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 6th Semester

(Department of Computer Technology)

B. Tech in Computer 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 Computer Tchnology)

B.Tech. in Computer Tchnology

SoE No. 23CT-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-B)															
1	1	BS	GE	23GE1103	Differential Equations and Complex Analysis	T	3	0	0	3	3	30	20	50	3
2	1	BS	GE	23GE1110	Applied Physics	T	3	0	0	3	3	30	20	50	3
3	1	BS	GE	23GE1111	**Lab:** Applied Physics	P	0	0	2	2	1		60	40	
4	1	BES	ME	23ME1101	Engineering Graphics	T	1	0	0	1	1	30	20	50	3
5	1	BES	ME	23ME1102	**Lab :** Engineering Graphics	P	0	0	4	4	2		60	40	
6	1	BES	EL	23EL1101	Basic Electrical and Electronics Engineering	T	3	0	0	3	3	30	20	50	3
7	1	BES	CT	23CT1103	**Lab :** Computer WorkShop	P	0	0	2	2	1		60	40	
8	1	PC	CT	23CT1101	Introduction to Logic Building and Programming	T	2	0	0	2	2	30	20	50	2
9	1	PC	CT	23CT1102	**Lab:** Introduction to Logic Building and Programming	P	0	0	2	2	1		60	40	
10	1	VSEC	GE	23GE1117	Get Set Go	…	…	…	…	…	2		60	40	
11	1	CC2	GE		**Liberal Learning Course (LLC2)**	…	…	…	…	…	2		60	40	
					TOTAL FIRST SEM		**12**	**0**	**10**	**22**	**21**				
MANDATORY LEARNING COURSES															
1	1	HS		GE2131	Universal Human Values (UHV)	**A**	2	0	0	2	0				
SECOND SEMESTER (GROUP-B)															
1	2	BS	GE	23GE1201	Calculus and Vector	T	3	0	0	3	3	30	20	50	3
2	2	BS	GE	23GE1206	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3
3	2	BS	GE	23GE1207	**Lab:** Engineering Chemistry	P	0	0	2	2	1		60	40	
4	2	HS/AEC1	GE	23GE1212	Professional Communication	T	2	0	0	2	2	30	20	50	2
5	2	HS/IKS	GE	23GE1215	Indian Knowledge System	T	2	0	0	2	2	30	20	50	2
6	2	BES	CV	23CV1201	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3
7	2	BES	CV	23CV1202	**Lab:** Engineering Mechanics	P	0	0	2	2	1		60	40	
8	2	BES	CT	23CT1204	Object Oriented Programming	T	3	0	0	3	3	30	20	50	3
9	2	BES	CT	23CT1205	**Lab :** Object Oriented Programming	P	0	0	2	2	1		60	40	
10	2	VSEC	GE	23GE1218	Functional English	…	…	…	…	…	2		60	40	
11	2	CC1	GE		**Liberal Learning Course (LLC1)**	…	…	…	…	…	2		60	40	
					TOTAL SECOND SEM		**16**	**0**	**6**	**22**	**23**				

Liberal Learning Course

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject
1	2	CC2	GE	23LLC1201	Music (Vocal)
2	2	CC2	GE	23LLC1202	Music (Instrumental)
3	2	CC2	GE	23LLC1203	Indian Classical Dance
4	2	CC2	GE	23LLC1204	Other forms of Dances
5	2	CC2	GE	23LLC1205	Painting
6	2	CC2	GE	23LLC1206	Theatre and acting
7	2	CC2	GE	23LLC1207	Photography
8	2	CC2	GE	23LLC1208	Yoga
9	2	CC2	GE	23LLC1209	Chess
10	2	CC2	GE	23LLC1210	Athletics
11	2	CC2	GE	23LLC1211	Basket Ball
12	2	CC2	GE	23LLC1212	Judo
13	2	CC2	GE	23LLC1213	Elements of Japanese Language
14	2	CC2	GE	23LLC1214	Elements of German Language
15	2	CC2	GE	23LLC1215	Elements of French Language
16	2	CC2	GE	23LLC1216	Elements of Spanish Language
17	2	CC2	GE	23LLC1217	Basics of Vedic Maths
18	2	CC2	GE	23LLC1218	Skilling in Microsoft Visio and Inkscape

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

(Department of Computer Tchnology)

B.Tech. in Computer Tchnology

SoE No. 23CT-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	

Liberal Learning Course

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject
1	1	CC1	GE	23LLC1101	Music (Vocal)
2	1	CC1	GE	23LLC1102	Music (Instrumental)
3	1	CC1	GE	23LLC1103	Indian Classical Dance
4	1	CC1	GE	23LLC1104	Other forms of Dances
5	1	CC1	GE	23LLC1105	Painting
6	1	CC1	GE	23LLC1106	Theatre and acting
7	1	CC1	GE	23LLC1107	Photography
8	1	CC1	GE	23LLC1108	Yoga
9	1	CC1	GE	23LLC1109	Chess
10	1	CC1	GE	23LLC1110	Athletics
11	1	CC1	GE	23LLC1111	Basket Ball
12	1	CC1	GE	23LLC1112	Judo
13	1	CC1	GE	23LLC1113	Elements of Japanese Language
14	1	CC1	GE	23LLC1114	Elements of German Language
15	1	CC1	GE	23LLC1115	Elements of French Language
16	1	CC1	GE	23LLC1116	Elements of Spanish Language
17	1	CC1	GE	23LLC1117	Basics of Vedic Maths
18	1	CC1	GE	23LLC1118	Skilling in Microsoft Visio and Inkscape

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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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	HSSM-1	GE	23GE1301	Fundamentals of Management & Economics	T	2	0	0	2	2	30	20	50	3
2	3	PC	CT	23CT1301	**Lab :** Web Technology	P	0	0	2	2	1		60	40	
3	3	PC	CT	23CT1302	Data Structures	T	3	0	0	3	3	30	20	50	3
4	3	PC	CT	23CT1303	**Lab :** Data Structures	P	0	0	2	2	1		60	40	
5	3	PC	CT	23CT1304	Computer Architecture & Organization	T	3	0	0	3	3	30	20	50	3
6	3	PC	CT	23CT1305	Discrete Mathematics and Probability Theory	T	3	0	0	3	3	30	20	50	3
7	3	VEC-2	CT	23CT1306	Cyber Laws	T	2	0	0	2	2	30	20	50	3
8	3	CEP	CT	23CT1307	**Community Engagement Project**	P	0	0	4	4	2		60	40	
9	3	OE-1	OE		**Open Elective -I**	T	2	0	0	2	2	30	20	50	3
10	3	MDM	CV		**MD Minor Course-I**	T	2	0	0	2	2	30	20	50	3
					TOTAL		**17**	**0**	**8**	**25**	**21**				

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

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

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(Department of Computer Tchnology)

B.Tech. in Computer Technology

SoE No. 23CT-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	BS	GE	23GE1403	Linear Algebra	T	3	0	0	3	3	30	20	50	3
2	4	HSSM-2	GE	23GE1401	Entrepreneurship Development	T	2	0	0	2	2	30	20	50	3
3	4	**AEC-2**	GE	23GE1405 23GE1406	Marathi Language / Hindi Language	T	2	0	0	2	2	30	20	50	3
4	4	VEC-1	CV	23CV1411	Environmental Sustainability, Pollution and Management	T	2	0	0	2	2	30	20	50	3
5	4	PC	CT	23CT1401	Operating systems	T	3	0	0	3	3	30	20	50	3
6	4	PC	CT	23CT1402	**Lab :** Operating systems	P	0	0	2	2	1		60	40	
7	4	PC	CT	23CT1403	Design and Analysis of Algorithms	T	3	0	0	3	3	30	20	50	3
8	4	PC	CT	23CT1404	**Lab :** Design and Analysis of Algorithms	P	0	0	2	2	1		60	40	
9	4	PC	CT	23CT1405	**Lab :** Data Analysis using R	P	0	0	0	2	1		60	40	
10	4	VSEC-3	CT	23CT1406	**Lab** : Python	P	0	2	2	4	2	60	40		
11	4	OE-2	OE		**Open Elective -II**	T	2	0	0	2	2	30	20	50	3
12	4	MDM	CT		**MD Minor Course-II**	T	2	0	0	2	2	30	20	50	3
					TOTAL		**19**	**2**	**6**	**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

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SoE No. 23CT-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	CT	23CT1501	Database Management System	T	3	0	0	3	3	30	20	50	3
2	5	PC	CT	23CT1502	**Lab : Database Management System**	P	0	0	2	2	1		60	40	
3	5	PC	CT	23CT1503	Mathematical Foundation of Data Analysis	T	3	0	0	3	3	30	20	50	3
4	5	PC	CT	23CT1504	**Lab : Mathematical Foundation of Data Analysis**	P	0	0	2	2	1		60	40	
5	5	PC	CT	23CT1505	Theorotical Foundation of Computer System	T	3	0	0	3	3		60	40	
6	5	PC	CT	23CT1506	**Lab : Java Stack**	P	0	0	2	2	1		60	40	
7	5	PE	CT		Professional Elective-I	T	2	0	0	2	2	30	20	50	3
8	5	PE	CT		**Lab : Professional Elective-I**	P	0	0	2	2	1		60	40	
9	5	OE-3	OE		Open Elective -III	T	3	0	0	3	3	30	20	50	3
10	5	MDM	CT		**MD Minor Course-III**	T	3	0	0	3	3	30	20	50	3
11	5	STR	CT	23CT1507	Internship, Seminar and Report	P	0	0	2	2	1		60	40	
					TOTAL		**17**	**0**	**10**	**27**	**22**				

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	CT	23CT1521	PE-I : Computer Vision
2	5	PE-I	CT	23CT1522	**PE-I : Lab : Computer Vision**
3	5	PE-I	CT	23CT1523	PE-I : Mobile OS
4	5	PE-I	CT	23CT1524	**PE-I : Lab : Mobile OS**
5	5	PE-I	CT	23CT1525	PE-I : Embedded Systems
6	5	PE-I	CT	23CT1526	**PE-I : Lab : Embedded Systems**
7	5	PE-I	CT	23CT1527	PE-I : Computer Graphics
8	5	PE-I	CT	23CT1528	**PE-I : Lab : Computer Graphics**
9	5	PE-I	CT	23CT1529	PE-I : Introduction to Salesforce
10	5	PE-I	CT	23CT1530	**PE-I : Lab : Introduction to Salesforce**
11	5	PE-I	CT	23CT1531	PE-I : Privacy and Security in Online Social Networks
12	5	PE-I	CT	23CT1532	**PE-I : Lab : Privacy and Security in Online Social Networks**

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

Chairperson	Dean (Acad. Matters)	July, 2023	1.00	Applicable for AY 2023-24 Onwards
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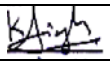
							L	T	P	Hrs		MSEs*	TA**	ESE	
SIXTH SEMESTER															
1	6	PC	CT	23CT1601	Artificial Intelligence and Machine Learning	T	3	0	0	3	3	30	20	50	3
2	6	PC	CT	23CT1602	**Lab : Artificial Intelligence and Machine Learning**	P	0	0	2	2	1		60	40	
3	6	PC	CT	23CT1603	Computer Networks		3	0	0	3	3		60	40	
4	6	PC	CT	23CT1604	**Lab : Computer Networks**		0	0	2	2	1				
5	6	PC	CT	23CT1605	Design Thinking and Research Methodology	T	2	0	0	2	2	30	20	50	3
6	6	PE	CT		Professional Elective-II	T	3	0	0	3	3	30	20	50	3
7	6	PE	CT		**Lab : Professional Elective-II**	P	0	0	2	2	1		60	40	
8	6	PE	CT		Professional Elective-III	T	3	0	0	3	3	30	20	50	3
9	6	MDM	CT		**MD Minor Course-IV**	T	3	0	0	3	3	30	20	50	3
10	6	VSEC-4	CV	23CT1606	**Lab : Competitive Coding**	P	0	0	4	4	2		60	40	
11	6	STR	CT	23CT1607	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 :**	**A**	3	0	0	3	**0**				

Professional Elective - II					
1	6	PE-II	CT	23CT1621	PE-II : Advance Web Technologies
2	6	PE-II	CT	23CT1622	**PE-II : Lab : Advance Web Technologies**
3	6	PE-II	CT	23CT1623	PE-II : Internet of Things
4	6	PE-II	CT	23CT1624	**PE-II : Lab : Internet of Things**
5	6	PE-II	CT	23CT1625	PE-II : Natural Language Processing
6	6	PE-II	CT	23CT1626	**PE-II : Lab : Natural Language Processing**
7	6	PE-II	CT	23CT1627	PE-II : Dot Net Full Stack Development
8	6	PE-II	CT	23CT1628	**PE-II : Lab : Dot Net Full Stack Development**
9	6	PE-II	CT	23CT1629	PE-II : Realtime Systems
10	6	PE-II	CT	23CT1630	**PE-II : Lab : Realtime Systems**

Professional Elective - III					
1	6	PE-III	CT	23CT1641	PE-III : Wireless Sensor Network
2	6	PE-III	CT	23CT1642	PE-III : Industrial and Social Applications of Digital Twins
3	6	PE-III	CT	23CT1643	PE-III : Cyber and Digital Forensics
4	6	PE-III	CT	23CT1644	PE-III : Model-Driven Software Engineering
5	6	PE-III	CT	23CT1645	PE-III : Data Mining

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

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 Computer Technology)

B. Tech in Computer 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 Computer Tchnology)

B.Tech. in Computer Tchnology

SoE No. 23CT-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-B)															
1	1	BS	GE	23GE1103	Differential Equations and Complex Analysis	T	3	0	0	3	3	30	20	50	3
2	1	BS	GE	23GE1110	Applied Physics	T	3	0	0	3	3	30	20	50	3
3	1	BS	GE	23GE1111	**Lab:** Applied Physics	P	0	0	2	2	1		60	40	
4	1	BES	ME	23ME1101	Engineering Graphics	T	1	0	0	1	1	30	20	50	3
5	1	BES	ME	23ME1102	**Lab :** Engineering Graphics	P	0	0	4	4	2		60	40	
6	1	BES	EL	23EL1101	Basic Electrical and Electronics Engineering	T	3	0	0	3	3	30	20	50	3
7	1	BES	CT	23CT1103	**Lab :** Computer WorkShop	P	0	0	2	2	1		60	40	
8	1	PC	CT	23CT1101	Introduction to Logic Building and Programming	T	2	0	0	2	2	30	20	50	2
9	1	PC	CT	23CT1102	**Lab:** Introduction to Logic Building and Programming	P	0	0	2	2	1		60	40	
10	1	VSEC	GE	23GE1117	Get Set Go	…	…	…	…	…	2		60	40	
11	1	CC2	GE		**Liberal Learning Course (LLC2)**	…	…	…	…	…	2		60	40	
					TOTAL FIRST SEM		**12**	**0**	**10**	**22**	**21**				
MANDATORY LEARNING COURSES															
1	1	HS		GE2131	Universal Human Values (UHV)	**A**	2	0	0	2	0				
SECOND SEMESTER (GROUP-B)															
1	2	BS	GE	23GE1201	Calculus and Vector	T	3	0	0	3	3	30	20	50	3
2	2	BS	GE	23GE1206	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3
3	2	BS	GE	23GE1207	**Lab:** Engineering Chemistry	P	0	0	2	2	1		60	40	
4	2	HS/AEC1	GE	23GE1212	Professional Communication	T	2	0	0	2	2	30	20	50	2
5	2	HS/IKS	GE	23GE1215	Indian Knowledge System	T	2	0	0	2	2	30	20	50	2
6	2	BES	CV	23CV1201	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3
7	2	BES	CV	23CV1202	**Lab:** Engineering Mechanics	P	0	0	2	2	1		60	40	
8	2	BES	CT	23CT1204	Object Oriented Programming	T	3	0	0	3	3	30	20	50	3
9	2	BES	CT	23CT1205	**Lab :** Object Oriented Programming	P	0	0	2	2	1		60	40	
10	2	VSEC	GE	23GE1218	Functional English	…	…	…	…	…	2		60	40	
11	2	CC1	GE		**Liberal Learning Course (LLC1)**	…	…	…	…	…	2		60	40	
					TOTAL SECOND SEM		**16**	**0**	**6**	**22**	**23**				

