-101

MDM3 TRACK

Web Development

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

V SEMESTER
MDM3IT303: Web Programming Framework

Course Outcomes :
Upon successful completion of the course the students will be able to 1. **Explain** the architecture and core concepts of Node.js, AngularJS, and ReactJS in full-stack development. 2. **Develop** RESTful APIs using Node.js and Express, and perform CRUD operations with MongoDB. 3. **Design and implement** dynamic single-page applications using AngularJS and ReactJS components and routing. 4. **Integrate and deploy** full-stack web applications with authentication and database connectivity.

Unit I: Introduction to Node.js	**(7 Hrs.)**
Introduction to Server-side JavaScript, Node.js Architecture & Event-driven model, Setting up Node.js environment, npm and package management, Modules, File System, Buffers, Streams.	
Unit II: Node.js with Express and MongoDB	**(6 Hrs.)**
Express.js: routing, middleware, RESTful API development, Connecting with MongoDB using Mongoose, CRUD operations, Handling JSON and errors.	
Unit III: Frontend Development with AngularJS	**(6 Hrs.)**
Introduction to AngularJS ,- MVC architecture in AngularJS ,- Two-way binding, directives, controllers, services ,- Dependency injection and routing.	
Unit IV: Frontend Development with ReactJS	**(7 Hrs.)**
Introduction to ReactJS,- JSX and Components ,- Props, State, Lifecycle methods ,- Hooks: useState, useEffect,- Event handling, conditional rendering.	
Unit V: Integration of Frontend and Backend	**(6 Hrs.)**
Integrating Node/Express backend with Angular/React frontend ,- CORS handling and API consumption ,- Session and Token-based authentication (JWT) ,- Form handling and validation.	
Unit VI: Deployment and Project Development	**(7 Hrs.)**
Build and bundle frontend apps ,- Hosting backend and frontend using services like Heroku, Netlify - Environment variables and security,- Final project overview.	
Total Lecture	**39 Hours**

Textbooks:	
1.	Ethan Brown, *Learning Node.js*, O'Reilly
2.	Brad Dayley, *Learning AngularJS*, Addison-Wesley
3.	Alex Banks & Eve Porcello, *Learning React*, O'Reilly

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

Reference Books:	
1.	Full Stack Open – University of Helsinki (Online)
2.	Mozilla Developer Network (MDN) Web Docs

VI SEMESTER
MDM4IT304: Java Full Stack

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Understand fundamental Java concepts including OOP principles, data structures, collections, and file handling.
2. Apply JDBC and Java 8 features like lambda expressions, streams, and functional interfaces.
3. Analyze enterprise application components using Spring, Hibernate, and cloud integration with AWS.
4. Design responsive users interfaces using HTML5, JavaScript, and build basic SPAs using Angular or React.

Unit I	**(6 Hrs.)**
Java Basics: OOP Concepts, Data Structures, Collection Framework, File handling	
Unit II	**(6 Hrs.)**
RDBMS Fundamentals: Introduction – RDBMS Fundamentals , JDBC, JDBC API, DML (CRUD)	
Unit III	**(7 Hrs.)**
Advance Java Features: Introduction to Java 8 Features, Interface Enhancements, Functional Interfaces, Lambda Expression, ForEach , Method References, Streams API, JavaDocs	
Unit IV	**(7 Hrs.)**
User Interface Design: Introduction to User Interface (UI) Design , Building Responsive Web Pages using HTML5, Introduction to JavaScript, Basic Single Page Applications Using Angular OR React	
Unit V	**(7 Hrs.)**
Spring Framework: Introduction to Spring Core Overview of the Spring Framework, Basics of Dependency Injection, Introduction to MVC architecture, Introduction to Hibernate and Spring Microservices, Introduction to Spring Boot.	
Unit VI	**(6 Hrs.)**
Cloud and Virtualization: Virtualization Basics, Introduction to Cloud, RDB Cloud Fundamentals (SaaS, Paas, IaaS), Introduction to AWS (S3 Buckets, RDS), AWS Cloudfront	
Total Lecture	**39 Hours**

Textbooks:	
1.	The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Developer Chris Northwood First Edition
2.	Full Stack Web Development For Beginners: Learn Ecommerce Web Development using HTML5,CSS3,Bootstrap, JavaScript,MySQL and PHP By Riaz Ahmed

Reference Books:	
1.	Full Stack Java Development with Spring MVC, Hibernate, jQuery, and Bootstrap Mayur Ramgir First Edition
2.	Java for Web Development: Create Full-Stack Java Applications with Servlets, JSP Pages, MVC Pattern and Database Connectivity Sarika Agarwal and Vivek Gupta First Edition

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://nptel.ac.in/courses/106106156
2.	https://www.coursera.org/learn/introduction-to-web-development-with-html-css-javacript?trk_location=query-summary-list-link
3.	https://ict.iitk.ac.in/product/full-stack-developer-html5-css3-javascript-bootstrap-php-with-mysql-demo/

VI SEMESTER

Mandatory Learning Course (MLC)

MLC2126 : YCAP6

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

(Accredited 'A++' Grade by NAAC with a score of 3.6)

Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2023

7th & 8th Semester

(Department of Information Technology)

B. Tech in Information Technology

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B.TECH SCHEME OF EXAMINATION 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Information Technology)

B. Tech. in Information Technology

SoE No. 23IT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
SEVENTH SEMESTER															
1	7	PC	IT	23IT1701	Principles of Compiler Design	T	3	0	0	3	3	30	20	50	3
2	7	PC	IT	23IT1702	**Lab :** Principles of Compiler Design	P	0	0	2	2	1		60	40	
3	7	PC	IT	23IT1703	Software Engineering	T	3	0	0	3	3	30	20	50	3
4	7	PC	IT	23IT1704	**Lab** : Software Engineering	P	0	0	2	2	1		60	40	
5	7	PC	IT	23IT1705	**Lab :** Software Lab-3	P	0	0	2	2	1		60	40	
6	7	PE	IT		**Professional Elective-IV**	T	3	0	0	3	3	30	20	50	3
7	7	PE	IT		**Lab : Professional Elective-IV**	P	0	0	2	2	1		60	40	
8	7	PE	IT		**Professional Elective-V**	T	3	0	0	3	3	30	20	50	3
9	7	MDM	IT		**MD Minor Course-V**	T	2	0	0	2	2	30	20	50	3
10	7	STR	IT	23IT1706	Project Phase-II	P	0	0	8	8	4		60	40	
11	7	STR	IT	23IT1707	Campus Recrutment Training (CRT)	P	0	0	0	0	2			100	
12	7	STR	IT	23IT1708	Comprehensive Evaluation of Core Knowledge	P	0	0	2	2	1		60	40	
					TOTAL		**14**	**0**	**18**	**32**	**25**				

Professional Elective - IV					
1	7	PE-IV	IT	23IT1721	**PE-IV :** Blockchain Technology
2	7	PE-IV	IT	23IT1722	**PE-IV : Lab :** Blockchain Technology
3	7	PE-IV	IT	23IT1725	**PE-IV :** Basics of Bioinformatics
4	7	PE-IV	IT	23IT1726	**PE-IV : Lab :** Basics of Bioinformatics
5	7	PE-IV	IT	23IT1727	**PE-IV :** UI /UX Design
6	7	PE-IV	IT	23IT1728	**PE-IV : Lab :** UI /UX Design
7	7	PE-IV	IT	23IT1729	**PE-IV :** Software Construction and Maintenance
8	7	PE-IV	IT	23IT1730	**PE-IV : Lab :** Software Construction and Maintenance
9	7	PE-IV	IT	23IT1731	**PE-IV :** Game Design and Programming
10	7	PE-IV	IT	23IT1732	**PE-IV : Lab :** Game Design and Programming
11	7	PE-IV	IT	23IT1735	**PE-IV :** Augmented and Virtual Reality
12	7	PE-IV	IT	23IT1736	**PE-IV : Lab :** Augmented and Virtual Reality
13	7	PE-IV	IT	23IT1737	**PE-IV :** Parallel Computing
14	7	PE-IV	IT	23IT1738	**PE-IV : Lab :** Parallel Computing

Professional Elective - V					
1	7	PE-V	IT	23IT1741	**PE-V :** Edge Computing
3	7	PE-V	IT	23IT1745	**PE-V :** Genetic Algorithms and Application
4	7	PE-V	IT	23IT1747	**PE-V :** Software Testing and Quality Assurance
5	7	PE-V	IT	23IT1749	**PE-V :** Software Project Management
6	7	PE-V	IT	23IT1751	**PE-V :** Artificial Intelligence for Games
7	7	PE-V	IT	23IT1753	**PE-V :** PLC (Programming for Industrial Automation)
8	7	PE-V	IT	23IT1755	**PE-V :** Big Data Analytics
9	7	PE-V	IT	23IT1756	**PE-V :** Cloud Services
10	7	PE-V	IT	23IT1757	**PE-V :** Real Time Systems
11	7	PE-V	IT	23IT1758	**PE-V :** Information Retrieval

		July, 2023	**1.00**	**Applicable for AY 2023-24 Onwards**
Chairperson	**Dean (Acad. Matters)**	**Date of Release**	**Version**	

Nagar Yuwak Shikshan Sanstha's

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B.TECH SCHEME OF EXAMINATION 2023

(Scheme of Examination w.e.f. 2023-24 onward)

(Department of Information Technology)

B. Tech. in Information Technology

SoE No. 23IT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
EIGHTH SEMESTER															
1	8	MDM	IT	23IT1801	**MD Minor Course-VI**	T	2	0	0	2	2	30	20	50	3
2	8	STR	IT	23IT1802	Internship / On Job training	P	0	0	14	14	7			100	
					TOTAL		**2**	**0**	**14**	**16**	**9**				
					GRAND TOTAL		**121**	**0**	**87**	**210**	**176**				

Multidisciplinary Minor Courses

		Track 1	Track 2
Courses	**Sem**	**Cloud Computing**	**Cyber Security**
MDM-I	3	(MDM1IT101) Introduction to Cloud Computing	(MDM1IT201) Mathematics for Cyber Security
MDM-II	4	(MDM2IT102) Cloud Security	(MDM2IT202) Cyber Security Fundamentals
MDM-III	5	(MDM3IT103) Introduction to Salesforce	(MDM3IT203) Cyber Security Techniques and Tools
MDM-IV	6	(MDM4IT104) Application Development using Salesforce	(MDM4IT204) Introduction to Blockchain
MDM-V	7	(MDM5IT105) Cloud Web Services	(MDM5IT205) Blockchain Security
MDM-VI	8	(MDM6IT106) Edge Computing	(MDM6IT206) Advanced Cyber Security

		Track 3
Courses	**Sem**	**Web Development**
MDM-I	3	(MDM1IT301) Fundamentals of Web Programming
MDM-II	4	(MDM2IT302) Dynamic web Programming
MDM-III	5	(MDM3IT303) Web Programming Framework
MDM-IV	6	(MDM4IT304) Java Full Stack
MDM-V	7	(MDM5IT305) Dot Net Full Stack
MDM-VI	8	(MDM6IT306) AI Tools for Web Development

		July, 2023	**1.00**	**Applicable for AY 2023-24 Onwards**
Chairperson	**Dean (Acad. Matters)**	**Date of Release**	**Version**	

VII SEMESTER
23IT1701: Principles of Compiler Design

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Understand different phases of compilation process, lexical analyzer tool "Lex" Or "Flex" and YACC or Bison tool.
2. Apply parsing techniques, syntax directed translation scheme for source program.
3. Apply different code optimization techniques.
4. Design and implement a compiler for a source program.