Liberal Learning Course

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject
1	2	CC2	GE	23LLC1201	Music (Vocal)
2	2	CC2	GE	23LLC1202	Music (Instrumental)
3	2	CC2	GE	23LLC1203	Indian Classical Dance
4	2	CC2	GE	23LLC1204	Other forms of Dances
5	2	CC2	GE	23LLC1205	Painting
6	2	CC2	GE	23LLC1206	Theatre and acting
7	2	CC2	GE	23LLC1207	Photography
8	2	CC2	GE	23LLC1208	Yoga
9	2	CC2	GE	23LLC1209	Chess
10	2	CC2	GE	23LLC1210	Athletics
11	2	CC2	GE	23LLC1211	Basket Ball
12	2	CC2	GE	23LLC1212	Judo
13	2	CC2	GE	23LLC1213	Elements of Japanese Language
14	2	CC2	GE	23LLC1214	Elements of German Language
15	2	CC2	GE	23LLC1215	Elements of French Language
16	2	CC2	GE	23LLC1216	Elements of Spanish Language
17	2	CC2	GE	23LLC1217	Basics of Vedic Maths
18	2	CC2	GE	23LLC1218	Skilling in Microsoft Visio and Inkscape

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 Computer Tchnology)

B.Tech. in Computer Tchnology

SoE No. 23CT-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	

Liberal Learning Course

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject
1	1	CC1	GE	23LLC1101	Music (Vocal)
2	1	CC1	GE	23LLC1102	Music (Instrumental)
3	1	CC1	GE	23LLC1103	Indian Classical Dance
4	1	CC1	GE	23LLC1104	Other forms of Dances
5	1	CC1	GE	23LLC1105	Painting
6	1	CC1	GE	23LLC1106	Theatre and acting
7	1	CC1	GE	23LLC1107	Photography
8	1	CC1	GE	23LLC1108	Yoga
9	1	CC1	GE	23LLC1109	Chess
10	1	CC1	GE	23LLC1110	Athletics
11	1	CC1	GE	23LLC1111	Basket Ball
12	1	CC1	GE	23LLC1112	Judo
13	1	CC1	GE	23LLC1113	Elements of Japanese Language
14	1	CC1	GE	23LLC1114	Elements of German Language
15	1	CC1	GE	23LLC1115	Elements of French Language
16	1	CC1	GE	23LLC1116	Elements of Spanish Language
17	1	CC1	GE	23LLC1117	Basics of Vedic Maths
18	1	CC1	GE	23LLC1118	Skilling in Microsoft Visio and Inkscape

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

I SEMESTER

23GE1103: 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/

I SEMESTER
23GE1110 : 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

I SEMESTER

23GE1111 : 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.

I SEMESTER

23ME1101 : 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

I SEMESTER

23ME1102 : 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**

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 Electrical Engineering)

B.Tech in Electrical Engineering

SoE No. 23EL-101

I SEMESTER

23EL1101 : 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

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B. Tech SoE and Syllabus 2023

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

(Department of Computer Technology)

B.Tech in Computer Technology

SoE No. 23CT-101

I SEMESTER

23CT1103 : Lab. Computer WorkShop

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand the fundamentals of computer hardware and working of Linux operating system 2. Use Linux commands to manage files and file systems 3. Execute Scripts 4. Debug Programs on various IDEs

Unit I: Computer Hardware	**(4 Hrs.)**
Computer Hardware, RAM, HDD, Levels of Caches, Setting environment variables, Installation of software in Linux, Installing printers	
Unit II: Introduction to Linux/Unix OS	**(4 Hrs.)**
Introduction to Linux/Unix OS - ls, wc, chdir, mkdir, chmod, cd, mv, df, du, netstat, ps, more, set, env, setenv, chgrp, man, rm, rmdir, grep, vi, tar, untar, uuencode, find, cat, history, ping, ifconfig, traceroute	
Unit III: Unix tools	**(4 Hrs.)**
Unix tools - Awk, sed, Emacs	
Unit IV: Scripting	**(4 Hrs.)**
Scripting – variables, conditionals, loops, finding logged in users , Parameter passing to C program from shell (argc / argv)	
Unit V: Installing Linux (or any variant)	**(4 Hrs.)**
Installing Linux (or any variant): Introduction to using different tools for identification of possible errors in C program – gdb, concepts of "core dump", backtracing using "bt", using "info" to dump all registers, creating watch-list / watch variables. DDD (Data Display Debugger) – introduction and usage	
Unit VI: IDE for code development	**(4 Hrs.)**
IDE for code development Using DevCpp and/or VisualStudio, Create a project using multiple .c and .h files with cross-refrences, Setting compiler options and linker options, Understanding different settings	
Total Lecture	**24 Hours**

Textbooks:	
1.	Linux Pocket Guide, Daniel J. Barrett, 3rd edition, O'Reilly Media
2.	The Linux Command Line, William Shotts, 2nd edition, No Starch Press
3.	Linux for Beginners, Jason Cannon, 1st edition, Independently Published

Reference Books:	
1.	Linux Command Line and Shell Scripting Bible, Richard Blum, 3rd edition, Wiley
2.	Command Line Kung Fu, Jason Cannon, 1st edition, Independently Published

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

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/SERIES%20WISE%20BOOKS/COMPUTER%20TECHNOLOGY/COMPUTER%20TECHNOLOGY%20(G%20Series).pdf
2	chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/SERIES%20WISE%20BOOKS/COMPUTER%20TECHNOLOGY/COMPUTER%20TECHNOLOGY%20(I%20Series).pdf
3	chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/SERIES%20WISE%20BOOKS/COMPUTER%20TECHNOLOGY/COMPUTER%20TECHNOLOGY%20(PE%20Series).pdf

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=19O5kFdtKb0
2.	https://www.youtube.com/watch?v=ZtqBQ68cfJc
3.	https://www.youtube.com/watch?v=kfjDWygSvnw
4.	https://www.youtube.com/watch?v=GtovwKDemnI&t=1578s
5.	https://www.youtube.com/watch?v=J7L2x1ATOgk
6.	https://www.youtube.com/watch?v=85FrhrIwBtw

Course Outcomes

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

1. Understand the fundamentals of computer hardware and working of Linux operating system
2. Use Linux commands to manage files and file systems
3. Execute Scripts
4. Debug Programs on various IDEs

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

SN	Experiments based on
1	Installation of various software in Linux environment
2	Basics of Linux commands and its use
3	Programs based on Scripting
4	Execution of C Program through command line argument
5	Debugging in Turbo C and DEVC++
6	Debugging using gdb debugger
7	Create project using multiple C files
8	Exploring various text editors in Linux: AWK, SED, Emacs

I SEMESTER

23CT1101 : Introduction to Logic Building and Programming

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Describe the basics of computer system components and operation, write algorithms and draw flowcharts. 2. Write programs using flow control statements. 3. Use functions to write modular programs. 4. Use linear data structures such as arrays and structures in programs.

Unit I:	**6 Hrs.**
Computer System Basics: Introduction to components of a computer system (disks, memory, processor), how program is executed, understanding of concepts such as compilers, source and object programs, etc. Introduction to algorithms and flowcharts, types of programming errors. Basic building blocks of C: Character set, variables, identifiers & keywords, Data types, Operators: arithmetic, logical and relational operators, precedence of operators	
Unit II:	**6 Hrs.**
Expressions, sizeof() operator, constants, typedef statement, basic input/output statements and functions (scanf, printf, getch, putch, gets, puts), Introduction to library functions, 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:	**6 Hrs.**
Loop Structures: While, do while and for loops, break and continue statement, "goto" statement, bitwise operators	
Unit IV:	**6 Hrs.**
Modular programming: Concept of functions, user defined functions, function prototypes, formal parameters, actual parameters, return types, call by value, Recursive functions, comparing recursion against iteration, Concepts of a pointer, call by reference.	
Unit V:	**6 Hrs.**
Arrays: One dimensional array, array manipulation, insertion, deletion of an element, searching techniques- Linear and binary search, sorting techniques – Bubble sort , and selection sort. Two-dimensional arrays: matrix representation, basic matrix operations such as addition, multiplication and transpose, Array as function arguments. Strings: string representation and string handling functions	

Unit VI:		**6 Hrs.**
Structure: Introduction, defining a structure, declaring structure variables, accessing structure members, structure initialization, array of structures.		
	Total Lecture	**36 Hours**

Textbooks:	
1.	Computer Science: A Structured Programming Approach Using C, 3rd , B.A.Forouzan and R.F. Gilberg, Cengage Learning
2.	The C Programming Language, 2nd, Brian Kernighan and Dennis Ritchie, Prentice Hall

Reference Books:	
1.	Let Us C, 15th , Yashavant Kanetkar , BPB
2.	Computer Programming and Data Structures, 4th , E Balagurusamy, Tata McGraw Hill

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	

MOOCs Links and additional reading, learning, video material	
1.	https://onlinecourses.nptel.ac.in/noc22_cs40/preview

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 Computer Technology)

B.Tech in Computer Technology

SoE No. 23CT-101

I SEMESTER

23CT1102 : Lab. Introduction to Logic Building and Programming

Course Outcomes :

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

1. Describe the basics of computer system components and operation, write algorithms and draw flowcharts.
2. Write programs using flow control statements.
3. Use functions to write modular programs.
4. Use linear data structures such as arrays and structures in programs.

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

<table>
<tr><th>Sr.</th><th>Problem Statements</th></tr>
<tr><td>1 A</td><td>Introduction to Linux Operating system & it's different commands.</td></tr>
<tr><td>1 B</td><td>Introduction to Vi editor, Compilation and Execution of a program in Linux</td></tr>
<tr><td>2 A</td><td>1) Write a C program to display Your Name, Address and City in different lines.
2) Write a C program to convert centigrade into Fahrenheit. Formula: C= (F-32)/1.8.</td></tr>
<tr><td>2 B</td><td>1) Write program using conditional operators to evaluate the following function and print the value of y. y = 2.4x + 3, for x <= 2
y = 3x –5, for x > 2</td></tr>
<tr><td>3</td><td>Write a program to implement the following table, which tries to predict if a customer would buy a product. In particular, you need to ask for inputs Age, Gender and City, and print one of the three outputs Yes, No or Cannot Say.
<table>
<tr><td>Age</td><td>Gender</td><td>City</td><td>Will Buy?</td></tr>
<tr><td>25-30</td><td>M</td><td>Chenaai</td><td>Yes</td></tr>
<tr><td>33-45</td><td>F</td><td>Bangalore</td><td>Yes</td></tr>
<tr><td>57-80</td><td>F</td><td>Chennai</td><td>No</td></tr>
<tr><td>25-30</td><td>F</td><td>Hyderabad</td><td>No</td></tr>
<tr><td>13-19</td><td>M</td><td>Bangalore</td><td>Yes</td></tr>
<tr><td>16-20</td><td>M</td><td>Chenaai</td><td>No</td></tr>
</table></td></tr>
<tr><td>4</td><td>Write a menu driven program to perform following operations.
1) To display maximum number among inputted three number.
2) To display the final prize based on assumption that if total purchase price is above 2500 rs then discount is 25% and if total prize is above 5000 then discount is 30% else 40% discount.
3) To Display percentage of 2nd number to 1st number if two number is entered by the user.
4) Exit.</td></tr>
<tr><td>5</td><td>Write a program print weather entered number is Prime or not</td></tr>
<tr><td>6</td><td>Write a program to print the sum of exponential series e(x) =1 + x/1! + x^2 / 2! + x^3 / 3! +…….</td></tr>
</table>

7	Write a program to print following pyramid **1** **1 2 3** **1 2 3 4 5** **1** 2 3 4 5 6 7
8	i) Write a program in C that will scan a number N and then output the sum of the powers from 1 to N. thus, if the input is 4, the output should be 288. E.g. $(1)^1 + (2)^2 + (3)^3 + (4)^4 = 1 + 4 + 27 + 256 = 288$ [1,2,3,4] Use power function to calculate the power of number. ii) Write a recursive function to print Factorial of a entered number.
9	Write a program to sort an elements using bubble Sort.
10	Produce a multiplication table. Top left hand corner will show 1x1 and bottom right shows 12x12, as below. 1 2 3 4 5 6 7 8 9 10 11 12 2 4 6 8 10 12 14 16 18 20 22 24 3 6 9 12 15 18 21 24 27 30 33 36 4 8 12 16 20 24 28 32 36 40 44 48 5 10 15 20 25 30 35 40 45 50 55 60 6 12 18 24 30 36 42 48 54 60 66 72 7 14 21 28 35 42 49 56 63 70 77 84 8 16 24 32 40 48 56 64 72 80 88 96 9 18 27 36 45 54 63 72 81 90 99 108 10 20 30 40 50 60 70 80 90 100 110 120 11 22 33 44 55 66 77 88 99 110 121 132 12 24 36 48 60 72 84 96 108 120 132 144
11	Write a program To copy one string to another string without using library function
12	Define a structure for a student having name, roll number and marks obtained in six, subjects. Write a program to input the details for 20 students and print the same.
13	Write a program that copies a file to another file. The names of two files should be sent as command line arguments.

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B. Tech SoE and Syllabus 2023

(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**

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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

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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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

2nd Semester

(Department of Computer Technology)

B. Tech in Computer 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 Computer Tchnology)

B.Tech. in Computer Tchnology

SoE No. 23CT-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-B)															
1	1	BS	GE	23GE1103	Differential Equations and Complex Analysis	T	3	0	0	3	3	30	20	50	3
2	1	BS	GE	23GE1110	Applied Physics	T	3	0	0	3	3	30	20	50	3
3	1	BS	GE	23GE1111	**Lab:** Applied Physics	P	0	0	2	2	1		60	40	
4	1	BES	ME	23ME1101	Engineering Graphics	T	1	0	0	1	1	30	20	50	3
5	1	BES	ME	23ME1102	**Lab :** Engineering Graphics	P	0	0	4	4	2		60	40	
6	1	BES	EL	23EL1101	Basic Electrical and Electronics Engineering	T	3	0	0	3	3	30	20	50	3
7	1	BES	CT	23CT1103	**Lab :** Computer WorkShop	P	0	0	2	2	1		60	40	
8	1	PC	CT	23CT1101	Introduction to Logic Building and Programming	T	2	0	0	2	2	30	20	50	2
9	1	PC	CT	23CT1102	**Lab:** Introduction to Logic Building and Programming	P	0	0	2	2	1		60	40	
10	1	VSEC	GE	23GE1117	Get Set Go	…	…	…	…	…	2		60	40	
11	1	CC2	GE		**Liberal Learning Course (LLC2)**	…	…	…	…	…	2		60	40	
					TOTAL FIRST SEM		**12**	**0**	**10**	**22**	**21**				
MANDATORY LEARNING COURSES															
1	1	HS		GE2131	Universal Human Values (UHV)	**A**	2	0	0	2	0				
SECOND SEMESTER (GROUP-B)															
1	2	BS	GE	23GE1201	Calculus and Vector	T	3	0	0	3	3	30	20	50	3
2	2	BS	GE	23GE1206	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3
3	2	BS	GE	23GE1207	**Lab:** Engineering Chemistry	P	0	0	2	2	1		60	40	
4	2	HS/AEC1	GE	23GE1212	Professional Communication	T	2	0	0	2	2	30	20	50	2
5	2	HS/IKS	GE	23GE1215	Indian Knowledge System	T	2	0	0	2	2	30	20	50	2
6	2	BES	CV	23CV1201	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3
7	2	BES	CV	23CV1202	**Lab:** Engineering Mechanics	P	0	0	2	2	1		60	40	
8	2	BES	CT	23CT1204	Object Oriented Programming	T	3	0	0	3	3	30	20	50	3
9	2	BES	CT	23CT1205	**Lab :** Object Oriented Programming	P	0	0	2	2	1		60	40	
10	2	VSEC	GE	23GE1218	Functional English	…	…	…	…	…	2		60	40	
11	2	CC1	GE		**Liberal Learning Course (LLC1)**	…	…	…	…	…	2		60	40	
					TOTAL SECOND SEM		**16**	**0**	**6**	**22**	**23**				

Liberal Learning Course

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject
1	2	CC2	GE	23LLC1201	Music (Vocal)
2	2	CC2	GE	23LLC1202	Music (Instrumental)
3	2	CC2	GE	23LLC1203	Indian Classical Dance
4	2	CC2	GE	23LLC1204	Other forms of Dances
5	2	CC2	GE	23LLC1205	Painting
6	2	CC2	GE	23LLC1206	Theatre and acting
7	2	CC2	GE	23LLC1207	Photography
8	2	CC2	GE	23LLC1208	Yoga
9	2	CC2	GE	23LLC1209	Chess
10	2	CC2	GE	23LLC1210	Athletics
11	2	CC2	GE	23LLC1211	Basket Ball
12	2	CC2	GE	23LLC1212	Judo
13	2	CC2	GE	23LLC1213	Elements of Japanese Language
14	2	CC2	GE	23LLC1214	Elements of German Language
15	2	CC2	GE	23LLC1215	Elements of French Language
16	2	CC2	GE	23LLC1216	Elements of Spanish Language
17	2	CC2	GE	23LLC1217	Basics of Vedic Maths
18	2	CC2	GE	23LLC1218	Skilling in Microsoft Visio and Inkscape

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 Computer Tchnology)

B.Tech. in Computer Tchnology

SoE No. 23CT-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	

Liberal Learning Course

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject
1	1	CC1	GE	23LLC1101	Music (Vocal)
2	1	CC1	GE	23LLC1102	Music (Instrumental)
3	1	CC1	GE	23LLC1103	Indian Classical Dance
4	1	CC1	GE	23LLC1104	Other forms of Dances
5	1	CC1	GE	23LLC1105	Painting
6	1	CC1	GE	23LLC1106	Theatre and acting
7	1	CC1	GE	23LLC1107	Photography
8	1	CC1	GE	23LLC1108	Yoga
9	1	CC1	GE	23LLC1109	Chess
10	1	CC1	GE	23LLC1110	Athletics
11	1	CC1	GE	23LLC1111	Basket Ball
12	1	CC1	GE	23LLC1112	Judo
13	1	CC1	GE	23LLC1113	Elements of Japanese Language
14	1	CC1	GE	23LLC1114	Elements of German Language
15	1	CC1	GE	23LLC1115	Elements of French Language
16	1	CC1	GE	23LLC1116	Elements of Spanish Language
17	1	CC1	GE	23LLC1117	Basics of Vedic Maths
18	1	CC1	GE	23LLC1118	Skilling in Microsoft Visio and Inkscape

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 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

II SEMESTER

23GE1201: 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.)**

			July,2025	1.00	Applicable for AY 2025-26 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

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

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 Mathematics & Humanities)

B.Tech First Year

SoE No. 23FY-101

II SEMESTER

23GE1212 : 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

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

II SEMESTER

23GE1215 : 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

II SEMESTER
23CV1201 : 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**

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

II SEMESTER
23CV1202 : 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,

II SEMESTER
23CT1204 : 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
3. Analyze the problem to provide the objectoriented solution using advanced programming concepts

Unit I: Introduction to C++	**(6 Hrs.)**
Difference between C and C++- Evolution of C++- The Object-Oriented Technology-Disadvantage of Conventional Programming- Key Concepts of Object-Oriented Programming, Advantage of OOP-Object Oriented Language.	
Unit II: Classes and Objects & Constructors and Destructor	**(7 Hrs.)**
Classes in C++-Declaring Objects- Access Specifiers and their Scope- Defining Member Function-Overloading Member Function- Nested class, Constructors and Destructors, Introduction- Constructors and Destructor-Characteristics of Constructor and Destructor- Application with Constructor- Constructor with Arguments (parameterized Constructor-Destructors- Anonymous Objects	
Unit III: Operator Overloading and Type Conversion & Inheritance	**(7 Hrs.)**
The Keyword Operator- Overloading Unary Operator- Operator Return Type- Overloading Assignment Operator (=)- Rules for Overloading Operators, Inheritance, Reusability- Types of Inheritance- Virtual Base Classes-Object as a Class Member- Abstract Classes- Advantages of Inheritance-Disadvantages of Inheritance.	
Unit IV: Pointers & Binding Polymorphisms and Virtual Functions	**(7 Hrs.)**
Pointer, Features of Pointers- Pointer Declaration- Pointer to Class- Pointer Object- The this Pointer- Pointer to Derived Classes and Base Class, Binding Polymorphisms and Virtual Functions, Introduction- Binding in C++-Virtual Functions- Rules for Virtual Function- Virtual Destructor.	
Unit V: Generic Programming with Templates & Exception Handling	**(7 Hrs.)**
Generic Programming with Templates, Need for Templates- Definition of class Templates- Normal Function Templates- Over Loading of Template Function-Bubble Sort Using Function Templates- Difference Between Templates and Macros- Linked Lists with Templates, Exception Handling- Principles of Exception Handling- The Keywords try to throw and catch- Multiple Catch Statements –Specifying Exceptions.	
Unit VI: Overview of Standard Template Library	**(6 Hrs.)**
Overview of Standard Template Library- STL Programming Model- Containers- Sequence Containers-Associative Containers- Algorithms- Iterators- Vectors- Lists- Maps.	
Total Lecture	**40 Hours**

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Textbooks:	
1.	Object Oriented Programming with C++, 5th edition , Bal Gurusamy, McGraw Hill Publications.
2	Object Oriented Programming in C++ , 3rd edition , Lafore,R , Sams Publication

Reference Books:	
1.	The C++ Programming Language, 6th edition , Stroustrup.B , Pearson Education
2.	C++ The Complete Reference , 6th edition , Schildt, H , McGraw Hill Publications

MOOCs Links and additional reading, learning, video material	
1.	https://nptel.ac.in/courses/106105153

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.

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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

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.

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

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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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

3rd Semester

(Department of Computer Technology)

B. Tech in Computer 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 Computer Tchnology)

B.Tech. in Computer Technology

SoE No. 23CT-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	HSSM-1	GE	23GE1301	Fundamentals of Management & Economics	T	2	0	0	2	2	30	20	50	3
2	3	PC	CT	23CT1301	**Lab :** Web Technology	P	0	0	2	2	1		60	40	
3	3	PC	CT	23CT1302	Data Structures	T	3	0	0	3	3	30	20	50	3
4	3	PC	CT	23CT1303	**Lab :** Data Structures	P	0	0	2	2	1		60	40	
5	3	PC	CT	23CT1304	Computer Architecture & Organization	T	3	0	0	3	3	30	20	50	3
6	3	PC	CT	23CT1305	Discrete Mathematics and Probability Theory	T	3	0	0	3	3	30	20	50	3
7	3	VEC-2	CT	23CT1306	Cyber Laws	T	2	0	0	2	2	30	20	50	3
8	3	CEP	CT	23CT1307	**Community Engagement Project**	P	0	0	4	4	2		60	40	
9	3	OE-1	OE		**Open Elective -I**	T	2	0	0	2	2	30	20	50	3
10	3	MDM	CV		**MD Minor Course-I**	T	2	0	0	2	2	30	20	50	3
					TOTAL		**17**	**0**	**8**	**25**	**21**				

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

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

III SEMESTER
23GE1301: Fundamentals of Management & 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**

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

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 SEMESTER
23CT1301: Lab: Web Technology

Course Outcomes :
Upon successful completion of the course the students will be able to
1. Understand various internet technologies.
2. Design the web pages using HTML and CSS.
3. Implement the XML technology to store the data.
4.Develop the interactive web pages using JavaScript

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

SN	Program based on
1	[A] Introduction to internet (overview of internet, email, www, broadband, FTP) [B] Study HTML5 architecture and to implement basic HTML5 Tags.
2	Create a web form by using form tags in HTML5 (use any example)
3	Develop and demonstrate the usage of inline, internal and external style sheet using CSS.
4	Write a program in JSON to store information related to programming books along with edition and author name.
5	Introduction to XML. Program to demonstrate the use of External and Internal DTD. (Write an XML file which will display the Book information which includes the following: 1) Title of the book 2) Author Name 3) ISBN number 4) Publisher name 5) Edition 6) Price)
6	Parsing a file cd_catalog.xml and use the response as an XML DOM object and extracts the info from it with JavaScript.
7	[A] Write a program in JavaScript to perform arithmetic operations. [B] Write a Program in JavaScript To create Dialogue Boxes.
8	[A] Write a program in JavaScript to demonstrate the use of While and For Loop. [B] Write a program in JavaScript to demonstrate the use of Conditional Statements and Functions.
9	Write JavaScript to validate the following fields of the Registration page. 1. **First Name** (Name should contains alphabets and the length should not be less than 6 characters). 2. **Password** (Password should not be less than 6 characters length). 3. **E-mail id** (should not contain any invalid and must follow the standard pattern name@domain.com) 4. **Mobile Number** (Phone number should contain 10 digits only). 5. **Last Name and Address** (should not be Empty).
10	**Project:** Submission of Website with Report.

III SEMESTER

23CT1302 : Data Structures

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Implement applications of stacks and queues. 2. Develop applications using linked list. 3. Demonstrate various operations of tree data structure. 4. Apply the knowledge of graph data structure for solving real life problems.

Unit I:	**8 Hrs.**
Introduction to Data structures, classification, dynamic memory allocation, array-based implementation of stacks, queues, applications of stacks: expression conversion, applications of queue, implementation stack using queue and queue using stack, Hashing	
Unit II:	**8 Hrs.**
Linked list, self-referential data structure, types: singly, doubly, circular, application for polynomial evaluation, implementation of stacks and queue using linked list.	
Unit III:	**8 Hrs.**
Binary trees, binary search trees, terminologies, AVL, Red-Black	
Unit IV:	**8 Hrs.**
Splay trees, B and B+ trees, Multidimensional trees, Tries	
Unit V	**7 Hrs.**
Directed and Undirected Graphs, Terminologies, Graph traversals, connected and bi-connected components, Topological sort, Applications of BFS and DFS	
Unit VI:	**6 Hrs.**
Minimum Spanning Trees, Shortest Path Algorithms and Applications, Introduction to Network flow Problems	
	Total Lecture **45 Hours**

Textbooks:	
1.	Data Structures using C ,Latest , Reema Thareja ,Oxford publications.
2.	Data Structures, Algorithms and Applications in C++, 2nd, S. Sahani, University Press Orient Longman (India) Pvt. Ltd.
3.	Data Structures and Algorithms in C++ ,Student, Michael T. Goodrich, R. Tamassiaand, Mount Willy, JonhWilly and sons.

Reference Books:	
1.	Data Structures a Pseudocode approach with C ,Latest , Richard Gilberg, B. Forouzan ,Thompsons Course Technology
2.	Data Structures and Program Design in C, Latest ,Tondo Kruse, Leung and Tondo, Pearson Publications

MOOCs Links and additional reading, learning, video material	
1.	https://nptel.ac.in/courses/106102064
2.	https://www.youtube.com/watch?v=I_314LpT6X8
3.	https://nptel.ac.in/courses/106106133

III SEMESTER
23CT1303: Lab: Data Structures

Course Outcomes
Upon successful completion of the course the students will be able to 1. Implement applications of stacks and queues. 2. Develop applications using linked list. 3. Demonstrate various operations of tree data structure. 4. Apply the knowledge of graph data structure for solving real life problems

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

SN	Experiments based on
1	Program based on Stacks and its application
2	Program based on Queue and its application
3	Implementation of one data structures using another
4	Program based on linked list
5	Program on Skip list
6	Program based on Binary tree
7	Program based on Binary Search tree
8	Program based on application of Graph in networking
9	Program based on finding shortest path using Graph
10	Mini project covering all data structures

III SEMESTER

23CT1304: Computer Architecture and Organization

Course Outcomes :

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

1. Understand basic functionality of computer system, control unit, Memory, Input- output and storage.
2. Understand issues involved in the instruction and microinstructions execution and different addressing modes.
3. Understand the different types of Hazards and its mitigation, and working of computer peripherals.
4. Apply the arithmetic operations on signed/un-signed integer and floating point operands.
5. Apply the concept of memory circuits, organization of memory management and cache memory..

Unit I:	**7 Hrs.**
Basic Structure of Computer Hardware and Software: Functional Units, Basic Operational Concepts, Bus Structures, Software, addressing methods and machine program sequencing: Memory Locations, addressing and encoding of information, Instructions and Instruction sequencing	
Unit II:	**8 Hrs.**
Addressing modes, Assembly language, Stacks, Subroutine. Instruction set : Simple RISC Processing Unit: Some fundamental concepts, Execution of a complete instruction, Single, two, three bus organization, Sequencing of control Signals	
Unit III:	**8 Hrs.**
Processor Design, hard wired control, Microprogrammed Control: Microinstructions, Grouping of control signals, Microprogram sequencing, Micro Instructions with next Address field, perfecting microinstruction.	
Unit IV:	**8 Hrs.**
Arithmetic (Fixed and Floating point): 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	
Unit V:	**8 Hrs.**
Integer Division, Floating point numbers and operations. The Main Memory: Basic concepts, Memory Hierarchy, semiconductor RAM memories, Memory system consideration, semiconductor ROM memories, Speed Size, and Cost, Cache Memory, Performance Considerations	
Unit VI:	**(6 Hrs.)**
Mapping techniques, Pipelining: Basic Concepts, Data Hazards, Instruction Hazards Computer Peripherals: I/O Devices, I/O transfers – program-controlled, interrupt-driven and DMA, Interrupt handling . **Case Study:** Intel Core i5-12600K, Intel Core i7-4770 Processor, Intel Core i9-13900K, AMD Ryzen 5 7600X, AMD Ryzen 7 7700X, Intel Core2 Duo Processor.	
Total Lecture	**45 Hours**

Textbooks:	
1.	Computer Organization ,5th edition,V.Carl Hamacher, Zvonko Vranesic, McGraw Hill Publications.

Reference Books:				
1.	Computer Organization and Architecture	6th edition	Willaiam Staliing	Pearson Education
2.	Computer Architecture & Organization,3rd edition,J.P. Hayes,McGraw Hill Publications.			

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

MOOCs Links and additional reading, learning, video material	
1.	https://www.digimat.in/nptel/courses/video/106105163/L01.html
2.	https://www.youtube.com/watch?v=q6oiRtKTpX4&list=PLfzBO7vcQZ1ILg0snGisdbzp4SZ2-W8ah&index=3

III SEMESTER

23CT1305: Discrete Mathematics and Probability Theory

Course Outcomes :

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

1. Analyze and express logic sentence in terms of predicates, quantifiers, and logical connectives.
2. Derive the solution for a given problem using deductive logic and prove the solution based on logical inference.
3. Classify algebraic structure for a given mathematical problem
4. Perform combinatorial analysis to solve counting problems.
5. Develop the given problem as graph networks and solve with techniques of graph theory.