Unit I	**(7 Hrs.)**
Introduction to Abstract Model & Grammar, Introduction to Compilation Process, Compilers & Translators, Phase structure of Compiler, Role of Lex, Design of Lexical Analysis.	
Unit II	**(8 Hrs.)**
Specifying Syntactic Structure of Programming Language using Context Free Grammars, The role of Parser, Top-down Parsing, and Bottom up Parsing, Predictive Parsers, and Recursive Decent Parser	
Unit III	**(7 Hrs.)**
Construction of efficient LR Parsers (SLR, CLR & LALR), Canonical Collection of set of items and construction of Parsing table, Implementation of LR Parsing table	
Unit IV	**(8 Hrs.)**
Syntax Directed Translation: Intermediate Code, Postfix notation, Parse tree and Syntax Trees, Three address codes, quadruples, triples, Translation of Arithmetic Expression, Boolean expressions, Control Statements. Array references, Procedure Calls, Declarations, Case Statements, Use of Compiler writing tools (Lex/Flex, Yacc /Biason).	
Unit V	**(7 Hrs.)**
Symbol Tables: Contents, Representing scope information. Error detection and Recovery: Error handling, Lexical-phase, Syntactic phase and semantic phase	
Unit VI	**(8 Hrs.)**
Introduction to Code Optimization, The principle sources of optimization, Loop optimization, The DAG representation, Introductory Data Flow analysis, Introduction to Code Generation: Object programs, Problems in Code Generation, Register allocation and assignment, Code generation from DAG, Peephole optimization.	
Total Lecture	**45 Hours**

Textbooks:

1. Compilers Principles, Techniques & Tools, Alfred V. Aho, Ravi Sethi , Jeffrey D Ullman, Addison Wesley. 2nd Edition
2. Principles of Compiler Design, Alfred V. Aho Jeffrey D. Ullman, Addison Wesley, 2nd Edition

Reference Books:	
1.	Compiler Design, O.G. Kakde, Laxmi Publication, 4th edition
2.	Introduction to Compiling Techniques: First Course Using ANSI C, LEX and YACC, J.P. Bennett, Alfred Waller Ltd

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/117/105/117105135/
2.	https://www.youtube.com/watch?v=fC7V8QsPBec

VII Semester
23IT1702: Lab - Principles of Compiler Design

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand different phases of compilation process, lexical analyzer tool "Lex" Or "Flex" and YACC or Bison tool. 2. Apply parsing techniques, syntax directed translation scheme for source program. 3. Apply different code optimization techniques. 4. Design and implement a compiler for a source program.

List of Practical's

Sr. No	Experiments Base On
1	LEX TOOL
2	YACC TOOL
3.	Practical Based on Top down parser design
4.	Practical Based on Bottom up parser
5.	Practical Based on code optimization

VII Semester

23IT1703: Software Engineering

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand different software process, models and appropriate architectural style in software development cycle. 2. Analyze the different software process model and appropriate architectural style to develop software. 3. Apply the software testing techniques in a variety of ways to test the software. 4. Design and analyze software development process with the help of UML.

Unit I	**(7 Hrs.)**
Introduction to Software Engineering .A Generic View of process, and project management, Process model(Waterfall, incremental, prototype, Spiral, Agile, RAD) CMM, Requirement Engineering: Eliciting Requirement, Developing Use Case, Analysis Model, Negotiation, Validation, Building the Analysis model: Requirement Analysis, Analysis Modelling Approaches, Data Modelling.	
Unit II	**(8 Hrs.)**
Design Engineering: Design Concept, Design Model, Pattern Based Software Design, Architectural, Design: Software Architecture., Data Design, Architectural style, Architectural design, Mapping, Data Flow into a Software Architecture, Component Level Design, User Interface Analysis Design, Interface Analysis ,Interface Design steps, Design Evaluation.	
Unit III	**(7 Hrs.)**
Testing Strategies: Strategic Approach, Strategic issues, Strategies for conventional Software, Validation Testing, Testing Tactics: White Box Testing, regression Testing, basic Path testing, Control Structure Testing, Black Box Testing, Object Oriented Testing Method, Testing Method applicable at class Level, Interclass Test Case Design. Metrics: Software Quality.	
Unit IV	**(7 Hrs.)**
Project Management, KPES for project management, Metrics for Process and Projects, Project Estimation, Project Scheduling, Risk Management, Quality Management and Change Management.	
Unit V	**(8 Hrs.)**
Overview of UML, Conceptual Models of the UML, UML and Design Patterns, Applying the UML, UML Diagrams for Payroll processing systems, ATMS, small companies etc.	
Unit VI	**8 Hrs.)**
Advanced Topics in Software Engineering: Case studies based on recent Trends, Reengineering, and CASE tools, client server software Engineering. CORBA	
Total Lecture	**45 Hours**

Textbooks:	
1.	Software Engineering –A Practitioner's Approach Seventh Edition
2.	Lethbridge and Pearson Object Oriented Software Engineering 2nd Edition,2005 Pearson Education

Reference Books:	
1.	I. Somerville Software Engineering 10th Edition, 2014, Oxford University Press
2.	Dr. Pankaj Jalote An integrated approach to software Engineering 3rd Edition,1991, Narosa Pub

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=AN5I6fFxyfs
2.	https://www.youtube.com/watch?v=w0LQh0vCeqI

VII SEMESTER
23IT1704: Lab: Software Engineering

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand different software process, models and appropriate architectural style in software development cycle 2. Analyze the different software process model and appropriate architectural style to develop software 3. Apply the software testing techniques in a variety of ways to test the software. 4. Design and analyze software development process with the help of UML.

Sr. No	Experiments Base On
1	**Requirement Gathering and Analysis**: Prepare Software Requirements Specification (SRS) document for a given case study.
2	Use Case Modeling: Develop Use Case Diagrams using tools
3	**Design Modeling**: Create Class Diagrams, Sequence Diagrams, and State Diagrams using UML.
4	**Data Flow Diagrams (DFD)**: Draw Context-Level and Level-1 DFDs for the given software system.
5	Design Entity-Relationship diagrams for data modeling of the system.
6	**Test Case Design (White-box Testing)**: Apply Statement Coverage and Branch Coverage techniques using a code snippet.
7	**Test Case Design (Black-box Testing)**: Design test cases using Equivalence Class Partitioning and Boundary Value Analysis.
8	**Mini Project**: Complete a mini-project involving full SDLC phases: requirement analysis, design, implementation, and testing

VII SEMESTER
23IT1705: Software Lab3

Course Outcomes :

Upon successful completion of the course the students will be able to

1. **Apply** AI code assistants for code generation, optimization, debugging, and refactoring in software development.
2. **Use** AI tools for automated testing, code documentation, and static code analysis to improve software quality.
3. **Apply** AI-assisted techniques for requirements analysis, user-story generation, API documentation, and software design using UML/ER/architecture diagrams.
4. **Develop and evaluate** a software application using AI assistance throughout the Software Development Life Cycle (SDLC), including CI/CD and security analysis.

Sr. No.	Practical
1	**Installation and Exploration of an AI Code Assistant:** To install and configure [GitHub Copilot / Windsurf / Ollama] as the AI code assistant in an IDE, and to compare the AI-generated boilerplate code with manually written code.
2	**AI-Assisted Code Writing and Optimization:** To write and optimize a given program using [GitHub Copilot / Windsurf / Ollama] as the AI tool, and to evaluate the efficiency of the AI-generated solution.
3	**AI-Assisted Debugging:** To identify and fix errors in a given buggy program using [GitHub Copilot / Windsurf / Ollama] as the AI tool, and to verify the correctness of the AI-suggested fix.
4	**AI-Assisted Code Refactoring and Auto-Documentation:** To refactor a piece of legacy/unstructured code using [GitHub Copilot / Windsurf / Ollama] as the AI tool, and to auto-generate comments and docstrings for the refactored code.
5	**AI-Generated Unit Test Cases:** To generate unit test cases for a given function/module using [GitHub Copilot / Windsurf / Ollama] as the AI tool, and to execute them using a testing framework.
6	**AI-Based Static Code Analysis and Vulnerability Scanning:** To identify code smells, bugs, and security vulnerabilities in a sample project using a static analysis tool with [GitHub Copilot / Windsurf / Ollama] as the AI tool, and to verify the fixes applied.
7	**AI-Generated API Documentation:** To generate API documentation from a given piece of backend code using [GitHub Copilot / Windsurf / Ollama] as the AI tool, and to validate the generated documentation.
8	**AI-Based Conversion of Requirements into User Stories:** To convert a given Software Requirement Specification (SRS) excerpt into user stories and acceptance criteria using [GitHub Copilot / Windsurf / Ollama] as the AI tool, and to evaluate their completeness.
9	**AI-Generated UML/ER/Architecture Diagrams:** To generate UML/ER diagram code from a

	textual description using [GitHub Copilot / Windsurf / Ollama] as the AI tool, and to render and verify the diagram.
10	**AI-Assisted Automated UI Testing:** To write and execute automated UI test scripts using Selenium with [GitHub Copilot / Windsurf / Ollama] as the AI tool, and to evaluate the accuracy of the generated test cases.
11	**AI-Based CI/CD Build Log Analysis:** To analyze a CI/CD build log using [GitHub Copilot / Windsurf / Ollama] as the AI tool, and to identify and verify the probable cause of failure.
12	**Mini Project – End-to-End AI-Assisted Software Development:** To design and develop a small application using [GitHub Copilot / Windsurf / Ollama] as the AI tool at every stage of the SDLC, and to document the complete AI-assisted workflow.

VII SEMESTER
23IT1721: PE IV Blockchain Technology

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand the concept of Blockchain, architecture, Types and structure of Blockchain. 2. Understand the concepts of Blockchain Consensus mechanism. 3. Understand the concept of Cryptography and Cryptocurrency 4. Apply the knowledge of blockchain and bitcoin to achieve decentralization. 5. Apply concepts of Cryptocurrency to Etherium.

Unit I: Introduction to Block chain.	**(7 Hrs.)**
History, Definition, Distributed Ledger, Blockchain Categories – Public, Private, Consortium, Blockchain Network and Nodes, Peer-to-Peer Network, Mining Mechanism, Generic elements of Blockchain, Features of Blockchain, and Types of Blockchain.	
Unit II: Operation of Bitcoin	**(7 Hrs.)**
Blockchain, Blockchain Architecture – Block, Hash, Distributer P2P, Structure of Blockchain- Consensus mechanism: Proof of Work (PoW), Proof of Stake (PoS), Byzantine Fault Tolerance (BFT), Proof of Authority (PoA) and Proof of Elapsed Time (PoET).	
Unit III: Introduction to cryptography & Cryptocurrencies	**(7 Hrs.)**
Introduction to cryptography-Encryption and Decryption-Ciphers- -hashing algorithms-SHA-256 algorithm-Application of SHA algorithm, Hash Pointers and Data Structures, Digital Signatures.	
Unit IV: How Bitcoin Achieves Decentralization	**(8 Hrs.)**
Centralization vs. Decentralization, Distributed consensus, Distributed consensus protocol, Byzantine Generals Problem, Consensus without identity using a block chain, Bitcoin consensus algorithm , Incentives and proof of work.	
Unit V: How to Store and Use Bitcoins	**(8 Hrs.)**
Simple Local Storage, Hot and Cold Storage, Splitting and Sharing Keys, Online Wallets and Exchanges, Payment Services, Transaction Fees, Currency Exchange Markets.	
Unit VI: Ethereum: a Programmable Blockchain	**(8 Hrs.)**
Introduction, Ether, Smart Contracts: State, History, Solidity and a Sample Smart Contract. Current and Potential Uses.	
Total Lecture	**45 Hours**

Textbooks:	
1.	Bitcoin and Cryptocurrency Technologies. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder,2016
2.	Imran Bashir, "Mastering Blockchain: Distributed Ledger Technology, decentralization, and smart contracts explained", 2nd Edition, Packt Publishing Ltd, March 2018.
3.	Bellaj Badr, Richard Horrocks, Xun (Brian) Wu, "Blockchain By Example: A developer's guide to creating decentralized applications using Bitcoin, Ethereum, and Hyperledger", Packt Publishing Limited, 2018
4.	An Introduction to etherim and Smart Contract.Sebastian E. Peyrott, Auth0 Inc. Version 0.1.0,2017

Reference Books:	
1.	W. Mao, "Modern Cryptography – Theory and Practice", Pearson Education,2011.
2.	Imran Bashir, "Mastering Blockchain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained", Second Edition, Packt Publishing, 2018.
3	Andreas M. Antonopoulos , "Mastering Bitcoin: Unlocking Digital Cryptocurrencies", O'Reilly Media Inc, 2015.
4.	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", Princeton University Press, 2016.