Unit I:	**8 Hrs.**
Foundations: Logic and Proofs: Propositions, Truth Tables, Compound Propositions, Logical Operators, Logic and Bit Operations; Logical Equivalences, De Morgan's Laws, Satisfiability: Applications and Solving Problems; Predicates, Quantifiers: Restricted Domains, Precedence, Logical Equivalences; Rules of Inference for Propositional Logic, Use to Build Arguments, Resolution, Combination for Propositions and Quantified Statements; Proofs Terminology, Methods, Direct Proofs, Proof by Contraposition and Contradiction.	
Unit II:	**8 Hrs.**
Sets, Functions and Relations: Introduction, Venn Diagrams, Subsets, Size of a Set, Power Sets, Cartesian Products, Set Notation with Quantifiers, Truth Sets and Quantifiers, Set Operations; Inverse Functions, Compositions and Graphs of Functions, Important Functions, Partial Functions; Sequences, Recurrence Relations, Special Integer Sequences, Summations; Countable Sets, An Uncountable Set; Functions as Relations, Relations on a Set, Properties of Relations, Combining Relations; n-ary Relations, Operations on *n*-ary Relations; Representing Relations Using Matrices; Closures, Transitive Closures.	
Unit III:	**8 Hrs.**
Number Theory and Induction: Division, The Division Algorithm, Modular Arithmetic, Arithmetic Modulo m; Primes, Trial Division, Conjectures and Open Problems About Primes, GCD and LCM, The Euclidean Algorithm, gcds as Linear Combinations; Linear Congruences, The Chinese Remainder Theorem, Fermat's Little Theorem, Pseudoprimes, Primitive Roots and Discrete Logarithms; Applications: Hashing Functions; Mathematical Induction and Examples of Proofs, Mistaken Proofs, Guidelines for Proofs; Strong Induction, Examples of Proofs.	
Unit IV:	**8 Hrs.**
Algebraic Structures: Algebraic Systems: Examples and General Properties; Semigroups and Monoids: Homomorphism of Semigroups and Monoids, Subsemigroups and Submonoids; Groups: Definitions, Subgroups and Homomorphisms, Cosets and Lagrange's Theorem, Normal Subgroups, algebraic Systems with Two Binary Operations.	
Unit V:	**7 Hrs.**
Counting and Discrete Probability: Basic Counting Principles, Complex Counting Problems, Subtraction and Division Rule, Tree Diagrams; The Pigeonhole Principle, The Generalized Pigeonhole Principle, Applications; Permutations, Combinations, Generating Permutations, Generating Combinations; Discrete Probability: Introduction, Probability Theory, Bernoulli Trials and the Binomial Distribution, Random Variables, Bayes' Theorem, Expected Value and Variance.	

Unit VI:	6 Hrs.
Graphs: Graph Models; Basic Terminology, Special Simple Graphs, Bipartite Graphs, Matchings, Applications of Special Types of Graphs, New Graphs from Old; Graph Representation, Adjacency and Incidence Matrices, Isomorphism of Graphs, Determining Isomorphism; Paths, Connectedness in Undirected Graphs and Directed Graphs, Paths and Isomorphism, Counting Paths Between Vertices; Euler Paths and Circuits, Hamilton Paths and Circuits, Applications of Hamilton Circuits; Planar Graphs: Euler's Formula, Kuratowski's Theorem; Graph Coloring: Introduction, Applications of Graph Colorings.	
Total Lecture	**45 Hours**

Textbooks:	
1.	Discrete Mathematics and Its Applications 7th Edition Kenneth H. Rosen McGraw-Hill
2.	Discrete Mathematical Structures with Applications to Computer Science Tata McGraw-Hill Edition J. P. Tremblay and R. Manohar McGraw-Hill

Reference Books:	
1.	Discrete Mathematics 2nd Edition Norman L. Biggs Oxford University Press
2.	Schaum's Outline of Theory and Problems of Discrete Mathematics 3rd Edition Seymour Lipschutz and Marc Lars Lipson Schaum's Outlines Series, McGraw-Hill
3.	Elements of Discrete Mathematics: A Computer Oriented Approach 3rd Edition Tata McGraw-Hill C. L. Liu and D. P. Mohapatra McGraw-Hill

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

MOOCs Links and additional reading, learning, video material	
1.	https://www.digimat.in/nptel/courses/video/111104079/L01.html
2.	https://www.digimat.in/nptel/courses/video/111107058/L39.html

III SEMESTER
23CT1306 : Cyber Laws

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Identify and explain international and national legal frameworks governing cyberspace. 2. Demonstrate familiarity with legal terminology commonly used in cyber law and technology-related legal discussions. 3. Identify different types of cybercrime and understand relevant laws and regulations for investigating and prosecuting cyber offenses.

Unit I:	**7 Hrs.**
Introduction: Cyber Crime: Meaning and Definition, Classification of Cyber Crimes, Causes of Cyber Crime, Impact and Effects of Cyber Crimes,	
Unit II:	**8 Hrs.**
Information Technology Law: Need of Legal Protection in Cyber World, Information Technology Act 2000 – Objectives, Scope, Applicability, Information Technology (Amendment) Act 2008, Recompense of Information Technology Law, Limitation of Information Technology Law	
Unit III:	**8 Hrs.**
Legal Protection against Cyber Crimes: Criminal Liabilities under Information Technology Act 2000, Common Cyber Crimes and Applicable Legal Provisions, Civil Liabilities under Information Technology Act 2000, Civil Liability for Corporate, Cyber Crimes under IPC and Special Laws	
Unit IV:	**7 Hrs.**
Case studies: Cyber Crime-Some Landmark Occurrence, Recent Trends in Cyber Laws	
Total Lectures	**30**

Textbooks:	
1.	Cyber Crim Elaw and Practice, The Institute of Company Secretaries of India - New Delhi
2.	Information Security & Cyber Laws, by Gaurav Gupta, Sarika Gupta, Khanna Publishing House

Reference Books:	
1.	Understanding Cybersecurity Law and Digital Privacy, Melissa Lukings, Arash Habibi Lashkari, Springer Cham

III SEMESTER

23CT1307 : Lab : Data Collection/Web-site/App designing for NGOs and report submission

III SEMESTER
MDM1CT101: Foundations of Software Engineering

Course Outcomes :

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

1. Principles Understanding: grasp the fundamentals of software engineering principles and methodologies.
2. Requirements Management: proficiently elicit, analyze, specify, and validate software requirements.
3. Design Competency: ability to design software solutions considering modularity, abstraction, and reusability.
4. Design Competency: ability to design software solutions considering modularity, abstraction, and reusability.
5. Design Competency: ability to design software solutions considering modularity, abstraction, and reusability.

Unit I: Introduction to Software Engineering	**8 Hrs.**
Overview of Software Engineering, Software Development Lifecycle, Software Processes, Software Development Methodologies (Waterfall, Agile, etc.), Ethical and Professional Responsibilities in Software Engineering	
Unit II: Requirements Engineering	**7 Hrs.**
Introduction to Requirements Engineering, Requirements Elicitation Techniques, Requirements Analysis and Specification, Requirements Validation and Verification, Use Cases and User Stories, Principles of Software Design	
Unit III: Fundamentals of Software Testing	**8 Hrs.**
Unit Testing, Integration Testing, System Testing, Black box testing, White box testing	
Unit IV: Software Project Management	**7 Hrs.**
Project Planning and Scheduling, Agile Project Management, Scrum, Kanban, and Lean methodologies Risk Management, Quality Assurance and Control	
Total Lectures	**30 Hrs**

Textbooks:	
1.	"Software Engineering: A Practitioner's Approach" by Roger S. Pressman

Reference Books:	
1.	"Clean Code: A Handbook of Agile Software Craftsmanship" by Robert C. Martin
2.	Software Engineering, 9th Edition, Ian Sommerville, University of St Andrews, Pearson

MOOCs Links and additional reading, learning, video material	
1.	https://onlinecourses.nptel.ac.in/noc21_cs65/preview
2.	https://nptelvideos.com/course.php?id=444

III SEMESTER
MDM2CT102 : Foundations of AR/VR

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Explain the fundamental concepts, components, and applications of AR and VR. 2. Develop basic AR and VR applications using modern development tools and SDKs. 3. Analyze design, performance, and ethical considerations in AR/VR systems.

Unit I:	**6 Hrs.**
Introduction to AR/VR: History and Evolution of AR/VR, Definitions and Key Differences: AR, VR, MR, XR, Applications in Healthcare, Education, Gaming, etc.,Components of AR/VR Systems: Sensors, Displays, Trackers, Challenges: Motion Sickness, Latency, Hardware Limitations	
Unit II:	**7 Hrs.**
VR Development Basics : Introduction to Game Engines: Unity/Unreal, Coordinate Systems, Scene Setup, Object Navigation,Creating Basic VR Environments, VR Interaction: Gaze, Gesture, Controllers, Performance Optimization Techniques,**Tools**: Unity + XR Toolkit or Unreal Engine	
Unit III:	**7 Hrs.**
AR Development Basics: AR Frameworks: ARCore, ARKit, Vuforia,Plane Detection, Anchors, Scene Understanding,Marker-based and Markerless AR,Developing Basic AR Applications	
Unit IV:	**6 Hrs.**
Advanced Topics and Industry Trends: UI/UX Design for AR/VR, WebXR and Mobile AR, Ethical and Safety Considerations, Future Trends: Haptics, AI in AR/VR, Metaverse,Case Study/Mini Project Discussion	
Total Lecture	**26 Hours**

Textbooks:	
1.	Virtual Reality, Steven M. LaValle, Cambridge University Press, 2016
2.	Allan Fowler-AR Game Development‖, 1st Edition, A press Publications, 2018, ISBN 978 1484236178

Reference Books:	
1.	Augmented Reality: Principles & Practice by Schmalstieg / Hollerer, Pearson Education India; First edition (12 October 2016),ISBN-10: 9332578494
2.	Understanding Virtual Reality: Interface, Application and Design, William R Sherman and Alan B Craig, (The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	https://www.vttresearch.com/sites/default/files/pdf/science/2012/S3.pdf
2	http://lavalle.pl/vr/book.html

MOOCs Links and additional reading, learning, video material	
1.	https://www.coursera.org/learn/ar
2.	https://nptel.ac.in/courses/106/106/106106138/
3.	https://www.coursera.org/learn/introduction-virtual-reality

III SEMESTER

Multidisciplinary Minor Courses

Track 1

MDMT1CT101 : Software Engineering and Project Management

Courses	Sem	MDMT1CT101 : Software Engineering and Project Management
MDM-I	3	(MDM1CT101) Foundation of Software Engineering
MDM-II	4	(MDM2CT102) Software Requirements and Modelling
MDM-III	5	(MDM3CT103) Functional Programming in Practice
MDM-IV	6	(MDM4CT104) Software Engineering Tools
MDM-V	7	(MDM5CT105) Software Architecture and Design
MDM-VI	8	(MDM6CT106) Software Testing and Quality Assurance

Track 2

MDMT1CT201 : Augmented and Virtual Reality

Courses	Sem	MDMT1CT101 : Software Engineering and Project Management
MDM-I	3	(MDM1CT201) Foundations of AR/VR
MDM-II	4	(MDM2CT202) AR/VR Development and Programming
MDM-III	5	(MDM3CT203) 3D Design and Interactive Storytelling
MDM-IV	6	(MDM4CT204) AI and Computer Vision in AR/VR
MDM-V	7	(MDM5CT205) Immersive Learning and Industry Applications
MDM-VI	8	(MDM6CT206) Ethics and Enterprise in AR/VR

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

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

4th Semester

(Department of Computer Technology)

B. Tech in Computer 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 Computer Tchnology)

B.Tech. in Computer Technology

SoE No. 23CT-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	BS	GE	23GE1403	Linear Algebra	T	3	0	0	3	3	30	20	50	3
2	4	HSSM-2	GE	23GE1401	Entrepreneurship Development	T	2	0	0	2	2	30	20	50	3
3	4	**AEC-2**	GE	23GE1405 23GE1406	Marathi Language / Hindi Language	T	2	0	0	2	2	30	20	50	3
4	4	VEC-1	CV	23CV1411	Environmental Sustainability, Pollution and Management	T	2	0	0	2	2	30	20	50	3
5	4	PC	CT	23CT1401	Operating systems	T	3	0	0	3	3	30	20	50	3
6	4	PC	CT	23CT1402	**Lab :** Operating systems	P	0	0	2	2	1		60	40	
7	4	PC	CT	23CT1403	Design and Analysis of Algorithms	T	3	0	0	3	3	30	20	50	3
8	4	PC	CT	23CT1404	**Lab :** Design and Analysis of Algorithms	P	0	0	2	2	1		60	40	
9	4	PC	CT	23CT1405	**Lab :** Data Analysis using R	P	0	0	0	2	1		60	40	
10	4	VSEC-3	CT	23CT1406	**Lab** : Python	P	0	2	2	4	2	60	40		
11	4	OE-2	OE		**Open Elective -II**	T	2	0	0	2	2	30	20	50	3
12	4	MDM	CT		**MD Minor Course-II**	T	2	0	0	2	2	30	20	50	3
					TOTAL		**19**	**2**	**6**	**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

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

III /IV SEMESTER
23GE1303/ 23GE1403 : 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/

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 start up. 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 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

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

1. विद्यार्थियों में देशभक्तिपरक एवं पारिवारिक मूल्यों का विकास |
2. विद्यार्थियों पर्यावरण-संरक्षण के प्रति सजग करना |
3. एकांकी, कहानी, निबंध आदि विधाओं के मध्य का अंतर अवगत कराना |
4. हिंदी के प्रयोजनमूलक स्वरूप से परिचित कराना |
5. 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"**

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	

IV Semester
23CT1401: Operating Systems

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand the various services provided by operating systems at different levels. 2. Apply knowledge of different operating system algorithms to effectively solve specific problems. 3. Analyze various approaches for enhancing system performance. 4. Evaluate the performance of different disk scheduling algorithms.

Unit I:	**(7 Hrs.)**
Introduction, services provided by OS, functions of OS, system calls. Process management-introduction, process control block, process states, process context switch, threads: user level and kernel level.	
Unit II:	**(8 Hrs.)**
CPU scheduling, goals of scheduling, CPU scheduling algorithms: FCFS, SJF, SRTF, RR, Priority based.	
Unit III:	**(7 Hrs.)**
Inter-process communication: process cooperation and synchronization, race condition, critical section, mutual exclusion and implementation, semaphores, classical inter-process communication problems.	
Unit IV:	**(8 Hrs.)**
Deadlocks: System Model, deadlock characterization-necessary conditions, resource allocation graph (RAG), methods for handling deadlock-deadlock avoidance, deadlock detection, deadlock prevention, recovery from deadlock.	
Unit V:	**(8 Hrs.)**
Memory management techniques-contiguous and non-contiguous, paging and segmentation, translation look aside buffer (TLB) and overheads Virtual memory and demand paging, page faults, page replacement algorithms, thrashing and working set model	
Unit VI:	**(7 Hrs.)**
File systems-introduction, disk space management and space allocation strategies, directory structures, disk caching, disk arm scheduling strategies: FCFS, SSTF, SCAN, CSACN, LOOK, CLOOK, File Organization: Sequential, Index, Index Sequential	
Total Lecture	**45 Hours**

Textbooks:	
1.	Operating system concepts, A. Silberchatz and P.Galvin , Addison Wesley Longman Inc

Reference Books:	
1.	Modern operating systems, 1st , A.S. Tanenbaum , Prentice Hall of India publication
2.	Operating Systems, Crowley , Tata McGraw Hill

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

MOOCs Links and additional reading, learning, video material	
1.	https://nptel.ac.in/courses/106102132
2.	https://www.youtube.com/watch?v=kqGhEJlRdu8
3.	https://www.youtube.com/watch?v=ucVm_arB-fw

IV SEMESTER
23CT1402 : Lab. Operating Systems

Course Outcomes
Upon successful completion of the course the students will be able to 1. Describe the different services provided by Operating System at different level. 2. Apply knowledge of different operating system algorithms to solve a given problem. 3. Analyze various approaches used to improve system performance. 4. Differentiate various disk scheduling algorithms based on their performances.