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1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://www.pearson.com/us/higher-education/product/Stallings-Cryptography-and-Network-Security-Principles-and-Practice-5th-Edition/9780136097044.html
2.	https://www.lopp.net/pdf/princeton_bitcoin_book.pdf
3.	http://nptel.ac.in/courses/106105031/
4.	https://www.coursera.org/learn/wharton-cryptocurrency-blockchain-introduction-digital-currency
5.	https://www.udemy.com/course/build-your-blockchain-az/

VII SEMESTER
23IT1722: Lab: PE IV Blockchain Technology

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Understand the concept of Blockchain, architecture, Types and structure of Blockchain.
2. Understand the concepts of Blockchain Consensus mechanism.
3. Understand the concept of Cryptography and Cryptocurrency
4. Apply the knowledge of blockchain and bitcoin to achieve decentralization.
5. Apply concepts of Cryptocurrency to Etherium.

Sr. No	Experiments Base On
1	Creation of Block
2	Blockchain implementation
3	Creating ERC20 token
4.	Blockchain implementation using Merkle Trees
5.	Mining in Blockchain
6.	Peer-to-Peer implementation using Blockchain
7.	Creating Crypto-currency Wallet
8.	Mini Application development

VII Semester
23IT1725: PE-IV: Basics of Bioinformatics

Course Outcomes:
Upon successful completion of the course the students will be able to apply 1. Knowledge and awareness of the basic principles and concepts of biology, computer science and mathematics 2. Existing software effectively to extract information from large databases and to use this information in computer modeling 3. Problem-solving skills, including the ability to develop new algorithms and analysis methods 4.An understanding of the intersection of life and information sciences, the core of shared concepts, language and skills the ability to speak the language of structure-function relationships, information theory, gene expression, and database queries

Unit I	**(8 Hrs.)**
Need for Bioinformatics technologies , Overview of Bioinformatics technologies , Structural bioinformatics , Data format and processing , secondary resources and applications , Role of Structural bioinformatics - Biological Data Integration System.	
Unit II	**(7 Hrs.)**
Bioinformatics data , Data warehousing architecture , data quality , Biomedical data analysis , DNA data analysis , Protein data analysis , Machine learning , Neural network architecture and applications in bioinformatics.	
Unit III	**(7 Hrs.)**
Need for tools, Knowledge discovery, Industry trends and data mining tools; Data submission tools, Data analysis tools, Prediction tools and modeling tools.	
Unit IV	**(7 Hrs.)**
Hidden markov modeling for biological data analysis , Sequence identification , Sequence classification , multiple alignment generation , Comparative modeling , Protein modeling , genomic modeling , Probabilistic modeling , Bayesian networks , Boolean networks - Molecular modeling , Computer programs for molecular modeling.	
Unit V	**(8 Hrs.)**
Gene regulation , motif recognition , motif detection , strategies for motif detection , Visualization , Fractal analysis , DNA walk models , one dimension , two dimension , higher dimension , Game representation of Biological sequences , DNA, Protein, Amino acid sequences.	
Unit VI	**(8 Hrs.)**
Microarray technology for genome expression study , image analysis for data extraction , preprocessing , segmentation , gridding , spot extraction , normalization, filtering , cluster analysis , gene network analysis , Compared Evaluation of Scientific Data Management Systems , Cost Matrix , Evaluation model - Benchmark – Tradeoffs.	
Total Lecture	**45 Hours**

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

VII SEMESTER
23IT1726: Lab: PE IV Basics of Bioinformatics

Course Outcomes:

Upon successful completion of the course the students will be able to apply

1. Knowledge and awareness of the basic principles and concepts of biology, computer science and mathematics
2. Existing software effectively to extract information from large databases and to use this information in computer modeling
3. Problem-solving skills, including the ability to develop new algorithms and analysis methods
4. An understanding of the intersection of life and information sciences, the core of shared concepts, language and skills the ability to speak the language of structure-function relationships, information theory, gene expression, and database queries

Sr. No	Experiments Base On
1	Explore Biological Databases
2	Structural Visualization
3	Biological Data Format Conversion
4.	DNA Sequence Analysis
5.	Apply a simple classification algorithm (e.g., KNN, SVM) for gene expression data using Python libraries (scikit-learn).
6.	Use a neural network (e.g., TensorFlow/Keras) to predict protein secondary structure or classify sequences.
7.	Apply clustering or association rule mining (e.g., using WEKA or Orange) on biological datasets.
8.	Implement a simple 1D/2D DNA walk model using Python or MATLAB; analyze DNA sequence complexity.

VII SEMESTER
23IT1727: PE IV- UX and UI Design

Course Outcomes :
Upon successful completion of the course the students will be 1. Understand the definition and principles of UI/UX Design in order to design with intention. 2. Achieve a deep understanding of the entire life-cycle of design process, purpose, and tools. 3. Learn the basics of HCI (human-computer interaction) and the psychology behind user decision-making. 4. Discover the industry-standard tools and specific project deliverables in UI/UX.

Unit I	**(8 Hrs.)**
INTRODUCTION :Human, Computer Interface , Characteristics Of Graphics Interface , Direct Manipulation Graphical System , Web User Interface , Popularity , Characteristic & Principles.	
Unit II	**(7 Hrs.)**
HUMAN COMPUTER INTERACTION:User Interface Design Process , Obstacles , Usability , Human Characteristics In Design, Human Interaction Speed , Business Functions , Requirement Analysis , Direct , Indirect Methods , Basic Business Functions , Design Standards , System Timings , Human Consideration In Screen Design , Structures Of Menus , Functions Of Menus, Contents Of Menu, Formatting , Phrasing The Menu , Selecting Menu Choice, Navigating Menus, Graphical Menus.	
Unit III	**(8 Hrs.)**
WINDOWS Characteristics, Components, Presentation Styles, Types, Managements, Organizations, Operations, Web Systems, Device, Based Controls Characteristics, Screen , Based Controls , Operate Control , Text Boxes, Selection Control, Combination Control, Custom Control, Presentation Control.	
Unit IV	**(8 Hrs.)**
Text For Web Pages , Effective Feedback, Guidance & Assistance, Internationalization, Accessibility, Icons, Image, Multimedia , Coloring.	
Unit V	**(7 Hrs.)**
WINDOWS LAYOUT, TEST Prototypes , Kinds Of Tests , Retest , Information Search , Visualization , Hypermedia , WWW, Software Tools.	
Unit VI	**(7 Hrs.)**
INTRODUCTION TO ACTIVE ELEMENTS OF INTERFACE DESIGN: Static to Active, Functionality, Speed and Style, Composition and Structure, Buttons, Not Buttons, States and Changes	
Total Lecture	**45 Hours**

Textbooks:	
1.	Ben Shneiderman, Designing the user interface, Pearson Education Asia, 2004, 3rd edition
2.	Wilbert O Galitz, The essential guide to user interface design, Wiley DreamTech, 2009

Reference Books:

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

1.	Alan Cooper, The Essential Of User Interface Design, Wiley DreamTech, 2009

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1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=Ol8D69VKX2k
2.	https://www.youtube.com/watch?v=4nEr2Z2tItg
3.	https://www.youtube.com/watch?v=-Bwiv5EGucs

VII SEMESTER
23IT1728: Lab: PE IV- UX and UI Design

Course Outcome:

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

1. Conduct user research using surveys, interviews, and competitor analysis to create user personas and journey maps.
2. Develop low-fidelity and high-fidelity wireframes using industry-standard tools like Figma or Adobe XD, and create interactive prototypes for user testing.
3. Perform usability testing to identify design flaws and iterate on UI/UX solutions based on user feedback for an enhanced user experience.
4. Apply UI/UX principles to design a responsive, accessible interface and build a professional portfolio showcasing real-world projects.

Sr.No.	Problem Statements
1	PART-1 Lab based o Formal Elements of Interface Design
2	PART-2 Lab based Active Elements of Interface Design • Imagery • Typography
3	PART-2 Lab based Active Elements of Interface Design • Design Before Design • Look and Feel
4	PART-2 Lab based Active Elements of Interface Design • Language as a design tool • Color and Shape
6	PART-2 Lab based Active Elements of Interface Design • Icons
7	PART-3 Lab based composing the Elements of Interface Design • Static to Active • Functionality • Buttons

8	PART-3 Lab based composing the Elements of Interface Design • Speed and Style • Composition and Structure
9	PART-3 Lab based composing the Elements of Interface Design Not Buttons • States and Changes
10	Case study based on complete UI/UX Designing on the selected application with the use of open source tool.

VII SEMESTER
23IT1729: PE IV Software Construction and Maintenance

Course Outcomes:

Upon successful completion of the course the students will be able to

1. Apply the fundamentals of software construction and appreciate the challenges in software construction.
2. Interpret key practical construction considerations such as design, languages, coding, testing, quality and reuse.
3. Understand and recognize the importance of modern construction technologies
4. Learn about Construction Tools including development environments, GUI Builders etc.

Unit I: Software Construction Fundamentals and Managing Construction	**(7 Hrs.)**
Software Construction Fundamentals: Minimizing Complexity; Anticipating Change; Constructing for Verification; Reuse; Standards in Construction, Managing Construction: Construction in Life Cycle Models; Construction Planning; Construction Measurement	
Unit II: Practical Considerations	**(7 Hrs.)**
Construction Design; Construction Languages; Coding; Construction Testing; Construction for Reuse; Construction with Reuse; Construction Quality; Integration	
Unit III: Construction Technologies	**(7 Hrs.)**
API Design and Use, Object-Oriented Runtime Issues, Parameterization and Generics; Assertions, Design by Contract, and Defensive Programming; Error Handling, Exception Handling, and Fault Tolerance; Executable Models; State-Based and Table-Driven Construction Techniques; Runtime Configuration and Internationalization - Development Environments; GUI Builders; Unit Testing Tools; Profiling, Performance Analysis and Slicing Tools	
Unit IV: Software Maintenance Basics	**(7 Hrs.)**
Software Maintenance; customer's View point; Economic of Maintenance; A Bird's Eye view of Maintenance; Different type of software products; An Overview of corrective Maintenance; Other forms of Maintenance; Adaptive Maintenance; Enhancement Requests; Maintenance Processes; Customer side preliminary Activities; Skill sets needed for the various Roles During Problem Reporting.	
Unit V: Problem Resolution &Fix Distribution	**(6 Hrs.)**
Problem Resolution: High Level Overview of Activities in problem Resolution; Categorizing the problem; Identifying the Right Developer for fixing the problem; Reproducing the problem; Scheduling for release. Fix Distribution: High Level Overview of Activities in problem Resolution; Categorizing the problem; Identifying the Right Developer for fixing the problem; Reproducing the problem; Scheduling for release.	
Unit VI: Contemporary issues	**(6 Hrs.)**
Applications of software construction and maintenance in industry.	
Total Lecture	**40 Hours**

Textbooks:

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

1.	McConnell, Steve, Code complete: A practical handbook of software construction, 2nd Edition, Microsoft Press, 2012.
2.	Gopalaswamy Ramesh and Ramesh Bhattiprolu, Software Maintenance - Effective Practices for Geographically Distributed Environments, Tata McGraw-Hill Education, 2012.

Reference books:	
1.	A. Hunt and D. Thomas, The Pragmatic Programmer , from journey man to master, Addison-Wesley, 2010.
2.	B.W. Kernighan and R. Pike, The Practice of Programming, Pearson Eductaion India, 2012.
3.	SWEBOK V3.0, Guide to the Software Engineering Body of Knowledge, A Project of the IEEE, Computer Society, 2014.

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=nulFv99VBGs
2.	https://www.youtube.com/watch?v=OjRmMP1zGuQ
3.	https://www.youtube.com/watch?v=0FX7ThtwPVE

VII SEMESTER
23IT1730: Lab: PE IV Software Construction and Maintenance

Course Outcomes
Upon successful completion of the course the students will be able to 1. Describe principles like minimizing complexity, anticipating change, and constructing for verification. 2. Apply modular and object-oriented programming principles 3. Design and implement unit, integration, and regression tests.

Minimum Eight Practical's to be performed from the list as below

SN	**Experiments based on**
1	Write a program to implement a calculator using modular functions (each operation in its own function)
2	Write a program to implement a plugin system where new features can be added without modifying core logic.
3	Write a program with unit tests using a testing framework (e.g., JUnit, pytest)
5	Write a script to count lines of code, comment ratio, and cyclomatic complexity.
6	Write a program using SOLID principles (e.g., single-responsibility and open/closed).
7	Design and implement a library for common mathematical operations and reuse it in multiple scripts.
8	Write a program with intentional bugs and fix them using debugging tools and static analysis.
9	Write a program with bugs, have peers file bug reports, and fix them based on severity.
10	Modify a program to work on a new OS or library version.

VII Semester
23IT1731: PE IV Game Design and Programming

Course Outcome :
On completion of this course, the student will be able to 1. Understand different types/genres of video games and the components thereof. 2. Able to write scripts which control the behavior of different game components. 3. Able to create realistic scenes and environments. 4. Able to design, write and deploy 2D video games 5. Apply hands-on experience with game engines, e.g., Unity.

Unit 1: Motivation; Types of games	**(8 Hrs.)**
Motivation; Types of games, Different aspects of game design; Different components in a game; Game Engines; Geometric primitives, 2D and 3D linear transforms, Homogeneous matrices; Examples of games.	
Unit 2: Different image formats	**(8 Hrs.)**
Different image formats; Polygon file formats; Creating sprites; Rigging; Animations using sprite-sheets; Animations using key frames; Animation controllers. Setting up a project, Scene View, Game View, Inspector, Console, Hierarchy, Game Objects, Prefabs, and Components.	
Unit 3: Scenes	**(8 Hrs.)**
Scenes; Tiles, visual continuity in tiles; Adding objects to scene; Prefabs; Lighting, RGB space, transparency, texture mapping; Collectibles; Navigation and path finding, Input Methods, invoke(),Start() and Awake(), Game Loops, Update(), FixedUpdate() and LateUpdate(),Singletons,Coroutines, Enumerators.	
Unit 4: Physics engines	**(7 Hrs.)**
Physics engines; Gravity simulation; Rigid body interaction; Collisions. Rigid body, Components, Unity Colliders, Physics Materials, Scripting Collision Events.	
Unit 5: Layout	**(7 Hrs.)**
Layout; Menu system; Visual components; Event system, Skins, Canvas, Buttons, Anchors ,Pivots RectTransform vs Transforms, I Design Concepts.	
Unit 6: Audio assets	**(7 Hrs.)**
Audio assets; Different audio formats; Audio mixing.	
Total Lectures	**(45 Hrs.)**

Text Books	
1	Game Programming Patterns 3rd edition Nystrom Robert Genever Benning
2	Introduction to Game Analysis , 2nd Edition, Clara Fernandex-vara

Reference Books	
1	Unity Game Development Cookbook: Essentials for Every Game 1st Edition Paris Buttfield-Addison O'Reilly Media

MOOCs Links and additional reading, learning, video material	
1.	https://www.ltu.se/en/education/programme/tkdpg-computer-game-development-and-programming
2.	https://www.youtube.com/watch?v=w0LQh0vCeqIhttps://youtu.be/MFL9QggMqGw
3.	https://onlinecourses.nptel.ac.in/noc22_cs77/preview
4.	https://www.classcentral.com/course/swayam-games-and-information-269709

VII Semester

23IT1732: PE IV Lab: Game Design and Programming

Course Outcome :

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

1. Understand different types/genres of video games and the components thereof.
2. Able to write scripts which control the behavior of different game components.
3. Able to create realistic scenes and environments.
4. Able to design, write and deploy 2D video games
5. Apply hands-on experience with game engines, e.g., Unity.

Experiments based on theory content covered

VII Semester
23IT1735: PE IV: Augmented and Virtual Reality

Course Outcome
On completion of this course, the student will be able to
1. Describe how VR systems work and list the applications of VR. 2. Understand the design and implementation of the hardware that enables VR systems to be built. 3. Understand the system of human vision and its implication on perception and rendering. 4 Explain the concepts of motion and tracking in VR systems.

Unit I : Introduction to Virtual Reality	**(8 Hrs.)**
Defining Virtual Reality, History of VR, Human Physiology and Perception, Key Elements of Virtual Reality Experience, Virtual Reality System, Interface to the Virtual World-Input & output- Visual, Aural & Haptic Displays, Applications of Virtual Reality.	
Unit II : Virtual Environment	**(6 Hrs.)**
Input: Tracker, Sensor, Digital Gloves, Movement Capture, Video-based Input, 3D Menus & 3D Scanner etc. Output: Visual /Auditory / Haptic Devices. Generic VR system: Introduction, Virtual environment, Computer Environment, VR technology, Model of interaction, VR Systems. Animating the Virtual Environment: Introduction, The dynamics of numbers, Linear and Nonlinear interpolation, the animation of objects, linear and non-linear translation, shape & object in between, free from Deformation, particle system. Physical Simulation: Introduction, Objects falling in a gravitational field, Rotating wheels, Elastic collisions, projectiles, simple pendulum, Springs, Flight dynamics of an aircraft	
Unit III Augmented Reality	**(6 Hrs.)**
Taxonomy, technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, Augmented reality methods, visualization techniques for augmented reality, enhancing interactivity in AR environments, evaluating AR systems.	
Unit IV : Development Tools and Frameworks:	**(7 Hrs.)**
Human factors: Introduction, the eye, the ear, the somatic senses Hardware: Introduction, sensor hardware, Head-coupled displays, Acoustic hardware, Integrated VR systems. Software: Introduction, Modeling virtual world, Physical simulation, VR toolkits, Introduction to VRML	
Unit V : Motion & Tracking	**(7 Hrs.)**
Motion in Real and Virtual Worlds- Velocities and Accelerations, The Vestibular System, Physics in the Virtual World, Mismatched Motion and Vection Tracking- Tracking 2D & 3D Orientation, Tracking Position and Orientation, Tracking Attached Bodies	
Unit VI: Interaction & Audio	**(6 Hrs.)**
Interaction - Motor Programs and Remapping, Locomotion, Manipulation, Social Interaction. Audio -The Physics of Sound, The Physiology of Human Hearing, Auditory Perception, Auditory Rendering	
Total Lecture	**45 Hours**

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Textbook:	
1	Designing Virtual Systems: Gerard Jounghyun Kim, The Structured Approach, 2005
3	Spatial Augmented Reality: Oliver Bimber and Ramesh Raskar, Merging Real and Virtual Worlds, 2005.
4	Understanding Augmented Reality, Concepts and Alan B. Craig Applications, Morgan Kaufmann, 2013.

Reference Books	
1	3D User Interfaces, Theory and Practice, Doug A Bowman, Ernest Kuijff, Joseph J LaViola, Jr and Ivan Poupyrev Addison Wesley, USA, 2005.

YCCE e- library book links	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=04AMaTsXFJU

VII Semester
23IT1736: Lab: Virtual and Augmented Reality

Course Outcomes
On completion of this course, the student will be able to 1. Describe how VR systems work and list the applications of VR. 2. Understand the design and implementation of the hardware that enables VR systems to be built. 3. Understand the system of human vision and its implication on perception and rendering. 4 Explain the concepts of motion and tracking in VR systems.

S. N.	List of Practical
1	Installation of Unity and Visual Studio, setting up Unity for VR development, understanding documentation of the same.
2	Demonstration of the working of HTC Vive, Google Cardboard, Google Daydream and Samsung gear VR.
3	Develop a scene in Unity that includes: i. A cube, plane and sphere, apply transformations on the 3 game objects. ii. Add a video and audio source.
4	Develop a scene in Unity that includes a cube, plane and sphere. Create a new material and texture separately for three Game objects. Change the colour, material and texture of each Game object separately in the scene. Write a C# program in visual studio to change the colour and material/texture of the game objects dynamically on button click.
5	Develop a scene in Unity that includes a sphere and plane. Apply Rigid body component, material and Box collider to the game Objects. Write a C# program to grab and throw the sphere using vr controller.
6	Develop a simple UI (User interface) menu with images, canvas, sprites and button. Write a C# program to interact with UI menu through VR trigger button such that on each successful trigger interaction display a score on scene.
7	Create an immersive environment (living room/ battlefield/ tennis court) with only static game objects. 3D game objects can be created using Blender or use available 3D models.
8	Include animation and interaction in the immersive environment created in Assignment 7.
9	Mini-Projects/ Case Study Create a virtual environment for any use case. The application must include at least 4 scenes which can be changed dynamically, a good UI, animation and interaction with game objects. (e.g. VR application to visit a zoo)

VII SEMESTER

23IT1737: PE IV PARALLEL COMPUTING

Course Outcomes :

Upon successful completion of the course the students will be

1. Compare & Compute speedup, efficiency, and scaled speedup of parallel computations
2. Analyze and resolve the dependences in single, double and multi-level loops.
3. Design and develop parallel algorithms suited for Shared and Distributed memory models using Open-MP & MPI.
4. Write code using accelerator technologies of GPGPUs with CUDA for heterogeneous parallel programming environments.

Unit I	**(7 Hrs.)**
Introduction to parallel computing: Need of ever increasing performance, building parallel systems, need to write parallel programs, Parallel hardware, Parallel Software, Coordinating the processes/threads, Shared-memory, Distributed-memory, Programming hybrid systems. Parallel Programming Platforms: Implicit parallelism, Limitation of Memory system performance, Dichotomy of parallel computing platforms, physical organization of parallel platforms, communication cost in parallel machines.	
Unit II	**(7 Hrs.)**
Principles of Parallel Algorithm Design: Preliminaries, Decomposition Techniques, Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing. Methods for Containing Interaction Overheads Parallel Algorithm Models.	
Unit III	**(7 Hrs.)**
Dependence Concepts: Basic introduction of dependence in single loop and double loop, index and iteration spaces and perfect loop nest, loop unrolling, test for dependences, GCD test, Bound test.	
Unit IV	**(9 Hrs.)**
Shared-Memory Programming with OpenMP: What is OpenMP, creating team of threads, OpenMP Memory model, thread synchronization, Directives, Sharing the Work among Threads in an OpenMP Program : Loop Construct, The Sections Construct , The Single Construct , Workshare Construct, Combined Parallel Work-Sharing Constructs ,Clauses to Control Parallel and Work-Sharing Constructs, OpenMP Synchronization Constructs ,Interaction with the Execution Environment, OpenMP Clauses : If Clause , Num threads Clause, Ordered Clause, Reduction Clause, Copyin Clause ,Copyprivate Clause ,Advanced OpenMP Constructs: Nested Parallelism , Flush Directive , Thread private Directive.	
Unit V	**(8 Hrs.)**
Distributed-Memory Programming with MPI : Compilation and execution, MPI programs ,MPI_Init and MPI_Finalize, Communicators: MPI_Comm_ size and MPI_ Comm_rank, MPI_Send ,MPI_Recv, Message matching, Semantics of MPI_Send and MPI_Recv, Dealing with I/O, Collective communication, MPI derived data types.	
Unit VI	**(7 Hrs.)**
Compute Unified Device Architecture (CUDA):CUDA Architecture, Introduction to CUDA C, Kernel Call,	

Passing parameters, Querying Devices, Thread Cooperation: Splitting blocks, Shared Memory and Synchronization.	
Total Lecture	**45 Hours**

Textbooks:	
1.	Introduction to Parallel Computing AnanthGrama, Anshul Gupta, George Karypis, Vipin Kumar, Second edition.
2.	Dependence Concept by Utpal Banerjee Publishers
3.	CUDA by Example: An IntroductIon to General- Purpose GPU Programming by Jason Sanders, Edward Kandrot.