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

SN	Program based on
1	Basics of Linux commands and its use.
2	Write a shell script using control structure (i) Write a shell script to find maximum of 3 numbers. (ii)Write a shell script to check whether entered number even or odd
3	Write a shell script using loops (i) Write a shell script to find factorial of a number (ii)Write a shell script to reverse of a number
4	Write a program to create a process using fork( ) system call.
5	Write a program to implement Shortest Job First CPU scheduling algorithm.
6	Write a program to implement Non-Preemptive Priority CPU scheduling algorithm .
7	Write a program to implement FIFO page replacement algorithm.
8	Write a program to implement Best-Fit/Worst-Fit strategies
9	Program based on threads
10	Case study on Android Operating System

IV SEMESTER

23CT1403: Design & Analysis of Algorithms

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Students should be able to design some algorithms 2. Analyze their performance with respect to selected evaluation parameters

Unit I:	**(8 Hrs.)**
Mathematical foundations, summation of arithmetic and geometric series, □n, □n2, bound summations using integration, Analysis of algorithms, analyzing control structures, worst case and average case analysis, Asymptotic notations, Analysis of sorting algorithms such as selection sort, insertion sort, bubble sort, heap sort, external Sorting, lower bound proof. **Contemporary Issues related to Topic**	
Unit II:	**8 Hrs.)**
Recursive functions and recurrence relations, solutions of recurrence relations using technique of characteristic equation and generating functions, elementary and advanced data structures with operations on them and their time complexity, Amortized analysis **Contemporary Issues related to Topic**	
Unit III:	**(7 Hrs.)**
Divide and conquer basic strategy, binary search, quick sort, merge sort, Fast Fourier Transform etc. Greedy method –basic strategy, application to job sequencing with deadlines problem, minimum cost spanning trees, single source shortest path etc. **Contemporary Issues related to Topic**	
Unit IV:	**7 Hrs.)**
Dynamic Programming basic strategy, multistage graphs, all pair shortest path, single source shortest paths, optimal binary search trees, traveling salesman problem. **Contemporary Issues related to Topic**	
Unit V:	**(8 Hrs.)**
Basic Traversal and Search Techniques, breadth first search, connected components, Backtracking basic strategy, 8 – Queen"s problem, graph colouring, Hamiltonian cycles etc. **Contemporary Issues related to Topic**	
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. **Contemporary Issues related to Topic**	
Total Lecture	**45 Hours**

Textbooks:			
1.	Computer Algorithms Third	Horowitz, Sahani, Rajsekharan	Galgotia Publications Pvt. Ltd.
2.	Introduction to Algorithms Third	Thomas H. Cormen	Prentice Hall of India.

Reference Books:			
1.	Fundamentals of Algorithms Second	Brassard and Bratley	Prentice Hall

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/E%20-%20books-Wiley-Blackwell-/New%20Microsoft%20Office%20Word%20Document%20(2).htm

MOOCs Links and additional reading, learning, video material	
1	https://archive.nptel.ac.in/courses/106/101/106101060/
2	https://www.digimat.in/nptel/courses/video/106101060/L27.html

IV SEMESTER
23CT1404: Lab. Design & Analysis of Algorithms

Course Outcomes
Upon successful completion of the course the students will be able to 1. Students should be able to design some algorithms 2. Analyze their performance with respect to selected evaluation parameters

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

SN	Program based on
1	Write a program for insertion sort and display its time complexity for different number of inputs.
2	Write a program for heap sort and compare its time complexity with insertion sort for different number of inputs.
3	Write a program for merge sort and display its time complexity for different number of inputs.
4	Write a program for quick sort and compare its time complexity with merge sort for different number of inputs.
5	Write a program for fractional knapsack problem using greedy strategy and analyse its time complexity for different number of inputs.
6	Write a program for job sequencing with deadline problem using greedy strategyand analyse its time complexity for different number of inputs.
7	Write a program for travelling salesman problem using dynamic programmingand analyse its time complexity for different number of inputs.
8	Write a program for all pair shortest path using dynamic programming and analyse its time complexity for different number of inputs.
9	Write a program for 8 queen's problem using backtracking
10	Write a program for graph coloring problem using backtracking

IV SEMESTER
23CT1405 : Lab: Data Analysis Using R

Course Outcomes
Upon successful completion of the course the students will be able to 1. Independently analyze and interpret data using R. 2. Apply statistical methods and machine learning algorithms to solve real-world problems. 3. Create professional data visualizations and reports for effective communication. 4. Work on data analysis projects from data cleaning to insights generation.

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

SN	Experiments based on
1	Import data from CSV, Excel, databases, etc.
2	Export data to various formats.
3	Data Cleaning and preparing using R
4	Calculate descriptive statistics (mean, median, standard deviation, etc.).
5	Apply machine learning algorithms for classification and clustering tasks.
6	Create visualizations like histograms, boxplots, scatter plots.
7	Create interactive visualizations with plotly.
8	Preprocess text data (tokenization, stemming, stop word removal).
9	Integrate R with big data frameworks like Spark for large-scale data analysis.
10	Present analysis findings professionally to stakeholders.

IV SEMESTER

23CT14063IOT1306: Lab. Python Programming

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Select any framework for python programming as per their understanding. 2. Write any python program using various data structures and control statements. 3. Demonstrate skill for effective usage of file handling and concepts of classes and objects. 4. Develop advanced applications using functionalities provided under various packages of Python.

Unit I:	**7 Hrs.**
Python frameworks : Basic syntax, variables and expressions, basic operators, decision making	
Unit II:	**7 Hrs.**
Control flow statements: continue, break, Loops: while, for and Functions	
Unit III:	**8 Hrs.**
Data structures: list, dictionary, arrays, tuples, sets, strings Unit IV: [06Hrs] File handling, Classes and Objects, Introduction to Various Libraries: NumPy: Fundamental package for scientific computing NLTK- Natural language toolkit	
Unit IV:	**8 Hrs.**
File handling, Classes and objects, Python patterns- Implementing Graphs NetworkX- A package for the creation, manipulation, and study of the structure, dynamics, and functions of complex networks	
Total Lecture	**30 Hours**

Textbooks:	
1.	Introduction to Programming Using Python, 1st, Y. Daniel Liang Pearson
2.	Python: The Complete Reference ,1st, Martin C Brown McGraw Hill

Reference Books:	
1.	Database System Concepts, Henry Korth and Others, McGraw Hill
2.	Database Systems, Connolly, Pearson Publications
3	Database Systems, S. K. Singh, Pearson Education
4	Principles of Database Systems Ullman, Golgotia Publications 1998

IV SEMESTER

MDM2CT201: Software Requirements and Modelling

Course Outcomes :

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

1. Choose appropriate software engineering process model, requirement engineering principles and software designing fundamentals for a given project.
2. Select appropriate testing strategy and apply testing principles for testing a given application.
3. Apply basics of software configuration management, version control and change control in software development.
4. Evaluate cost estimation, effort and severity of software risk for given application.

Unit I:	**8 Hrs.**
Introduction to Software Engineering: A Generic View of process, Process models: Water fall Model, RAD Model, Prototyping Model, Component Development Model, Agile Model, Requirement Engineering: Requirement Engineering Task Initialization Eliciting Requirement, Analysis Model, Negotiation, Validation. Building the Analysis mode: Requirement Analysis, Analysis Modeling Approaches, Data Modeling Concept, Object Oriented Analysis, Types of Modeling, Design Engineering: Design Concept, Design Model.	
Unit II:	**8 Hrs.**
Testing Strategies: Strategic Approach, Strategic issues, Strategies for conventional Software, Strategies for Object Oriented Software, Validation Testing, Testing Tactics: White-Box Testing, Basis Path testing: Flow Graph Notation, Independent Program Paths, Control Structure Testing, Black Box Testing, Introduction to object oriented testing.	
Unit III:	**7 Hrs.**
Configuration Management: Base lines, Software Configuration items, The SCM Process, Identification of Objects in the Software Configuration, Version Control, Change Control, Configuration Audit, Status Reporting, SCM Standards, Project Management, Metrics for Process and Projects, Project Estimation, Risk Management: Reactive vs. Proactive Risk Strategies, Software Risks, Risk Identification, Risk Projection.	
Unit IV:	**7Hrs.**
Advanced Topics in Software Engineering: Re engineering Computer aided software engineering, Open source SE tools introduction, Example-Subversion: Overview, Typical subversion usage and work flow.	
	Total Lecture **30 Hours**

Textbooks:	
1.	Computer Science: A Structured Programming Approach Using C, 3rd , B.A.Forouzan and R.F. Gilberg, Cengage Learning
2.	The C Programming Language, 2nd, Brian Kernighan and Dennis Ritchie, Prentice Hall

Reference Books:	
1.	Let Us C, 15th , Yashavant Kanetkar , BPB
2.	Computer Programming and Data Structures, 4th , E Balagurusamy, Tata McGraw Hill

IV SEMESTER
MDM2CT202 : AR/VR Development and Programming

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand the core concepts, technologies, and applications of Augmented and Virtual Reality.. 2. Develop interactive AR/VR applications using modern tools, game engines, and SDKs with an emphasis on UI/UX design and optimization. 3. Integrate emerging technologies such as AI, Haptics, and WebXR into practical AR/VR prototypes and solutions

Unit I:	**6 Hrs.**
Foundations of AR/VR Development: Evolution and Current Trends in AR/VR/MR/XR, Real-World Applications in Education, Healthcare, Retail, Industry, System Architecture: Sensors, Displays, Trackers, Software Stack, Common Development Challenges: Motion Sickness, Latency, Hardware Constraints	
Unit II:	**7 Hrs.**
VR Application Development using Unity/Unreal: Setting up Development Environment (Unity + XR Toolkit / Unreal Engine), VR Scene Creation: Coordinate Systems, Object Manipulation, Lighting, Interaction Mechanisms: Gaze, Gestures, VR Controllers, Performance Optimization and Platform Deployment (Oculus/PC/Android)	
Unit III:	**7 Hrs.**
AR Application Development using ARCore, ARKit, Vuforia: Setting up AR Projects on Android/iOS, Plane Detection, Anchoring, Marker-based & Markerless AR, Scene Understanding and Light Estimation, Building and Testing Basic AR Apps with Real-time Feedback	
Unit IV:	**6 Hrs.**
Advanced Development and Industry Use Cases: UI/UX Design Principles in Immersive Interfaces, Web-based XR (WebXR API) and Mobile AR Deployment, Ethics, Privacy & Safety in AR/VR, Emerging Trends: Metaverse, AI integration, Haptic Feedback.	
Total Lecture	**26 Hours**

Textbooks:	
1.	Alan B. Craig – *Understanding Augmented Reality: Concepts and Applications*, Elsevier
2.	Tony Parisi – *Learning Virtual Reality*, O'Reilly Media

Reference Books:	
1.	Dieter Schmalstieg, Tobias Hollerer – *Augmented Reality: Principles and Practice*

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

IV SEMESTER

Multidisciplinary Minor Courses

Track 1

MDMT1CT101 : Software Engineering and Project Management

Courses	Sem	MDMT1CT101 : Software Engineering and Project Management
MDM-I	3	(MDM1CT101) Foundation of Software Engineering
MDM-II	4	(MDM2CT102) Software Requirements and Modelling
MDM-III	5	(MDM3CT103) Functional Programming in Practice
MDM-IV	6	(MDM4CT104) Software Testing and Quality Assurance
MDM-V	7	(MDM5CT105) Software Architecture and Design
MDM-VI	8	(MDM6CT106) Software Project Management

Track 2

MDMT2CT201 : Augmented and Virtual Reality

Courses	Sem	MDMT1CT201 : Augmented and Virtual Reality
MDM-I	3	(MDM1CT201) Foundations of AR/VR
MDM-II	4	(MDM2CT202) AR/VR Development and Programming
MDM-III	5	(MDM3CT203) 3D Design and Interactive Storytelling
MDM-IV	6	(MDM4CT204) AI and Computer Vision in AR/VR
MDM-V	7	(MDM5CT205) Immersive Learning and Industry Applications
MDM-VI	8	(MDM6CT206) Ethics and Enterprise in AR/VR

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

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

5th Semester

(Department of Computer Technology)

B. Tech in Computer 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 Computer Tchnology)

B.Tech. in Computer Technology

SoE No. 23CT-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	CT	23CT1501	Database Management System	T	3	0	0	3	3	30	20	50	3
2	5	PC	CT	23CT1502	**Lab : Database Management System**	P	0	0	2	2	1		60	40	
3	5	PC	CT	23CT1503	Mathematical Foundation of Data Analysis	T	3	0	0	3	3	30	20	50	3
4	5	PC	CT	23CT1504	**Lab : Mathematical Foundation of Data Analysis**	P	0	0	2	2	1		60	40	
5	5	PC	CT	23CT1505	Theorotical Foundation of Computer System	T	3	0	0	3	3		60	40	
6	5	PC	CT	23CT1506	**Lab : Java Stack**	P	0	0	2	2	1		60	40	
7	5	PE	CT		Professional Elective-I	T	2	0	0	2	2	30	20	50	3
8	5	PE	CT		**Lab : Professional Elective-I**	P	0	0	2	2	1		60	40	
9	5	OE-3	OE		Open Elective -III	T	3	0	0	3	3	30	20	50	3
10	5	MDM	CT		**MD Minor Course-III**	T	3	0	0	3	3	30	20	50	3
11	5	STR	CT	23CT1507	Internship, Seminar and Report	P	0	0	2	2	1		60	40	
					TOTAL		**17**	**0**	**10**	**27**	**22**				

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	CT	23CT1521	PE-I : Computer Vision
2	5	PE-I	CT	23CT1522	**PE-I : Lab : Computer Vision**
3	5	PE-I	CT	23CT1523	PE-I : Mobile OS
4	5	PE-I	CT	23CT1524	**PE-I : Lab : Mobile OS**
5	5	PE-I	CT	23CT1525	PE-I : Embedded Systems
6	5	PE-I	CT	23CT1526	**PE-I : Lab : Embedded Systems**
7	5	PE-I	CT	23CT1527	PE-I : Computer Graphics
8	5	PE-I	CT	23CT1528	**PE-I : Lab : Computer Graphics**
9	5	PE-I	CT	23CT1529	PE-I : Introduction to Salesforce
10	5	PE-I	CT	23CT1530	**PE-I : Lab : Introduction to Salesforce**
11	5	PE-I	CT	23CT1531	PE-I : Privacy and Security in Online Social Networks
12	5	PE-I	CT	23CT1532	**PE-I : Lab : Privacy and Security in Online Social Networks**

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

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

V SEMESTER
23CT1501 : Database Management System

Course Outcomes :

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

1. Understand database management system, through modeling and designing concepts.
2. Apply the knowledge of relational algebra, query language, transaction management to perform the operations on database.
3. Analyze database schemas to identify design issues and recommend suitable normalization and transaction management techniques for improved efficiency and integrity
4. Design database schema using the entity relation diagrams and relational database aspects.