Reference Books:	
1.	Using OpenMP Barbara Chapman, Gabriele Jost, Ruud van der Pas
2.	An Introduction to Parallel Programming Peter S. Pacheco , Morgan Kaufmann ,ELSEVIER

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=a8R784VtXBg&list=PLp6ek2hDcoNBAyEJmxsOowMYNTKsUmTZ8
2.	https://www.youtube.com/watch?v=BjZPuSO8Lvc

VII SEMESTER
23IT1738: Lab: PE IV PARALLEL COMPUTING

Course Outcomes :
Upon successful completion of the course the students will be 1. Compare & Compute speedup, efficiency, and scaled speedup of parallel computations 2. Analyze and resolve the dependences in single, double and multi-level loops. 3. Design and develop parallel algorithms suited for Shared and Distributed memory models using Open-MP & MPI. 4. Write code using accelerator technologies of GPGPUs with CUDA for heterogeneous parallel programming environments.

S.N.	**List of Practical**
1.	Write a "Hello world" Program Using OpenMP pragmas.
2	Write a OpenMP program to find Sum of Natural Numbers using OpenMP Parallel FOR Directive
3	Write a OpenMP program to find Sum of Natural Numbers using OpenMP REDUCTION Clause
4	Write a OpenMp program for Simple Matrix Multiplication (Sequential vs. Parallel)
5	Write a OpenMP program to illustrate Data Race condition
6	Write a OpenMP program to illustrate Managing Shared & Private Data
7	Write a "Hello world" Program Using MPI to illustrate the parallel programming model.
8	Write a Vector Addition program using MPI with Scatter and Gather operations:
9	Write a program for matrix multiplication using CUDA.
10	Write a CUDA program for Image Processing (e.g., Edge Detection).

SEMESTER VII
23IT1741: PE V- Edge Computing

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Explain the need for Edge Computing over traditional cloud models by identifying key factors such as latency, bandwidth, and privacy, and describe the architectural components and real-world use cases like IoT and smart cities. 2. Demonstrate knowledge of edge networking models and communication protocols and analyze their role in enabling user applications in edge environments such as 5G networks and autonomous systems. 3. Illustrate distributed system concepts to evaluate their relevance and implementation in edge and fog computing scenarios. 4. Apply AI frameworks and container technologies like Docker and Kubernetes to develop and deploy intelligent edge solutions

Unit I	**(8 Hrs.)**
Fundamentals of Edge Computing: Introduction to Cloud and its limitations to support low latency and ,RTT, From Cloud to Edge computing: Motivation: latency, bandwidth, and privacy, Architecture: edge devices, nodes, gateways Use cases: IoT, autonomous systems, smart cities.	
Unit II	(8 Hrs.)
Edge Networking and Communication Protocols: Edge communication models, IoT protocols: MQTT, CoAP, HTTP, Edge Computing to support User Applications (5G-Slicing, self-driving cars and more), Introduction to MQTT and Kafka for end-to-end edge pipeline.	
Unit III	
Concepts of distributed systems in edge computing such as time ordering and clock synchronization, distributed snapshot, etc. Characteristics and challenges of distributed systems ,Role of distributed systems in edge and fog computing environments,Importance of decentralization, autonomy, and fault tolerance Examples of distributed edge applications (e.g., smart cities, autonomous vehicles)	
Unit IV	(8 Hrs.)
Edge AI and Analytics : Introduction to Edge AI:Edge Inference vs Training, AI Tools and Frameworks for Edge,, Model Optimization Techniques, Edge Analytics, Use Cases Object detection (YOLO-lite, MobileNet),Voice recognition (Wake word detection) Anomaly detection in sensor data, Smart camera systems.	

Unit V	(7 Hrs.)
Introduction to Edge Data Center, Lightweight Edge Clouds and its services provided by different service providers.	
Unit VI	(7 Hrs.)
Introduction to docker container and Kubernetes in edge computing. Design of edge storage systems like key-value stores Use cases of machine learning for edge sensor data in predictive maintenance, image classifier and self-driving cars.	
Total Lecture	**46 Hours**

Textbooks:	
1.	Edge Computing: A Primer by Jie Cao, Quan Zhang, Weisong Shi,Springer,2020
2.	Fog and Edge Computing: Principles and Paradigms, Rajkumar Buyya (Editor), Satish Narayana Srirama (Editor), Wiley, 2019
3.	Edge Computing: Models, Technologies and Applications Amir H. Gandomi, Amir Hossein Montazerolzohour, Alireza Sadeghian

Reference Textbooks:	
1.	"Fog and Edge Computing: Principles and Paradigms" Rajkumar Buyya, Satish Narayana srirama,Wiley,2019

MOOCs Links and additional reading, learning, video material	
1.	https://onlinecourses.nptel.ac.in/noc24_cs66
2.	https://www.edx.org/course/edge-computing

SEMESTER VII
23IT1745: PE V: Genetic Algorithms and Applications

Course Outcomes :
Upon successful completion of the course the students will be able to
1. Understand the fundamentals of evolutionary algorithms and genetic algorithms.
2. Design and implement genetic algorithm operators such as selection, crossover, and mutation.
3. Analyze and tune parameters for efficient genetic algorithm performance.
4. Apply genetic algorithms to real-world optimization and search problems.
5. Explore advanced hybrid models and evolutionary algorithm variants.
6. Use tools and frameworks to implement GAs for practical applications.

Unit I: Introduction to Evolutionary Computation and Genetic Algorithms	**(8 Hrs.)**
Introduction to optimization and search problems, Biological inspiration and Darwinian principles, Overview of evolutionary computation techniques, Introduction to genetic algorithms (GAs),Basic terminologies: chromosome, gene, population, fitness function, Simple GA flowchart and pseudo-code	
Unit II: Genetic Algorithm Operators	**(8 Hrs.)**
Selection: roulette wheel, tournament, rank-based selection, Crossover: single-point, two-point, uniform crossover Mutation: bit flip, swap, inversion, Elitism and replacement strategies, Schema theorem and building block hypothesis	
Unit III: Advanced Concepts in GAs	**(8 Hrs.)**
Convergence analysis and premature convergence, Fitness scaling and sharing, Niching and speciation, Multi-objective genetic algorithms (NSGA-II),Constraint handling in GAs	
Unit IV: Implementation and Tools	**(7 Hrs.)**
Representation techniques: binary, real-valued, permutation encoding, Parameter tuning: population size, mutation/crossover rates, GA programming frameworks and libraries (Python DEAP, MATLAB, etc.),Case study: implementing a simple GA from scratch	
Unit V: Applications of Genetic Algorithms	**(7 Hrs.)**
Function optimization (continuous and discrete),Machine Learning: feature selection, hyperparameter tuning, Scheduling problems: job-shop, timetabling, Game playing and AI, Evolving neural networks (neuro evolution)	
Unit VI: Hybrid and Alternative Evolutionary Algorithms	**(7 Hrs.)**
Hybrid GAs with local search (memetic algorithms),Genetic Programming (GP) overview, Differential Evolution (DE) and Particle Swarm Optimization (PSO),Real-world applications: robotics, control systems, network design,Current research trends and open challenges in GAs	
Total Lecture	**45 Hours**

Reference Books:	
1.	S. N. Sivanandam and S. N. Deepa, Introduction to Genetic Algorithms, Springer.
2.	Kalyanmoy Deb, Multi-objective Optimization using Evolutionary Algorithms, Wiley.
3.	Zbigniew Michalewicz, Genetic Algorithms + Data Structures = Evolution Programs, Springer.

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Textbooks:	
1.	David E. Goldberg, Genetic Algorithms in Search, Optimization, and Machine Learning, Pearson.
2.	Melanie Mitchell, An Introduction to Genetic Algorithms, MIT Press.

MOOCs Links and additional reading, learning, video material	
1.	NPTEL Course - Soft Computing by Dr. Debasis Samanta, IIT Kharagpur
2.	YouTube - Genetic Algorithms Playlist by The Coding Train (Daniel Shiffman)

SEMESTER VII

23IT1747: PE V-Software Testing and Quality Assurance

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Explain the fundamental concepts of software testing, software defects, testing life cycle, testing models, and unit testing techniques, including debugging and testing tools.
2. Apply control flow and data flow testing techniques to analyze software programs and design effective test cases with appropriate test coverage.
3. Develop and execute system integration and system-level test plans using functional and non-functional testing techniques to ensure software reliability and performance.
4. Evaluate software quality through acceptance testing, web/mobile application testing, and quality standards to validate software against specified requirements.

Unit I: Introduction to Evolutionary Computation and Genetic Algorithms	**(8 Hrs.)**
Basic concepts of Testing: Need of Testing, Basic concepts-errors, faults, defects,failures, objective of testing, central issue in testing, Testing activities, V-Model, Sourcesof information for test cases, Monitoring and Measuring Test Execution, Test tools andAutomation, Limitation of Testing.	
Unit II:	**(8 Hrs.)**
Unit Testing: Concepts of Unit Testing, Static Unit Testing, Defect Prevention, DynamicUnit Testing, Mutation Testing, Debugging, Unit Testing in Extreme Programming, Tools forUnit Testing.	
Unit III:	**(8 Hrs.)**
Control Flow Testing: Outline of Control Flow Testing, Control Flow Graphs, Path inControl Flow Graph, Path selection criteria, All path coverage criteria, Statement coverage,Path coverage, Predicate coverage criteria, Generating Test input, Examples of Data selection.	
Unit IV:	**(7 Hrs.)**
Data Flow and System Integration Testing: Introduction Data flow testing, Data flow graph, Data flow testing criteria, Comparison of Data flow test selection criteria. Fundamentals of System Integration: Types of interfaces and interface errors, System integration testing, Software and Hardware integration, Test plan, Off-the shelf component integration and testing.	
Unit V:	**(7 Hrs.)**
System Test Categories and Test Design: Taxonomy of system test, Basic Test, Functionality test, Robustness test, Performance test, Scalability test, Stress test, Load and Stability test, Reliability test, Regression test, Documentation Test. Test Design: Test cases, Necessity of test case documentation, Test case design methods, Functional specification based test case design, Use case bases, Application based test case design, Level of test execution.	
Unit VI:	**(7 Hrs.)**
Acceptance Testing and Software Quality: Types of acceptance testing, Acceptance criteria, Acceptance test plan and execution, Special Tests: Client server testing, Web application testing and Mobile application	

testing, fire view of software quality, ISO-9126 quality characteristics, ISO-9000:2000 software quality standard, ISO -9000:2000 fundamentals	
Total Lecture	**45 Hours**

Textbooks:	
1.	Software Testing and Quality Assurance by Kshirsager Naik and Priyadarshini Tripathi (Wiley)
2.	Software Testing Concepts and Tools by Nageswara Rao Pusuluri (Dream Tech Press)

Reference Books:	
1.	Foundations of Software Testing, 2E by Aditya P. Mathur , Pearson Education.
2.	Effective Methods for Software Testing-William E Perry, (Wiley). 2. Software Testing Tools by Dr. K. V. K. K. Prasad (Dream Tech).

MOOCs Links and additional reading, learning, video material	
1.	https://nptel.ac.in/courses/106105150

SEMESTER VII
23IT1749: PE V: Software Project Management

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Explain the fundamental concepts and principles of software project management. 2. Apply project management techniques such as scheduling, risk management, and cost estimation. 3. Analyze the impact of project management decisions on project performance and success. 4. Design a software project plan using appropriate tools and methodologies.

Unit I: Introduction to Software Project Management	**(8Hrs)**
Definition and scope of software project management, Project vs. product, Characteristics of software projects, Stakeholders and project roles, Project life cycle models (Waterfall, Iterative, Agile), Overview of project planning	
Unit II: Project Evaluation and Estimation	**(8Hrs)**
Project selection models, Cost-benefit analysis, Software estimation techniques: Expert judgment ,Function Point Analysis, COCOMO I & II, Resource estimation	
Unit III: Project Scheduling and Staffing	**(7Hrs)**
Work Breakdown Structure (WBS),Scheduling techniques: Gantt charts, PERT and CPM, Resource leveling and allocation, Team formation and staffing plans, Effort distribution	
Unit IV: Risk, Configuration, and Quality Management	**(7Hrs)**
Risk management process: Identification, assessment, mitigation, Configuration management: Version control, change control, Software quality assurance, Metrics for quality measurement.	
Unit V: Project Monitoring and Control	
Project tracking techniques, Milestones and deliverables, Earned Value Analysis (EVA), Performance indicators, Change management and handling scope creep.	
Unit VI: Project Closure and Tools	
Project closure activities: Final report, documentation, lessons learned, Post-project analysis, Introduction to project management tools (e.g., MS Project, JIRA), Real-life case studies and industry practices.	
Total Hrs.	**(30Hrs.)**

Textbooks:	
1.	Bob Hughes, Mike Cotterell, Rajib Mall
2.	Software Engineering: A Practitioner's Approach by Roger S. Pressman

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3.	Applied Software Project Management by Andrew Stellman, Jennifer Greene

Reference Books:	
1.	The Mythical Man-Month: Essays on Software Engineering by Frederick P. Brooks Jr.
2.	Software Engineering: Theory and Practice, Shari Lawrence Pfleeger
3.	Managing the Software Process" by Watts S. Humphrey

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/106/105/106105191
2.	https://www.youtube.com/playlist?list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho

SEMESTER VII

23IT1751: Artificial Intelligence for Games

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Understand the models, structure, and types of AI used in games, and understand how AI is designed for various game genres.
2. Implement movement algorithms, steering behaviors, and practical path planning using various navigation graph methods.
3. Apply AI concepts to design specific game scenarios such as a soccer simulation, and tailor AI for different types of games like shooters and RTS.
4. Design to apply game-playing strategies using algorithms like alpha-beta and MCTS, and solve constraint satisfaction problems relevant to intelligent game behavior.

Unit I	**(8 Hrs.)**
Introduction, Model of Game AI and algorithms, the kind of AI in Games, Speed and memory, The AI Engine.	
Unit II	**(8 Hrs.)**
Movement, the basics of movement algorithms, Steering Behaviour, Combining Steering behaviors, predicting physics, Jumping, Motion control. Path finding.	
Unit III	**(8 Hrs.)**
Designing Game AI: The design, the shooters, driving, real time strategy, sports, turn-based strategy games. AI-Based game Genres: Teaching characters, Flocking and herding games.	
Unit IV	**(7 Hrs.)**
Simple Soccer: A walks through of the development of a five a side soccer game from start to finish.	
Unit V	**(7 Hrs.)**
Path Planning: an overview of the problems faced by today's game developers, tile based navgraphs, points of visibility, navgraphs, expanded geometry navgraphs, navmeshes, hierarchical path finding. Hierarchical Goal Based Agents: introduction of agents that are motivated by hierarchical goals.	
Unit VI	**(7 Hrs.)**
Game theory , optimal decisions in games , alpha-beta search , monte-carlo tree search , Stochastic games , partially observable games. Constraint satisfaction problems , constraint propagation , backtracking search for CSP , local search for CSP , structure of CSP.	
Total Lecture	**45 Hours**

Reference Books:

1. Georgios N. Yannakakis, Julian Togelius, Artificial Intelligence and Games, Springer, 1st Edition, 2018.
2. Mat Buckland, Programming Game AI by Example, Wordware Publishing, 1st Edition, 2005.
3. Stuart Russell, Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson Education, 4th Edition, 2020.

Textbooks:	
1.	Ian Millington, Artificial Intelligence for Games, CRC Press, 3rd Edition, 2019.

MOOCs Links and additional reading, learning, video material	
1.	https://nptel.ac.in/courses/106105237

SEMESTER VII

23IT1753: PE V:PROGRAMMABLE LOGIC CONTROLLER

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand the purpose, structure, and basic functioning of PLCs, including the instruction set used in programming. 2. Apply PLC programming knowledge to real-time industrial and automation applications. 3. Develop and Simulate ladder logic programs using timers, counters, arithmetic, and comparison instructions. 4. Interface PLCs with external devices and explain the basics of communication protocols and HMI/SCADA systems.

Unit I:	**(8 Hrs.)**
Concept of PLC, Building blocks of PLC, Functions of various blocks, limitations of relays. Advantages of PLCs over electromagnetic relays. Different programming languages, PLC manufacturers , Basic operation and principles of PLC , Memory structures, I/O structure ,Programming terminal.	
Unit II: Instruction Set	**(8 Hrs.)**
Basic instructions like latch, master control, self-holding relays., Timer instructions like retentive timers, resetting of timers. Counter instructions like up counter, down counter, resetting of counters. Arithmetic Instructions (ADD,SUB,DIV,MUL etc.) , MOV instruction , RTC(Real Time Clock Function) , Comparison instructions like equal, not equal, greater, greater than equal, less than, less than equal	
Unit III: Ladder Diagram Programming	**(8 Hrs.)**
Programming based on basic instructions, timer, counter, and comparison instructions using ladder program.	
Unit IV	**(7 Hrs.)**
Object counter, On-off control, Car parking, Sequential starting of motors, Traffic light control, Motor in forward and reverse direction , Star-Delta, DOL Starters .	
Unit V	**(7 Hrs.)**
Introduction to HMI (Human Machine Interface),Basics of SCADA in PLC context, Communication protocols: RS232, Modbus, Ethernet (basic level),Connecting PLC to PC and data logging	
Unit VI	**(7 Hrs.)**
Timers (ON-delay, OFF-delay),Counters (Up, Down),Latching and Unlatching, Comparison Instructions (>, <, =)	
Total Lecture	**45Hour**

Textbooks:	
1.	John W. Webb, Ronald A. Reis, Programmable Logic Controllers: Principles and Applications, Pearson Education, 5th Edition, 2002.

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2.	Gary Dunning, Introduction to Programmable Logic Controllers, Cengage Learning, 3rd Edition, 2006.
3	Madhuchhanda Mitra, Samarjit Sengupta, Programmable Logic Controller and Industrial Automation, Penram International Publishing, 2nd Edition, 2011.
4	Introduction to PLCs by Gary Dunning. McGraw Hill
5	Frank D. Petruzella, Programmable Logic Controllers, McGraw-Hill Education, 4th Edition, 2010.

Reference Books:	
1.	John W. Webb, Ronald A. Reis, Programmable Logic Controllers: Principles and Applications, Pearson Education, 5th Edition, 2002.

SEMESTER VII
23IT1755: PE:V Big Data Analytics

Course Outcomes
Upon successful completion of the course the students will be able to
1. Understand the concepts, architecture, and ecosystem of Big Data. 2. Learn distributed storage and processing frameworks for managing large-scale datasets. 3. Explore NoSQL databases and modern Big Data technologies for scalable analytics. 4. Understand distributed machine learning, cloud-based analytics, and emerging trends in Big Data.

UNIT I	**(05 Hrs.)**
Evolution of Big Data, Characteristics of Big Data (5Vs and beyond), Types of Data and Sources of Big Data, Traditional Data Environment vs. Big Data Environment, Challenges and Applications of Big Data, Information Product Pipeline, Information Product Value Chain, Big Data Management Architecture, Big Data Analytics Lifecycle.	
UNIT II	**(05 Hrs.)**
Introduction to Big Data Analytics, Types of Analytics (Descriptive, Diagnostic, Predictive and Prescriptive), Big Data Analytics Workflow, Data Acquisition and Data Ingestion, Data Cleaning and Data Preprocessing, Data Integration, Data Transformation, Data Quality, Data Governance, Batch Processing vs. Stream Processing, Business Intelligence vs. Big Data Analytics, Industrial Applications of Big Data.	
UNIT III	**(06 Hrs.)**
Apache Hadoop Architecture, Hadoop Distributed File System (HDFS), NameNode, DataNode and Secondary NameNode, Hadoop Cluster Architecture, YARN Architecture, Hadoop Ecosystem Components: Hive, Apache NiFi (Overview), Sqoop, Flume, Oozie and ZooKeeper.	
UNIT IV	**(08 Hrs.)**
MapReduce Programming Model, Mapper, Reducer, Combiner, Partitioner, Input and Output Formats, Data Serialization, Avro, Parquet and ORC File Formats, Apache Spark Architecture, Resilient Distributed Datasets (RDDs), DataFrames.	
UNIT V	**(08 Hrs.)**
Need for NoSQL Databases, CAP Theorem, BASE Properties, Types of NoSQL Databases (Key-Value, Document, Column Family and Graph Databases), MongoDB Architecture, HBase, Cassandra (Overview).	
UNIT VI	**(08 Hrs.)**
Spark SQL, Spark Streaming (Overview), Apache Kafka (Introduction), Distributed Machine Learning: Need, Challenges, Data Parallelism, Model Parallelism, Spark MLlib (Overview), Cloud-Based Big Data Platforms (AWS EMR, Azure HDInsight and Google BigQuery), Data Lakes and Lakehouse Architecture, Big Data Security and Privacy, Data Governance, Industrial Case Studies, Emerging Trends: Integration of Big Data with Generative AI, Vector Databases and Retrieval-Augmented Generation (Overview).	
Total Lecture	**40 Hours**

Textbooks:	
1	lublinsky, Kevin t. Smith, AlexeyYakubovich, Professional Hadoop Solutions, Wiley

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Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

2.	Tom White, Hadoop: The Definitive Guide, 4th Ed., O'Reilly, 2015.
3.	Seema Acharya and Subhasini Chellappan, Big Data Analytics, Wiley India, 2015
4.	Bill Chambers and Matei Zaharia, Spark: The Definitive Guide, O'Reilly, 2018.
5.	Pramod J. Sadalage and Martin Fowler, NoSQL Distilled, Addison-Wesley, 2012.

Reference Books:	
1.	Kyle Banker,Piter Bakkum, Shaun Verch, MongoDB in Action, Dream tech Press
2.	Vignesh Prajapati, Big Data Analytics with R and Hadoop, Packet Publishing
3.	Holden Karau,Learning Spark: Lightning-Fast Big Data Analysis Paperback,
4.	EMC Education Services, Data Science and Big Data Analytics, Wiley, 2015.
5.	Martin Kleppmann, Designing Data-Intensive Applications, O'Reilly, 2017.
6.	Holden Karau et al., Learning Spark, 2nd Ed., O'Reilly, 2020.
7.	Donald Miner and Adam Shook, MapReduce Design Patterns, O'Reilly, 2012.
8.	Judith Hurwitz et al., Big Data for Dummies, Wiley, 2013.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/106/104/106104189/
2.	https://archive.nptel.ac.in/courses/106/104/106104189/

VII Semester
23IT1756: PE-V: Cloud Services

Course Outcome :

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

1. Explain cloud service architecture, cloud infrastructure services, and cloud service management concepts.
2. Analyze cloud platforms, cloud security mechanisms, governance models, and cloud service deployment strategies.
3. Apply cloud services for deploying, managing, monitoring, and securing applications using leading cloud platforms.
4. Design cloud-native applications using containers, serverless computing, cloud databases, and microservices.