Unit I:	**8 Hrs.**
Introduction to Database Management System: Database system Concepts and Architecture, Data Models, Schemas and Instances, Abstraction & Different Levels of Data Abstraction, Data Independence: Logical & Physical Independence. **Entity-Relationship Model**: Entities and Entity Sets, Relationships and Relationship Sets, Attributes, Mapping Constraints, Keys, Entity Relationship Diagram, Generalization, Aggregation, Reducing E-R Diagrams to Tables	
Unit II:	**7 Hrs.**
Relational Data Model: Structure of Relational Databases **Relational Algebra:** Structure of relational databases, Fundamental Relational-Algebra Operations, Additional relational algebra operations, extended relational algebra operations, modification of the databases.	
Unit III:	**8 Hrs.**
SQL: Data definition language (DDL), Data Manipulation Language (DML), Basic structure of SQL Queries, Set operations, Null Values, Nested sub-queries, views, modification of database, transaction, Joins. **PLSQL Constructs:** SQL data types & schemas, Integrity Constraints, Domain Constraints, Assertions, triggers, Stored Procedures	
Unit IV:	**7 Hrs.**
Relational Database Design AND Normalization: Pitfalls in Relational Database Design, Functional Dependencies, Inference Rules, Equivalence, and Minimal Cover, Properties of Relational Decomposition, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form, Other Dependencies and Normal Forms	

Unit V:	**8 Hrs.**
Transaction Management: ACID Properties, Implementation of ACID Properties, Database processes to support ACID Properties, Schedules, and Testing of Serializability	
Unit VI:	**7 Hrs.**
Concurrency Control: Lock-based Protocols, Timestamp Based Protocols, Validation Techniques. **Crash Recovery:** Failure Classification, Log Based Recovery, Buffer Management, Checkpoints.	
Total Lecture	**45 Hours**

Textbooks:	
1.	Database System Concepts, Korth, Silberschatz McGraw-Hill publication.
2.	Fundamentals of Database Systems , Elmasri, Navathe & Gupta, Pearson Education.

Reference Books:	
1.	Database System Concepts, Henry Korth and Others, McGraw Hill
2.	Database Systems, Connolly, Pearson Publications
3.	Database Systems, S. K. Singh, Pearson Education
4.	Principles of Database Systems Ullman Golgotia Publications 1998

MOOCs Links and additional reading, learning, video material	
1.	https://onlinecourses.nptel.ac.in/noc22_cs40/preview

V SEMESTER
Code: 23CT1502 Sub. Name: Lab Database Management System

Course Outcomes
Upon successful completion of the course the students will be able to
1. Apply the concepts of database query language to extract, process and manage the data
2. Design the conceptual and physical database schema using database query language

SN	Experiments based on
1	Implementation of DDL commands of SQL with suitable examples
2	Implementation of DML commands of SQL with suitable examples
3	Implementation of different types of function with suitable examples
4	Implementation of different types of operators in SQL
5	Implementation of different types of Joins
6	Study and Implementation of • Group By & having clause • Order by clause • Indexing
7	Study & Implementation of • Sub queries • Views
8	Study & Implementation of different types of constraints
9	Study & Implementation of Database Backup & Recovery commands. Study & Implementation of Rollback, Commit, Savepoint
10	Creating Database /Table Space • Managing Users: Create User, Delete User • Managing roles:-Grant, Revoke.
11	Study & Implementation of PL/SQL
12.	Study & Implementation of SQL Triggers.

V SEMESTER
23CT1503: Mathematical Foundation of Data Analysis

Course Outcomes :

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

1. Apply different visualization, summarizing techniques and linear algebra to given data for its interpretation
2. Solve given problem using the probability theory, random variables and apply the concept to Bayes Theorem
3. Perform sampling distribution to estimate the given data and predict the analysis using regression.
4. Formulate and test a hypothesis, using critical values to draw conclusions and determining probability of making errors in hypothesis tests.
5. Understand small sample test methods and analyse various methods of Non-parametric tests

Unit I:	**8 Hrs.**
Introduction to Statistics and Linear Algebra: The role of statistics, numerical and graphical methods for describing and summarizing data. Linear Algebra: Introduction to Vectors, Solving Linear Equations, Vector Spaces and Subspaces, Orthogonality and determinants, linear transformations.	
Unit II:	**7 Hrs.**
Probability and Probability distribution: Basic terminology in probability and rules, Probabilities under conditions of statistical independence and dependence, Bayes Theorem. Random variables, expected values, variance, probability distributions, model given data	
Unit III:	**8 Hrs.**
Sampling Distributions and Estimation: Sampling Distributions: Introduction to sampling, random sampling, non-random sampling, Introduction to sampling distributions, design of experiments. Estimation: Introduction, point estimates, interval estimates and confidence interval, determining the sample size in estimations	
Unit IV:	**8 Hrs.**
Simple Regression and Correlation: Introduction, Estimation Using the Regression Line, Correlation Analysis Making Inferences about Population Parameters Using Regression and Correlation Analyses.	
Unit V:	**7 Hrs.**
Testing Hypotheses: Introduction, Basic to the Hypotheses-testing Procedure, Testing Hypotheses, One sample test: Hypotheses Testing of Means when the population standard deviation is Known, Hypotheses Testing of Means when the population standard deviation is not known, Hypotheses Testing of proportions, Limitations of the tests of hypotheses	

Unit VI:		7 Hrs.
Parametric and Non-Parametric Testing: Introduction to parametric and non-parametric tests, ANNOVA, Chi-square test, sign test, rank sum test.		
	Total Lecture	45 Hours

Textbooks:	
1.	Introduction to probability and statistics for engineers and scientist ,3rd Edition, Sheldon M. Ross, Elsevier
2.	Statistics for Management,7th Edition, Richard I. Levin & David S. Rubin, Pearson Education

Reference Books:	
1.	Applied Statistics and Probability for Engineers ,5th Edition,Montgomery, D. C. and G. C. Runger,John Wiley & Sons
2.	Elementary Linear Algebra,8th edition, Ron Larson, Cengage Learning

V SEMESTER
23CT1504: Mathematical Foundation of Data Analysis LAB

Course Outcomes

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

1. Apply different visualization, summarizing techniques and linear algebra to given data for its interpretation
2. Solve given problem using the probability theory, random variables and apply the concept to Bayes Theorem
3. Perform sampling distribution to estimate the given data and predict the analysis using regression.
4. Formulate and test a hypothesis, using critical values to draw conclusions and determining probability of making errors in hypothesis tests.
5. Understand small sample test methods and analyse various methods of Non-parametric tests

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

SN	**Program based on**
01	Installation of any open-source interactive programming language used for data analytics and implement its basic functionality
02	Implement visualization techniques and analyze the data
03	Implement the functionalities of linear algebra
04	Implement different probability distributions
05	Implement sampling technique and analyze the data
06	Implement estimation and analyze the data
07	Implement regression technique for estimation
08	Implement hypothesis testing
09	Implement parametric and non-parametric tests

V SEMESTER

23CT1505 : Theoretical Foundation of Computer System

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Construct automata, regular expression for any pattern. 2. Construct context free grammar for various languages. 3. Construct push down automata and Turing Machine for a language. 4. Evaluate and justify whether a problem is decidable or not.

Unit I	**7 Hrs.**
Alphabet, Symbols, Sets, Strings, Language, Operations, Relations, Finite Automata, Acceptance of strings and languages, Non Deterministic Finite Automation , Deterministic Finite Automation Equivalence between NFA and DFA ,NFA with ε-transition, Minimization of FA.	
Unit II	**8 Hrs.**
Regular sets, Regular expressions, Manipulation of regular expressions, Equivalence between RE and FA. Pumping Lemma, closure properties of regular sets with proofs, Regular grammars, Right linear and left linear regular grammars, inter-conversion, Equivalence between regular grammar and FA, Inter-conversion between RE and RG	
Unit III	**7 Hrs.**
Context free grammar, Derivation trees (Syntax tree and Parse tree), Ambiguous Grammar, Context Free Language (CFL), Normal Form of grammar: Chomsky Normal Form, Greibach Normal Form, CYK algorithm.	
Unit IV	**8 Hrs.**
Push down automata, definition, and model, acceptance of CFL by empty Stack and by final state, equivalence CFL and PDA, Interconversion, Closure of properties of CFL with proofs, 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, Church's hypothesis, Chomsky hierarchy of language , Linear bounded automata and context sensitive language, Universal Turing Machine	
Unit VI	**7 Hrs.**
Undecidable Problems related to Recursive enumerable language and Turing Machine, post correspondence problem, Recursive function Theory –Basis functions and operations on them. Bounded minimization preemptive μ recursive function –unbounded minimization and recursive function. Introduction to formal verification.	
Total	**45Hrs**

Textbooks:	
1.	Introduction to Automata Theory, Languages and Computation, Hopcroft H.E., Ullman and Motwani, Addison Wesley 2nd Edition, 2000
2.	Introduction to Languages and the theory of Automata, John C. Martin, McGraw-Hill 3rd Edition, 2003.

Reference Books:	
1.	Introduction to the Theory of Computation, Michael Sipser, Course Technology, 2nd Edition, 2005
2.	Theory of Computation, O.G.Kakde, USP 2008

Google Syllabus Links and additional reading, learning, video material	
1.	Your first Android app
2	Building app UI

V SEMESTER
23CT1506 : Lab. Java Stack

Course Outcomes :
Upon successful completion of the course the students will be able to
1. Develop backend applications using object-oriented programming concepts and implement data persistence using relational databases. 2. Design and implement interactive and responsive user interfaces using standard web technologies. 3. Build and integrate complete web applications by combining client-side and server-side components

SN	Experiments based on
1	**Module 1: Core Java & OOP Concepts** • Lab 1: Implement basic Java programs (loops, conditionals, arrays) • Lab 2: Demonstrate OOP concepts (inheritance, polymorphism, encapsulation, abstraction) • Lab 3: Use collections and exception handling in Java
2	**Module 2: Java Web Development (Backend) – Using Spring Boot** • Lab 4: Create a simple RESTful API using Spring Boot • Lab 5: Implement CRUD operations using Spring Boot and JPA (Hibernate) • Lab 6: Connect REST API to MySQL/PostgreSQL database • Lab 7: Implement validation and exception handling in Spring Boot
3	**Module 3: Frontend Development – Using HTML, CSS, JavaScript, and Angular/React** • Lab 8: Build a responsive UI using HTML, CSS, and Bootstrap • Lab 9: Create a dynamic UI using JavaScript (form validation, DOM manipulation) • Lab 10: Build a frontend application using Angular or React • Lab 11: Connect frontend with REST API (from Lab 4-6)
4	**Module 4: Full Stack Integration** • Lab 12: Build a complete mini-project: ○ Frontend (Angular/React) ○ Backend (Spring Boot REST API) ○ Database (MySQL/PostgreSQL) ○ Lab 13: Implement user authentication (e.g., JWT or Spring Security)
5	**Module 5: Testing and Deployment** • Lab 14: Write unit tests using JUnit and integration tests with MockMvc

V SEMESTER
23CT1521 : Computer Vision

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand the basic concepts of image formation, camera geometry, and image representation in computer vision. 2. Apply fundamental image processing techniques like filtering, edge detection, and feature extraction. 3. Analyze 3D vision methods such as stereo vision and optical flow for motion and depth understanding. 4. Implement basic machine learning techniques for tasks like face detection and object classification in vision applications.

Unit I:	**(7 Hrs.)**
Introduction and applications of computer vision: Image formation, Image transformations, Basics of camera geometry and calibration, Understanding pixel values and image types (grayscale, color)	
Unit II:	**(8 Hrs.)**
Image Processing and Feature detection: Image filters, Edge detection, Corner detection, Feature Detection and Matching, Image Stitching/Mosaicing.	
Unit III:	**(7 Hrs.)**
3D Vision and Object Tracking: Stereo Vision, Optical Flow, Basic object tracking and recognition, Introduction to simple segmentation techniques.	
Unit IV:	**(8 Hrs.)**
Learning-Based Vision and Applications: Basics of machine learning in vision, Face detection using Adaboost, Object classification using SVMs and Neural Networks, Real-life applications: face recognition, motion detection	
Total Lecture	**30 Hours**

Textbooks:	
1.	Computer Vision: A Modern Approach, Forsyth and PonceH, 4th edition, Pearson Education.
2.	Introductory Techniques for 3D Computer Vision", Emanuele Trucco and Alessandro Verr, Prentice Hall
3.	Computer Vision Algorithms and Applications, Richard Szeliski
4.	OpenCV Documentation & Tutorials (online)

Reference Books:	
1.	Robot Vision, B. K. P. Horn, MIT Press (Cambridge)
2.	Trucco and Verri, Introductory Techniques for 3D Computer Vision, 1998

V SEMESTER
23CT1522 : Lab Computer Vision

Course Outcomes
Upon successful completion of the course the students will be able to 1. Apply image enhancement and smoothing techniques to improve image quality for further analysis. 2. Extract meaningful features from images using descriptors such as HOG and SIFT. 3. Implement and evaluate modern object detection methods including YOLO and R-CNN. 4. Analyze and develop solutions for motion estimation, object recognition, and facial expression recognition using classical and learning-based methods.

Sr. No	Aim of Practical
1	Implement various grey level transformations for Image Enhancement
2	Write a Program to apply convolution processes on an input image for image smoothing.
3	Implement Histogram of Oriented Gradient (HOG) for Feature extraction
4	Write a Program to apply Scale Invariant Feature Transform on input image.
5	Implement object detection algorithm YOLO
6	Implement R-CNN algorithms for object detection
7	Implement motion estimation using optical flow technique.
8	Implement Object recognition.
9	Implement Facial Expression Recognition.

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B. Tech SoE and Syllabus 2023

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

(Department of Computer Technology)

B.Tech in Computer Technology

SoE No. 23CT-101

V SEMESTER

23CT1523 : Mobile OS

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand the different flavors of mobile operating system and their specific features. 2. Design an app using different controls. 3. Design an app which can manage data and can communicate with native application. 4. Design and publish an app which can handle multiple devices with different configurations

Unit I: Introduction To Kotlin	**7 Hrs.**
Overview of Kotlin language and comparison with Java, Setting up the Kotlin development environment,Basic syntax: variables, data types, operators, and control flow (if, when, loops),Functions and basic I/O operations,Nullable types and null safety in Kotlin, Using Kotlin Playground and Android Studio for basic programming.	
Unit II: Introduction to Android	**8 Hrs.**
Android architecture and its components, understanding activities, fragments, and views, introduction to Android Studio and project structure, application lifecycle and manifest file, permissions and SDK versioning, introduction to Material Design guidelines. XML layout files and design structure, views and View Groups: Linear Layout, Relative Layout, Constraint Layout, widgets: Text View, Edit Text, Button, Image View, Scroll View and List View basics, designing responsive layouts for multiple screen sizes and densities, previewing and testing UI layouts on emulators and physical devices.	
Unit III: Fundamentals of Kotlin, object-oriented programming, and lambdas.	**8 Hrs.**
Object-Oriented Programming concepts: classes, objects, inheritance, polymorphism, constructors, properties, and methods, data classes and enums, collections and generics, introduction to lambdas and higher-order functions, using Kotlin's standard library for functional programming.	
Unit IV: Add a button to an APP & Interacting with UI & State	**7 Hrs.**
Handling user input through buttons and text fields, managing application state and stateful widgets, click listeners and UI event handling, toasts, dialogs, and snackbars, navigation between activities and passing data, introduction to View Model.	
Total	**30 Hrs.**

Textbooks:	
1.	Android Programming with Kotlin for Beginners by John Horton, Packt Publishing, **ISBN-10:** 178961540

Google Syllabus Links and additional reading, learning, video material	
1.	*Your first Android app*
2	*Building app UI*

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

V SEMESTER
23CT1525 : PE-I : Embedded Systems

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand the embedded system design process, design metrics, and various real-world applications. 2. Use software development tools, debugging techniques, and communication protocols in embedded systems. 3. Differentiate real-time operating systems from general-purpose operating systems 4. Analyze the ARM processor architecture, memory organization, and instruction set relevant to embedded applications.

Unit I: Introduction to Embedded Systems Architecture	**(7 Hrs.)**
Definition, Design challenges, Design metrics (NRE, unit cost), Applications, Trends in embedded systems, Embedded system design cycle. Hardware/software co-design, Processor selection, Memory types, IO devices, Interrupts, Context switching, Device drivers	
Unit II: Architecture and Programming	**(8 Hrs.)**
RISC and CISC, ARM organization, ARM Programmers model, operating modes, Exception Handling, ARM instruction set (Thumb), Assembly language basics	
Unit III: Real-Time Operating Systems	**(7 Hrs.)**
Architecture of the kernel , Task scheduler , ISR , Semaphores , Mailbox , Message queues , Pipes, Events , Timers , Memory Management, Multitasking and thread management	
Unit IV: Communication Protocols in Embedded Systems	**(8 Hrs.)**
Bluetooth, IEEE 802.11, 802.16, GPRS, MODBUS, CAN, I2C, USB: operation, architecture and implementation	
Total Lecture	**30 Hours**

Textbooks:	
1.	Raj Kamal, Embedded Systems: Architecture, Programming and Design, McGraw Hill Education.
2.	Frank Vahid, "Embedded System Design", Wiley Publications.

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

V SEMESTER
23CT1526 : PE-I: Lab: Embedded Systems

Course Outcomes

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

1. Understand the architecture and basic interfacing of embedded systems using microcontrollers.
2. Apply communication protocols such as One-Wire and I2C in embedded applications.
3. Interface analog/digital peripherals and perform serial communication using microcontrollers.

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

SN	**Program based on**
1	Study the architecture diagram of theATmega328micro-controller
2	Write a program to alternate blink 4 LED lights on Arduino Nano
3	Write a program to read the status of the Push button and control the LED light Using the Button
4	Study of One Wire Protocol. Write a program to read the DHT22 sensor data and display it on an LCD
5	Study of I2Cprotocol. Write a program to display messages on LCDI2C
6	Develop an RTOS-based application using Free RTOS (e.g., LED blinking using task scheduling)
7	Implement inter-task communication using semaphores/message queues in RTOS
8	Interfacing analog sensors (like temperature sensor) using ADC and displaying output
9	Write a program to send the data from the Serial monitor to Arduino Nano (controlLED) and read the analog signal value on the Serial Monitor
10	Case study: Develop a mini project based on embedded systems in domains like communication, automation, or automobile

V SEMESTER
23CT1529 : Introduction to Salesforce

Course Outcomes :

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

1. Apply the knowledge of customer-centered organization and implement the integral processes within an organization that are automated and how does the automation create predictability and efficiencies.
2. Analyze business intelligence, cross selling/up selling, customer loyalty, continuous improvement and quality programs that have been the direct and ongoing result of implementing CRM applications. Solve queries based on relational algebra & SQL.
3. Design and customize a CRM application for organization to suit their business needs

Unit I:	**7 Hrs.**
Introduction to Salesforce CRM: Salesforce, Types of Salesforce Clouds and their features, Industry Clouds in salesforce. **CRM Administration and Data Model Design:** Lightning and classic UI and differences, Object Manager, App Manager, Setup, App creation, tabs, Types of Objects, Data Types, Sandboxes, Understanding Relationships and its limitations, Types of Relationship and their differences, Junction Object, formulas, Dependency picklist fields, Validation Rules.	
Unit II:	**8 Hrs.**
Data Management with CRM Tool: Record details, List Views, Filters, Actions Page layouts, Compact Layouts, Introduction to Lightning flows (Auto triggered and Screen flow), email templates, approval processes, Community Creation, Reports and Dashboards. **Security Model:** Introduction to Profiles and Permission Set, Pemission Set Group, Overview of Data Security, Control access to org, object, field, record, OWD, Role and Roles Hierarchy, Sharing Rule, Sharing sObjects, Apex Sharing.	
Unit III:	**7 Hrs.**
CRM Tool Development: Introduction to Apex, Collections, SOQL and SOSL, DML Operations, Controllers In APEX, Email Service Using Apex Class and Triggers, Asynchronous APEX, Batch APEX, Apex Test Classes. Some Important Governor Limits (like SOQL limit, DML limit etc. Introduction to use of AI in Salesforce: Agentforce for developers, Agents, Prompt and Data Cloud.	
Unit IV:	**8 Hrs.**
Lightning Web Component: Introduction to Aura and LWC and difference between them. Decorators in LWC like wire, api and track. Lightning Data Service, Imperative Apex call from LWC, Parent child LWC component communication using custom events. Use of LMS (Lightning Message Service) for communicating between unrelated components, Navigation Mixin	
Total	**30 Hrs.**

			July,2023	1.00	Applicable for AY 2023-24 Onwards
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V SEMESTER
23CT1530 : Lab: Introduction to Salesforce

Course Outcomes
Upon successful completion of the course the students will be able to 1. Implement cloud-based solutions for customers using Salesforce CRM tool 2. Help teams articulate their CRM goals and identify key milestone in the relationship management process. 3. Demonstrate the use of Lightning Component Framework.

SN	Experiments based on
1	A] Introduction Cloud Computing and its Services. B] Introduction to Salesforce CRM.
2	A] Creation of Custom Objects in salesforce Lightning and apply validations on different fields. B] To create Look-up and Master Details Relationship with objects.
3	A] To implement formula field. B] To form dependencies among fields.
4	To create a domain specific schema builder.
5	A] To create clone user and assigned permissions B] To perform OWD operations.
6	Create lightning flow in salesforce: A] Auto triggered flow B] Screen flow
7	To create Email templates in salesforce Lightning. Send Email using flows.
8	A] Write an Apex code to perform the DML Operations on Standard or the Custom objects created by the user. B] Write Test class to cover the same C] Use of Agentforce for developers to document, explain and create test classes
9	Write Async Apex (Batch class)
10	A] Create Resource Resource, Connected App and test with workbench/postman B] Write a Apex class to do Basic Http Request Callout and related configuration like Named Credentials or Remote Site Settings
11	A] Create a Hello LWC Component B] Create a Hello Aura Component. Understand difference with respect to syntax
12.	A] LWC Component showing use of LDS. B] LWC Component showing use of wire to fetch the backend data C] LWC Component to do imperative call
13	A] Use of events in LWC to communicate between Parent and Child component B] Use of LMS for communication between unrelated components
14.	Group Mini Project

V SEMESTER

23CT1531: PE-I: Privacy and Security in Online Social Networks

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Explain the evolution, structure, and fundamental concepts of online social networks, including associated security and privacy challenges. 2. Apply data collection methods and analyze privacy risks such as phishing and information disclosure in online social networks. 3. Analyze various trust and reputation models used in online social systems to assess credibility and user behavior. 4. Evaluate access control models and identity management strategies to enhance privacy and security in online social platforms.

Unit I:	**7 Hrs.**
Introduction to Online Social Networks: Introduction to Social Networks, From offline to Online Communities, Online Social Networks, Evolution of Online Social Networks, Analysis and Properties, Security Issues in Online Social Networks, Trust Management in Online Social Networks, Controlled Information Sharing in Online Social Networks, Identity Management in Online Social Networks	
Unit II:	**8 Hrs.**
Data collection from social networks: challenges, opportunities, and pitfalls in online social networks, APIs; Collecting data from Online Social Media. Information privacy disclosure, revelation, and its effects in OSM and online social networks; Phishing in OSM & Identifying fraudulent entities in online social networks	
Unit III:	**7 Hrs.**
Trust Management in Online Social Networks: Trust and Policies, Trust and Reputation Systems, Trust in Online Social, Trust Properties, Trust Components, Social Trust and Social Capital, Trust Evaluation Models, Trust, credibility, and reputations in social systems; Online social media and Policing.	
Unit IV:	**8 Hrs.**
Controlled Information Sharing in Online Social Networks: Access Control Models, Access Control in Online Social Networks, Relationship-Based Access Control, Privacy Settings in Commercial Online Social Networks, Existing Access Control Approaches	
Total Lecture	**30 Hours**

Textbooks:	
1.	Security and Privacy-Preserving in Social Networks, Editors: Chbeir, Richard, Al Bouna, Bechara (Eds.), Spinger, 2013
2.	Security and Trust in Online Social Networks, Barbara Carminati, Elena Ferrari, Marco Viviani, Morgan & Claypool publications
3	Security and Privacy in Social Networks, Editors: Altshuler, Y., Elovici, Y., Cremers, A.B., Aharony, N., Pentland, A. (Eds.), Springer, 2013
4	Security and privacy preserving in social networks, Elie Raad & Richard Chbeir, Richard Chbeir& Bechara Al Bouna, 2013

Reference Books:	
1.	Social Media Security: Leveraging Social Networking While Mitigating Risk, Michael Cross, 2013

V SEMESTER

23CT1532 : Lab PE-I : Privacy and Security in Online Social Networks

Course Outcomes
Upon successful completion of the course the students will be able to 1. Collect and store online social networking data using different tools and API's. 2. Represent social media data as a graph. 3. Analyze data using tools and graphs

SN	Experiments based on
1	Collect data from Facebook using the graph API in Unix environment.
2	Collect data using twitter API in Unix environment
3	Store the data collected from various OSNs in MySQL database
4	Store the data collected from various OSNs in MongoDB
5	Represent social media data in a graph format consisting of nodes and edges
6	Analysing textual data obtained from Facebook using Python NLTK
7	Generate graphs and clusters of data of social networks like Facebook and Twitter using Gephi

V SEMESTER

MDM3CT103 : MDM- III Functional Programming in Practice

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand the core principles of functional programming and contrast it with imperative style. 2. Apply basic functional constructs such as recursion, higher-order functions, and immutability. 3. Develop programs using pattern matching, type inference, and algebraic data types. 4. Implement and evaluate lazy evaluation and infinite structures in a functional language. 5. Understand and apply monads, functors, and functional design patterns in real-world scenarios.

Unit I:	**6 Hrs.**
Introduction to Functional Programming : Declarative vs Imperative programming paradigms, History and evolution of functional programming, Advantages and applications of functional programming, Key concepts: expressions, immutability, statelessness, Introduction to functional languages (Haskell, Lisp, OCaml, Scala, F#)	
Unit II:	**8 Hrs.**
Functional Language Basics: Syntax and semantics of a functional language (focus on Haskell or OCaml), Data types: primitive, lists, tuples, algebraic data types, Functions as first-class citizens, Function application and composition, REPL and environment setup for practice.	
Unit III:	**8 Hrs.**
Core Functional Concepts: Recursion and tail recursion, Higher-order functions (map, filter, fold), Pure functions and side effects, Anonymous (lambda) functions, Currying and partial application	
Unit IV: Type Systems and Pattern Matching: Type inference and polymorphism, Strong and static typing, Pattern matching in functional languages, Guards and case expressions, Error handling using types (Maybe, Either in Haskell).	**7 Hrs.**
Unit V: Lazy Evaluation and Data Structures: Lazy vs strict evaluation, Infinite data structures (streams), Lazy lists and generators, Custom data types and recursive structures, Functional implementation of trees and graphs.	**8 Hrs.**
Unit VI:	**8 Hrs.**
Monads, Functors, and Functional Design: Introduction to category theory concepts: functors, applicatives, monads, The "do" notation in Haskell, I/O handling in functional languages, Functional design patterns, Case studies: mini compiler, DSL, parser combinators	
Total Lecture	**45 Hours**

Textbooks:	
1.	Programming in Haskell, Graham Hutton, Cambridge University Press
2.	Learn You a Haskell for Great Good!, Miran Lipovača, No Starch Press

Reference Books:	
1.	Real World Haskell, Bryan O'Sullivan, Don Stewart, and John Goerzen, O'Reilly Media
2.	Structure and Interpretation of Computer Programs (SICP), Harold Abelson & Gerald Jay Sussman,
3.	Introduction to Functional Programming, Richard Bird, Prentice Hall

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

(Department of Computer Technology)

SoE No. 23CT-101

B.Tech in Computer Technology

V SEMESTER

Open Elective -III : Basket

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

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

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V SEMESTER

Mandatory Learning Course (MLC)

MLC2125 : YCAP5

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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

6th Semester

(Department of Computer Technology)

B. Tech in Computer Technology

Nagar Yuwak Shikshan Sanstha's

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B.TECH SCHEME OF EXAMINATION 2023

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(Department of Computer Tchnology)

B.Tech. in Computer Technology

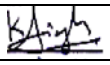
SoE No. 23CT-101

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	CT	23CT1601	Artificial Intelligence and Machine Learning	T	3	0	0	3	3	30	20	50	3
2	6	PC	CT	23CT1602	**Lab : Artificial Intelligence and Machine Learning**	P	0	0	2	2	1		60	40	
3	6	PC	CT	23CT1603	Computer Networks		3	0	0	3	3		60	40	
4	6	PC	CT	23CT1604	**Lab : Computer Networks**		0	0	2	2	1				
5	6	PC	CT	23CT1605	Design Thinking and Research Methodology	T	2	0	0	2	2	30	20	50	3
6	6	PE	CT		Professional Elective-II	T	3	0	0	3	3	30	20	50	3
7	6	PE	CT		**Lab : Professional Elective-II**	P	0	0	2	2	1		60	40	
8	6	PE	CT		Professional Elective-III	T	3	0	0	3	3	30	20	50	3
9	6	MDM	CT		**MD Minor Course-IV**	T	3	0	0	3	3	30	20	50	3
10	6	VSEC-4	CV	23CT1606	**Lab : Competitive Coding**	P	0	0	4	4	2		60	40	
11	6	STR	CT	23CT1607	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 :**	**A**	3	0	0	3	**0**				

Professional Elective - II					
1	6	PE-II	CT	23CT1621	PE-II : Advance Web Technologies
2	6	PE-II	CT	23CT1622	**PE-II : Lab : Advance Web Technologies**
3	6	PE-II	CT	23CT1623	PE-II : Internet of Things
4	6	PE-II	CT	23CT1624	**PE-II : Lab : Internet of Things**
5	6	PE-II	CT	23CT1625	PE-II : Natural Language Processing
6	6	PE-II	CT	23CT1626	**PE-II : Lab : Natural Language Processing**
7	6	PE-II	CT	23CT1627	PE-II : Dot Net Full Stack Development
8	6	PE-II	CT	23CT1628	**PE-II : Lab : Dot Net Full Stack Development**
9	6	PE-II	CT	23CT1629	PE-II : Realtime Systems
10	6	PE-II	CT	23CT1630	**PE-II : Lab : Realtime Systems**

Professional Elective - III					
1	6	PE-III	CT	23CT1641	PE-III : Wireless Sensor Network
2	6	PE-III	CT	23CT1642	PE-III : Industrial and Social Applications of Digital Twins
3	6	PE-III	CT	23CT1643	PE-III : Cyber and Digital Forensics
4	6	PE-III	CT	23CT1644	PE-III : Model-Driven Software Engineering
5	6	PE-III	CT	23CT1645	PE-III : Data Mining

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

VI SEMESTER

23CT1601: Artificial Intelligence and Machine Learning

Course Outcomes :

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

1. Understand the fundamentals of Artificial Intelligence, types of intelligent agents, and formulate problems using state space and search strategies.
2. Apply knowledge representation techniques and reasoning methods, including propositional logic, inference, and probabilistic models for intelligent decision-making.
3. Implement and evaluate supervised and unsupervised learning algorithms using appropriate performance metrics and validation techniques.
4. Analyze advanced machine learning concepts including ensemble methods, explainable AI, and federated learning for building interpretable and privacy-aware intelligent systems.