UNIT-I	**(06 Hrs.)**
Cloud Service Architecture and Infrastructure - Cloud Service Architecture, Cloud Service Provisioning, Compute Services, Storage Services, Networking Services, Virtual Machines and Containers, Resource Provisioning Resource Scheduling, Introduction to AWS, Microsoft Azure, and Google Cloud Platform.	
UNIT-II	**(06 Hrs.)**
Cloud Storage, Database and Networking Services: Object Storage, Block Storage, File Storage, Database as a Service (DBaaS), Relational and NoSQL Databases, Virtual Private Cloud (VPC) ,DNS Services ,Load Balancing ,Auto Scaling, Content Delivery Network (CDN).	
UNIT-III	**(07Hrs.)**
Cloud Service Management and Governance: Cloud Service Management, IT Service Management (ITSM) ,Cloud Service Lifecycle, Service Level Agreements (SLA), Cloud Governance, Billing and Pricing Models ,Cost Optimization ,Performance Metrics, High Availability and Fault Tolerance.	
UNIT-IV	**(06 Hrs.)**
Cloud Security Services: Shared Responsibility Model, Identity and Access Management (IAM), Authentication and Authorization, Multi-Factor Authentication (MFA) ,Encryption and Key Management, Public Key Infrastructure (PKI) ,Security Groups and Firewalls ,Backup and Disaster Recovery ,Compliance and Risk Management.	
UNIT-V	**(08 Hrs.)**
Cloud Automation and Monitoring: Infrastructure as Code (IaC), Configuration Management, CI/CD Pipelines, Cloud Monitoring, Logging Services, CloudWatch ,Azure Monitor, Resource Automation, Cloud Migration ,Cost Monitoring and Optimization.	
UNIT-VI	**(06 Hrs.)**
Advanced Cloud Services: Docker Containers, Kubernetes ,Serverless Computing, AWS Lambda, Azure Functions, Google Cloud Functions ,API Gateway ,Microservices Architecture ,Cloud Databases ,Emerging Cloud Services (AI/ML, IoT, Edge Computing).	
Total Lecture	**39 hrs**

			July,2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

Textbooks:	
1.	Enamul Haque, Cloud Service Management and Governance, Enel Publications, 2020.
2.	Thomas Erl, Ricardo Puttini, Zaigham Mahmood, Cloud Computing: Concepts, Technology & Architecture, Pearson
3.	Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, Mastering Cloud Computing, McGraw-Hill.

Reference Books:	
1.	Michael Wittig and Andreas Wittig, **Amazon Web Services in Action**, Manning Publications
2	Barrie Sosinsky, Cloud Computing Bible, Wiley.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	https://www.oreilly.com/library/view/designing-web-apis/9781492026912/
2.	https://books.google.com/books/about/Cloud_Computing.html?id=Orn7jwEACAAJ

MOOCs Links and additional reading, learning, video material	
1.	tps://www.coursera.org/specializations/cloud-computing
2.	https://www.edx.org/course/introduction-to-cloud-computing
3.	https://www.udemy.com/course/aws-certified-solutions-architect-associate/

VII Semester
23IT1757: PE-V : Real Time Systems

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Understand the basics and importance of real-time systems and explain & address the fundamental problems of real-time systems
2. Compare different scheduling algorithms and the Schedulability criteria and Determine schedulability of a set of periodic tasks given a scheduling algorithm.
3. Develop algorithms to decide the admission criterion of sporadic jobs and the schedule of aperiodic jobs
4. Integrate resource access mechanisms with the scheduling techniques and develop integrated schedulability criteria.

Unit I	**(8 Hrs.)**
Introduction to real time systems: The Concepts of Real-Time Systems, real time applications according to timing attributes. Hard and soft real time system: The Concept of Real-Time Tasks, Jobs & processors, release times, deadlines, timing constraint, Hard & Soft timing constraint, Hard real time systems, and soft real time systems. Modelling of real time systems: Processors and Resources, Temporal Parameters of Real Time Work load, Periodic task Model, Precedence Constraints and Data Dependency	
Unit II	**(7 Hrs.)**
Approach to real time scheduling: Clock-driven approach, weighted round-robin approach, priority-driven approach, dynamic versus static systems, effective release times and deadlines, optimality of EDF & LST algorithms, Non-optimality of the EDF & LST, challenges in validating timing constraints in priority-driven systems, off line versus on-line scheduling.	
Unit III	**(7 Hrs.)**
Clock driven scheduling: Notations & assumptions, static timer-driven scheduler, general structure of cyclic schedules, cyclic executives, improving the average response time of a periodic jobs, scheduling sporadic jobs, practical consideration and generalizations, algorithms for constructing static schedules, pros-cons of clock-driven scheduling.	
Unit IV	**(7 Hrs.)**
Priority-driven scheduling: Static assumptions, fixed-priority versus dynamics priority algorithms, maximum schedulable utilization, optimality of the RM & DM algorithms, a schedulability test for fixed priority tasks with short response times & with arbitrary response times, sufficient schedulability conditions for the RM & DM algorithms.	
Unit V	**(8 Hrs.)**
Scheduling aperiodic & sporadic jobs in priority-driven systems: Assumptions & approaches, deferrable servers, sporadic servers, constant utilization, total bandwidth and weighted fair-queuing servers, slack stealing in dead-line driven systems, slack stealing in fixed-priority systems, scheduling of sporadic jobs.	
Unit VI	**(8 Hrs.)**
Resources and resource access control: Assumption on resources and their usage, effects of resource contention & resource access control, non-preemptive critical sections, basic priority-inheritance protocol, basic priority-ceiling protocol, stack-based priority –ceiling protocol, use of priority-ceiling protocol in dynamic-priority systems, pre-	

emption-ceiling protocol, controlling accesses to multiple-unit resources, controlling concurrent accesses to data object	
Total Lecture	**45 Hours**

Textbooks:	
1.	Jane W. S. Liu Real Time Systems Pearson education

Reference Books:	
1.	C.M. Krishna & Kang G. Shin Real Time Systems McGraw Pub.

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1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=Ol8D69VKX2k
2.	https://www.youtube.com/watch?v=4nEr2Z2tItg
3.	https://www.youtube.com/watch?v=-Bwiv5EGucs

VII Semester
23IT1758: PE-V: Information Retrieval

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Explain IR process, indexing structures, Boolean retrieval model and apply TF-IDF and BM25 for document ranking
2. Evaluate IR system performance using Precision, Recall, MAP, NDCG and MRR and apply query expansion and relevance feedback techniques
3. Analyze probabilistic models — BIM, Bayesian networks and language models including smoothing techniques for information retrieval
4. Understand web crawling, PageRank, HITS algorithm and demonstrate awareness of modern neural and semantic search approaches.

Unit I	**(8 Hrs.)**
IR definition, IR vs DB, IR pipeline, Boolean model, Tokenization, Stopwords, Stemming, Lemmatization, Inverted index, Skip pointers, Phrase queries	
Unit II	**(7 Hrs.)**
Wildcard queries, Permuterm index, Bigram index, Spelling correction, Edit distance, Jaccard coefficient, Soundex, TF, IDF, TF-IDF, VSM, Cosine similarity, BM25	
Unit III	**(7 Hrs.)**
Precision, Recall, F-measure, E-measure, MAP, NDCG, MRR, Normalized recall, LSI, Eigenvectors, SVD, Low rank approximation	
Unit IV	**(7 Hrs.)**
Relevance feedback (explicit/implicit/pseudo), Rocchio algorithm, Probabilistic relevance feedback, Query expansion types, Query drift, Autocomplete	
Unit V	**(8 Hrs.)**
Probability Ranking Principle, BIM, Bayesian network, Language model, Unigram model, Query likelihood, Jelinek-Mercer smoothing, Dirichlet smoothing, BERT awareness	
Unit VI	**(8 Hrs.)**
Unit Unit VI: Hypertext, Web crawling, Search engine architecture, PageRank, HITS, Link analysis, Spam detection, Text classification basics, Semantic search awareness	
Total Lecture	**45 Hours**

Textbooks:

1. Christopher D. Manning, Raghavan and Schutze, Introduction to Information Retrieval Cambridge University Press,2008

Reference Books:	
1.	Tanveer Siddiqui and U. S. Tiwary Natural Language Processing And Information Retrieval Oxford Higher Education,2008

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology/39.Guide%20to%20computer%20network%20security.pdf

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=kNkCfaH2rxc&list=PLaZQkZp6WhWwoDuD6pQCmgVyDbUWl_ZUi

Multidisciplinary Minor Courses

VII SEMESTER
MDM5IT105: Cloud Web Services

Course Objectives
1. Understand the fundamental concepts, architecture, and service models of cloud computing. 2. Develop knowledge of cloud infrastructure services, including compute, storage, networking, and database services. 3. Explain cloud security, monitoring, governance, and resource management concepts for reliable cloud-based solutions. 4. Apply cloud services and emerging technologies to solve engineering problems using global cloud platforms.

UNIT I
Cloud Computing Foundations: Evolution of Cloud Computing, Service Models, Deployment Models, Virtualization, Scalability, Multi-tenancy, Global Cloud Service Providers and Cloud Infrastructure ,Regions, Availability Zones and Edge Locations.
UNIT II
Web Services in Cloud: Definition and Architecture of Web Services, REST vs SOAP Web Services, Cloud-based APIs (e.g., AWS API Gateway, Google Cloud Functions), Communication standards: WSDL, UDDI, Services: Compute, Storages, Database Networking.
UNIT III
Cloud Platforms and and Service Management: Identity and Access Management (IAM)Authentication and Authorization, Multi-Factor Authentication (MFA),Shared Responsibility Model. Data Backup and Disaster Recovery. Service Level Agreements (SLA).Billing Models
UNIT IV
Cloud Applications in Engineering: Cloud-based Data Storage and Collaboration, Cloud-based Engineering Applications, Cloud-based Simulation and Design, Internet of Things (IoT),Smart Manufacturing, Smart Infrastructure, Industry 4.0,Digital Engineering Applications.

Textbook
"Cloud Computing: Concepts, Technology & Architecture" by Thomas Erl.
"Architecting Cloud Computing Solutions" by Kevin L. Jackson.
"Foundation-level theory on cloud services, API design, and security" by Thomas Erl.

Reference Books:
https://www.oreilly.com/library/view/designing-web-apis/9781492026912/
https://books.google.com/books/about/Cloud_Computing.html?id=Orn7jwEACAAJ
https://www.amazon.in/Cloud-Computing-Concepts-Technology-Architecture/dp/0133387526

MOOCs Links and additional reading, learning, video material	
1.	https://nptel.ac.in/courses/106105167

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SEMESTER VII
MDM5IT205: Blockchain Security

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Describe the structure and functionality of blockchain systems. 2. Apply cryptographic techniques in the context of blockchain. 3. Evaluate consensus algorithms used in distributed networks. 4. Analyze applications and future directions of blockchain technology.

Unit I - Fundamentals of Blockchain Technology	**(6Hrs.)**
Introduction to Blockchain ,evolution and history of blockchain ,Characteristics of blockchain (immutability, decentralization, transparency, security),Blockchain vs Traditional Databases, Components of a blockchain system: blocks, chain, nodes, transactions, Types of blockchain: Public, Private, Consortium, Overview of Distributed Ledger Technology (DLT).	
Unit II- Cryptographic Foundations for Blockchain	**(6Hrs.)**
Basics of Cryptography, Hash functions: SHA-256, Merkle Trees, Digital Signatures and Public Key Infrastructure, Address generation, keys and wallets, Role of cryptography in securing transactions, Identity management in blockchain systems.	
Unit III- Blockchain Protocols and Smart Contracts	**(7Hrs.)**
Blockchain architecture: Block structure, headers, timestamps, nonce, Consensus algorithms: Proof of Work (PoW),Proof of Stake (PoS),Delegated PoS, PBFT, Hybrid models, Blockchain scalability issues, Introduction to Smart Contracts, Ethereum architecture and EVM, Smart contract development basics using Solidity.	
Unit IV- Blockchain Applications and Future Trends	**(7Hrs.)**
Applications of blockchain in: Finance (Cryptocurrency, DeFi), Supply chain management, Healthcare and identity management , Governance and voting systems , Limitations and challenges (scalability, energy usage, regulation) , Introduction to emerging platforms: Hyperledger Fabric, Corda, Polkadot , Overview of Web3 and NFTs	
Total Lecture	**26 Hours**

Textbooks:

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1.	Mastering Blockchain: Unlocking the Power of Cryptocurrencies, Smart Contracts, and Decentralized Applications *Author:* Imran Bashir , *Edition:* Latest (4th Ed preferred) , *Publisher:* Packt Publishing
2.	"Blockchain Basics: A Non-Technical Introduction in 25 Steps" *Author:* Daniel Drescher *Publisher:* Apress

Reference Books:	
1.	"Bitcoin and Cryptocurrency Technologies"Authors: Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder Publisher: Princeton University Press
2.	"Ethereum: Blockchains, Digital Assets, Smart Contracts, Decentralized Autonomous Organizations" Authors: Henning Diedrich Publisher: CreateSpace Independent Publishing
3.	"Blockchain Applications: A Hands-On Approach" Authors: Arshdeep Bahga, Vijay Madisetti Publisher: VPT

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MOOCs Links and additional reading, learning, video material	
1.	https://www.coursera.org/specializations/blockchain
2.	https://www.edx.org/course/blockchain-fundamentals
3.	https://cognitiveclass.ai/courses/blockchain-course

VII SEMESTER
MDM5IT305: Dot Net Full stack

Course Outcomes :

Upon successful completion of the course the students will be

1. Understand the concept of .NET full stack development using C# , MVC Controller.
2. Apply the concept in .NET Full stack development.
3. Analysis the concept in .NET full stack development
4. Design various application using .NET framework

Unit I	**(7 Hrs.)**
Introduction .NET, application and structure of application, Object Oriented Programming Concept in C#,	
Unit II	**(6 Hrs.)**
C# Concepts: Basic concept of Exception Handling, Types of exception Handling ,Delegates, Different methods of Delegate and Generic and Event.	
Unit III	**(7 Hrs.)**
LINQ, SQL Sever, DataBase Object introduction, Sql, Triggers, ADO.NET, HTML, CSS, UI	
Unit IV	**(6 Hrs.)**
Introduction to the Concept of MVC ,Exception in MVC,API, Introduction to Coding Principle, DevOps, Docker	
Total Lecture	**26 Hours**

Textbooks:

1. David S. Platt , Introducing MICROSOFT .NET Wiley publication

Reference Books:

1. Frameworkby Andrew Troelsen and Philip Japikse C# 6.0 and the .NET 4.6 Framework Prentice Hall, 1988

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]

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MOOCs Links and additional reading, learning, video material

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VIII SEMESTER

SEMESTER VIII

MDM6IT106: Edge Computing

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Explain the fundamentals of edge computing, its architecture, enabling technologies, and advantages over traditional cloud computing in addressing latency, bandwidth, and privacy challenges.
2. Analyze edge networking models, communication protocols (MQTT, CoAP, HTTP, Kafka), and their applications in IoT, 5G networks, and intelligent edge-based systems.
3. Apply the concepts of distributed systems, including synchronization, decentralization, and fault tolerance, to design and evaluate edge and fog computing solutions.
4. Develop AI-enabled edge computing applications by utilizing edge AI frameworks, model optimization techniques, and analytics for real-world applications such as object detection, voice recognition, and anomaly detection.

Unit I	**(8 Hrs.)**
Fundamentals of Edge Computing: Introduction to Cloud and its limitations to support low latency and RTT, motivation for edge computing (latency, bandwidth, privacy), architecture (edge devices, nodes, gateways), and use cases including IoT, autonomous systems, and smart cities.	
Unit II	**(8 Hrs.)**
Edge Networking and Communication Protocols: Edge communication models, IoT protocols (MQTT, CoAP, HTTP), edge computing for user applications (5G slicing, self-driving cars), introduction to MQTT and Kafka for end-to-end edge pipelines.	
Unit III	**(8 Hrs.)**
Distributed Systems in Edge Computing: Time ordering, clock synchronization, distributed snapshots, characteristics and challenges of distributed systems, role in edge and fog computing, decentralization, autonomy, fault tolerance, and applications in smart cities and autonomous vehicles.	
Unit IV	**(8 Hrs.)**
Edge AI and Analytics: Edge inference vs. training, AI tools and frameworks for edge, model optimization techniques, edge analytics, object detection (YOLO-Lite, MobileNet), voice recognition, anomaly detection, and smart camera systems.	
Total Lecture	**32 Hrs.**

Textbooks:	
1.	Edge Computing: A Primer by Jie Cao, Quan Zhang, Weisong Shi,Springer,2020
2.	Fog and Edge Computing: Principles and Paradigms, Rajkumar Buyya (Editor), Satish Narayana Srirama (Editor), Wiley, 2019
3.	Edge Computing: Models, Technologies and Applications Amir H. Gandomi, Amir Hossein Montazerolzohour, Alireza Sadeghian

Reference Textbooks:	
1.	"Fog and Edge Computing: Principles and Paradigms" Rajkumar Buyya, Satish Narayana Srirama,Wiley,2019

MOOCs Links and additional reading, learning, video material	
1.	https://onlinecourses.nptel.ac.in/noc24_cs66
2.	https://www.edx.org/course/edge-computing

SEMESTER VIII
MDM3IT206: Advanced Cyber Security

Course Outcomes:

Upon successful completion of the course the students will be able to

1. Understand the fundamental concepts of Artificial Intelligence and Cyber Security, including key terminologies, threat landscape, and challenges in protecting digital infrastructure.
2. Apply cyber security best practices and technologies for securing digital devices and networks, including endpoint protection, firewall management, and Wi-Fi security.
3. Analyze various cybercrime tools and methods such as phishing, malware, DoS/DDoS, and identity theft to recognize and mitigate security threats.
4. Evaluate the applications of Artificial Intelligence in cyber security such as anomaly detection, malware analysis, user behavior analytics, and security event management to improve threat detection and response.

Unit:I	**INTRODUCTION TO AI AND CYBER SECURITY**	**10 Hours**

Overview of AI and Cyber security ,importance of AI Security System , Cyber security increasing threat landscape, CIA triad, Cyber security terminologies- Cyberspace, attack, attack vector, attack surface, threat, risk, vulnerability, exploit, hacker, Non-state actors, Cyber terrorism, Protection of end user machine, Critical IT and National Critical Infrastructure, Cyberwarfare, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security,

Unit:II	**DIGITAL DEVICES SECURITY , TOOLS AND TECHNOLOGIES FOR CYBER SECURITY**	**10 Hours**

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

Unit:III	**TOOLS AND METHODS USED IN CYBER CRIME**	**10 Hours**

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan-horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks. Phishing and Identity Theft: Introduction to Phishing, Identity Theft (ID Theft)

Unit:IV	**AI FOR CYBER SECURITY**	**10 Hours**

Applying AI in cyber security-The evolution from expert systems to data mining and AI-The different forms of automated learning-The characteristics of algorithm training and Optimization, Security Information and Event Management(SIEM), Phishing Detection, User and Entity Behavior Analytics(UEBA) Behavior Analytics, Malware Analysis, Security Log Analysis, End Point Security, Benefits and Challenges of using AI in cyber

security.	
Total Lecture Hours	**40 Hours**

Textbooks	
1	Henry A. Oliver, Security in the Digital Age: Social Media Security threats and Vulnerabilities, Paperback, 2015.
2	Sumit Belapure and Nina Godbole , Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley India Pvt. Ltd. 2011

MOOCs Links and additional reading, learning, video material	
1.	https://nptel.ac.in/courses/106106248

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VIII SEMESTER

MDM6IT306: AI Tools for Web Development

Course Outcomes :

Upon successful completion of the course the students will be

1. Understand the fundamentals of Artificial Intelligence and its role in modern web development using AI-powered tools.
2. Develop responsive web pages using AI-assisted tools for HTML, CSS, and JavaScript development.
3. Build interactive web applications with AI-assisted coding, debugging, and code optimization tools.
4. Integrate AI services, chatbots, image generation, and content generation tools into modern web applications.

Unit I :Introduction to AI in Web Development and AI-assisted Web Design	**(8 Hrs.)**
Evolution of the Internet and Web Technologies,Static vs Dynamic Websites,Review of HTML5, CSS3 and JavaScript,Role of HTML, CSS and JavaScript in Web Development, Introduction to Artificial Intelligence,AI vs Machine Learning vs Generative AI,Importance of AI in Modern Web Development,AI-assisted HTML, CSS and JavaScript Development,Prompt Engineering Fundamentals for Web Developers,Writing effective prompts for webpage generation, Importance and use of **AI Tools** like ChatGPT,Google Gemini.	
Unit II: AI-assisted Front-End Development using ChatGPT & GitHub Copilot	**(8 Hrs.)**
AI-assisted HTML Page Development,AI-assisted CSS Styling,Responsive Web Design using AI,Flexbox and Grid Layout Generation,JavaScript Code Generation,DOM Manipulation using AI,Form Validation,Event Handling,JSON and AJAX Code Generation,AI-assisted Code Documentation,AI-assisted Bug Detection, Importance and use of **AI Tools** like ChatGPT, GitHub Copilot.	
Unit III : AI-powered UI/UX Design and Content Generation	**(8 Hrs.)**
AI-assisted UI/UX Design,Website Wireframing,AI-based Layout Design,Logo and Banner Generation,Website Image Generation,Website Content Creation,SEO-friendly Content Generation,AI-assisted Accessibility Improvements,AI-assisted User Experience Enhancement, Importance and use of **AI Tools** like Figma AI,Canva AI,Adobe Firefly.	
Unit IV : AI Integration, Deployment and Intelligent Web Applications	**(8 Hrs.)**
Introduction to AI APIs, Retrieval-Augmented Generation (RAG), Integrating AI into Web Applications,AI Chatbots for Websites,AI Image Generation APIs,AI-powered Search and Recommendation Systems,AI-assisted Website Deployment,Ethical Use of AI in Web Development,Future Trends in AI-powered Web Development, Importance and use of **AI Tools** like OpenAI API,Hugging Face,Google Dialogflow,	
Total Lecture	**32 Hours**

Textbooks:	
1.	Jon Duckett, HTML and CSS: Design and Build Websites, Wiley, 2011.
2	David Flanagan, JavaScript: The Definitive Guide (7th Edition), O'Reilly Media, 2020.

Reference Books:	
1.	Olivier Caelen & Marie-Alice Blete, "Developing Apps with GPT-4 and ChatGPT", 2nd Edition, O'Reilly Media,
2.	Chip Huyen, "AI Engineering: Building Applications with Foundation Models", 1st Edition, O'Reilly Media, 2025.

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1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://nptel.ac.in/courses/106108703