Unit I:	**8 Hrs.**
Philosophy of AI and Search Problems: Introduction to Artificial Intelligence, AI vs ML vs Deep Learning, Types of AI: Narrow AI, General AI, Super AI, Strong AI vs Weak AI, Applications of AI, Intelligent agents: Types and architectures, modelling a problem as search problem: State space representation and problem formulation, Informed and Uninformed search, Heuristic search, Adversarial search, Constraint satisfaction problems	
Unit II:	**7 Hrs.**
Knowledge Representation & Reasoning: Propositional and Predicate Logic, Inference rules and resolution, Semantic networks and frames, Ontologies and description logic, Forward and backward chaining, reasoning under uncertainty Introduction to probabilistic reasoning (Bayes Theorem, Bayes Nets)	
Unit III:	**8 Hrs.**
Supervised Learning: Introduction to Supervised learning, ML pipeline: Preprocessing, Training, Testing, Classification: KNN, Decision Trees, Model evaluation: Confusion Matrix, Precision, Recall, F1 Score, Accuracy, Error, Loss functions, Cross-validation and hyperparameter tuning, Overfitting, underfitting, bias-variance trade-off	
Unit IV:	**7Hrs.**
Unsupervised Learning: Clustering: K-Means, Hierarchical, Dimensionality Reduction: PCA, t-SNE, Evaluation of clustering models, Anomaly detection basics, Applications in recommendation systems.	
Unit V:	**8 Hrs.**
Ensemble Learning: Introduction to ensemble methods – Bagging, Boosting, Stacking, Bagging – Random Forests, Out-of-Bag (OOB) estimation, Boosting – AdaBoost, intuition and working, Gradient Boosting – GBM vs AdaBoost, XGBoost intro, Stacking & Voting – Hard vs Soft voting, meta-learning.	
Unit VI:	**7 Hrs.**

Federated Learning of Explainable AI: Explainable AI; Need for interpretability in ML models, SHAP, LIME: Model explanation tools, Fairness, accountability, transparency, Use cases, Distributed machine learning without centralized data, Federated Learning; Privacy-preserving ML, Applications in mobile devices (e.g., Google GBoard), Challenges in federated optimization.

Total Lecture	**45 Hours**

Sr. No	**Textbook**
1	Marc Peter Deisenroth, A. Aldo Faisal, Cheng Soon Ong, Mathematics for Machine Learning, Cambridge University Press (23 April 2020)
2	S Sridhar and M Vijayalakshmi, "Machine Learning", Oxford University Press, 2021.
3	Tom M. Mitchell- Machine Learning - McGraw Hill Education, International Edition
4	Stuart Russell & Peter Norvig, Artificial Intelligence: A Modern Approach, Prentice-Hall, Third Edition (2009)
5	Trevor Hastie, Robert Tibshirani, and Jerome Friedman -The Elements of Statistical Learning
6	Zhi-Hua Zhou -Ensemble Methods: Foundations and Algorithms

Reference Books:	
1	Christopher M. Bishop Pattern Recognition and Machine Learning - Springer, 2nd edition
2.	López-Blanco, R., Alonso, R.S., González-Arrieta, A., Chamoso, P., Prieto, J. (2023). Federated Learning of Explainable Artificial Intelligence (FED-XAI): A Review. In: Ossowski, S., Sitek, P., Analide, C., Marreiros, G., Chamoso, P., Rodríguez, S. (eds) Distributed Computing and Artificial Intelligence, 20th International Conference. DCAI 2023. Lecture Notes in Networks and Systems, vol 740. Springer, Cham. https://doi.org/10.1007/978-3-031-38333-5_32
	Fed-XAI: Federated Learning of Explainable Artificial Intelligence Models⋆

VI SEMESTER
23CT1602: Lab Artificial Intelligence and Machine Learning

VI SEMESTER
23CT1603 : Computer Networks

Course Outcomes :
Upon successful completion of the course the students will be able to: 1. To understand design issues of layers and network reference model 2. To Solve the given problems related to networking domain. 3. To analyze different networking protocol at various layers. 4. To evaluate the performance of network using different tools.

Unit I:	**8 Hrs.**
Introduction: The uses of computer networks, LAN's, MAN's, WAN's., protocol hierarchies, design issues for layers, interfaces and services, connection oriented and connectionless services, service primitives relationship of services to protocols. The OSI reference model. TCP/IP reference model, Comparison of OSI & TCP/IP reference models, Critique of OSI model & protocols, critique of TCP/IP reference mode	
Unit II:	**7 Hrs.**
Transmission Impairments, Transmission Media: Guided, unguided, Architecture of the Internet, , The Public Switched Telephone Network Switching: circuit, packet and message switching, Modems	
Unit III:	**8 Hrs.**
The Data Link Layer: Data link layer design issues- Framing, Error Control, Flow Control, Link Management, Error detection and Correction-Error-Correcting s, error-detecting s, Elementary data link protocols-An Unrestricted simplex Protocol, A simplex stop and wait protocol, A simplex protocol for a noisy channel, Sliding window protocols- A one bit sliding window protocol, Go Back N protocol, Selective Repeat Protocol.	
Unit IV:	**8 Hrs.**
The Medium Access Sublayer: Static and Dynamic Channel allocation in LAN's and MAN's, Access Protocols ALOHA, Persistent and Non Persistent CSMA, CSMA/CD, Collision free protocols, Binary countdown, Limited connection protocol: The adaptive tree walk protocol.	
Unit V:	**7 Hrs.**
The Network Layer: Network Layer design issues-services provided to the transport layer, Logical Addressing: Classbase and classless, Subnetting and Supernetting, Routing and Routing Algorithm, Distance Vector, Link State, Hierarchical. Congestion Control algorithms- Preallocation of buffers, Packet discarding, Choke packets, Load shedding, Jitter control. Leaky bucket algorithm, token bucket algorithm, IP header format (IPv4, IPv6)	
Unit VI:	**7 Hrs.**
The Transport Layer: Transport layer design issues-services provided to the session layer, Quality of service, transport service primitives, Elements of transport protocols-Addressing, Establishing and Releasing a connection, Flow control and Buffering, Multiplexing, Crash Recovery. Transmission Control Protocol (TCP). The Application Layer: HTTP DNS, SMTP, FTP, TFTP.	
	Total Lecture **45 Hours**

Textbooks:	
1.	Computer Networks, A.S. Tanenbaum , Pearson Publication
2.	Computer Networking , Behrouz A. Forouzan , McGraw-Hill Publication.

Reference Books:	
1.	Data communications and networking, Behrouz A. Forouzan , McGraw-Hill

MOOCs Links and additional reading, learning, video material
https://archive.nptel.ac.in/courses/106/105/106105183/

VI SEMESTER
23CT1604 : Lab Computer Networks

Course Outcomes
Upon successful completion of the course the students will be able to 1. To understand design issues of layers and network reference model 2. To Solve the given problems related to networking domain. 3. To analyze different networking protocol at various layers. 4. To evaluate the performance of network using different tools.

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

SN	Experiments based on
1	Use Network Utility Command like ping, ipconfig, netstat, tracert to observe the network details.
2	To implement Hamming using C and C++.
3	To implement Dijkstra's Routing algorithm using backtracking approach.
4	Use traffic monitoring tool Wireshark to observe network traffic with packet details.
5	To implement Go_back_n sliding window protocol
6	Configure router. Configure network using Cisco Packet Tracer software and show packet transmission from source to destination.
7	Use Openssl command to perform Asymmetric key encryption(RSA) and also implement RSA algorithm.
8	Client server communication using socket programming
9	Simulating IoT environment using Cisco Packet Tracer.

VI SEMESTER

23CT1605 : Design Thinking in Computer Technology and Research Methodology

Course Outcomes :

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

1. Comprehend the foundational concepts of 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	Fundamentals of Design Thinking	8 Hours

Definition and Evolution, Key Principles: Empathy, Ideation, Prototyping, Iteration; The Five-Stage Model (Stanford d.school): Empathize, Define, Ideate, Prototype, Test, Importance of Empathy in Tech Development Techniques: User Interviews, Observation; Case Study: User-Driven App Design; Problem Framing and Redefining in Tech Context: Wicked Problems, Root Cause Analysis in Software & System Failures: Collaborative Mindset & Interdisciplinary Teams: Roles in a Tech Design Team (UX Designer, Developer, Data Scientist, etc.), Activities: Empathy Mapping for a tech product (e.g., e-learning platform), Reframing a known problem using "How Might We..." approach.

Unit:2	Applying Design Thinking to Computer Technology Projects	7 Hours

Ideation Techniques for Tech Solutions: Brainstorming, SCAMPER, Mind Mapping, Idea Evaluation Matrices; Prototyping Digital Solutions: Low-Fidelity vs High-Fidelity Prototypes, Tools: Figma, Balsamiq, Code-based prototyping; User Testing and Feedback in Software Development: Usability Testing Methods, A/B Testing in Web & App Design; Iterative Development & Agile Mindset: MVP (Minimum Viable Product), Integration with Agile and Scrum; Case Studies of Design Thinking in Tech: Redesign of a Government Portal, Assistive Technology for Differently-Abled Users, Smart Home UI/UX; Activities: Team-based mini-project using all five stages of design thinking, Prototype a digital product and perform peer usability testing.

Unit:3	Research Fundamentals, Research Problem and Design, Literature Review	8 Hours

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.

Contemporary Issues related to Topic

Unit:4	Sampling and Data Collection, Data Analysis and Interpretation, Technical Writing, Research Ethics	7 Hours

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

Contemporary Issues related to Topic

Total Lecture Hours	**30 Hours**

Textbooks	
1	Don Norman - *The Design of Everyday Things*
2	Jake Knapp- Sprint: *How to Solve Big Problems and Test New Ideas in Just Five Days*
3	C.R. Kothari – *Research Methodology: Methods and Techniques*, New Age International
4	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*.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	
MOOCs Links and additional reading, learning, video material	
1	**Stanford d.school resources** (free) https://dschool.stanford.edu/resources
2	**IDEO Design Thinking Toolkit (free): https://designkit.org/**

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 Computer Technology)

B.Tech in Computer Technology

SoE No. 23CT-101

VI SEMESTER

23CT1621 : PE-II Advance Web Technologies

Course Outcomes :
Upon successful completion of the course the students will be able to: 1. Explain the architecture and protocols used in advanced web technologies 2. Describe the features of HTML5, CSS3, and DOM manipulation techniques 3. Explain various client-server communication mechanisms **4.** Understand different frameworks and technologies

Unit I:	**7 Hrs.**
Overview of HTTP, FTP, SMTP Protocols, Web Servers, Server side scripting, REST.	
Unit II:	**8 Hrs.**
Document Object Model (DOM), Overview of DOM Element Selector 6 (Examples in jQuery), Document ready function, HTML5, Audio and Video, Forms, CSS3 -Introduction to CSS3, What is CSS3?, Differences between CSS3 and earlier CSS specifications, How browsers are handling CSS3? CSS3 Selectors- Selectors Overview, Explore specific selectors, Designing and Developing with CSS3- Background and color Typography, CSS3 Box Model, Page layout, Media Queries, Implementing CSS3, Best Practices, Advantages and limitations of working with CSS3.	
Unit III:	**8 Hrs.**
Overview of Traditional Web Communication Processes and Technologies, Web 2.0, Introduction to AJAX-Create an XMLHttpRequest Object, Interacting with a Web Server, Processing Client Requests, Securing AJAX Applications, Progressive Web Apps, Form Factor detection, Browser detection, Feature detection.	
Unit IV:	**8 Hrs.**
Semantic Elements, WebSockets, Server-Sent Event (SSE), WebRTC, Web Graphics & Canvas, WebGL, WebWorkers, SVG. Libraries: Modernizr, Polyfills, Polymer	
Unit V:	**7Hrs.**
JavaScript: Functional programming, Asynchronous programming, Event driven systems, Debugging, Testing, Workflow optimization, and deployment pipelines, Web Components, Introduction to Web Frameworks-React, Node.js, Angular' JS	
Unit VI:	**7 Hrs.**
Introduction to the server-side programming, Server-side web frameworks like Django, Express. etc.	
Total Lecture	**45 Hours**

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

Textbooks:	
1.	Web Technologies Black Book: HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Kogent Learning Solutions, Dreamtech Press India Pvt. Ltd.
2.	Javascript Bible, Danny Goodman, Michael Morrison, Paul Novitski, Tia Gustaff Rayl, Wiley India Pvt Ltd.

Reference Books:	
1.	Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML (With CD) and PHP, Ivan Bayross, BPB Publication

VI SEMESTER
23CT1622 : Lab. PE-II Advance Web Technologies

Course Outcomes
Upon successful completion of the course the students will be able to 1. Apply HTML5, CSS3, and JavaScript to develop interactive and responsive web pages. 2. Implement real-time web features 3. Design and develop full-stack web applications using modern web development frameworks

SN	Experiments based on
1	Create a static webpage using HTML5 and CSS3 with multimedia elements (audio/video).
2	Manipulate the DOM using JavaScript and jQuery to dynamically update webpage content.
3	Design responsive layouts using CSS3 Media Queries and Flex/Grid layouts.
4	Implement form validation using JavaScript and jQuery.
5	Build a web application that communicates with a server using AJAX.
6	Develop a real-time chat application using WebSockets.
7	Create and render graphics using HTML5 Canvas and SVG.
8	Develop a small application using a front-end framework like React or Angular.
9	Implement a server-side API using Node.js and Express.
10	Deploy a full-stack web application integrating frontend (React/HTML/CSS), backend (Node.js/Express), and server-side technologies.

VI SEMESTER
23CT1623 : PE-II: Internet of Things

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand the core concepts, architecture, enabling technologies, and applications of the Internet of Things (IoT), including sensors, actuators, and IoT communication models. 2. Illustrate the concept of cloud computing framework in IoT environments. 3. Apply IoT communication protocols and wireless sensor networks to address interoperability, machine-to-machine communication, and SDN advancements in real-world IoT applications.

Unit I:	**8 Hrs.**
Introduction: Concepts behind the Internet of Things, Characteristics of IoT, IoT enabling technologies, IoT Communication Model, IoT architecture, Applications of IoT, Transducers, Sensors, Sensor classes, Sensor types, Actuators and its types	
Unit II:	**7 Hrs.**
IOT Protocols: Application layer: MQTT, COAP, XMPP, AMQP, Network Layer: IPv4, IPv6, 6LoWPAN, IoT Communication protocols: IEEE802.15.4, ZigBee, Wireless HART, Zwave, Bluetooth, NFC, RFID	
Unit III:	**7 Hrs.**
Wireless Sensor networks: Components of sensor nodes, Node Behavior in WSNs, Applications, WSN Coverage, OGDC algorithm, Stationary and Mobile Wireless Sensor Networks	
Unit IV:	**8 Hrs.**
Cloud Computing: Recent Trends in Computing, Characteristics, Components of Cloud Computing, Service Models, Deployment Models, Service Management, Cloud Security, IoT Data analytics, Case studies, Middleware for IoT.	
Unit V:	**7 Hrs.**
Machine to Machine Communication: Node types, IP and Non-IP based M2M network Interoperability in Internet of Things: Current Challenges in IoT, Interoperability, Types of Interoperability	
Unit VI:	**8 Hrs.**
Software-Defined Networking: Current Network to SDN, SDN Architecture, Challenges, OpenFlow Protocol, APIs in SDN, Controller Placement, Recent Advances of SDN in IoT, Industrial internet of things, Case studies.	
Total Lecture	**45 Hours**

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

Textbooks:	
1.	Internet of Things: A hands on approach by ArshdeepBahga and Vijay K. Madisetti

Reference Books:	
1.	NPTEL course material on Introduction to Internet of Things

VI SEMESTER

23CT1625 : PE-II: Natural Language Processing

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Model linguistic phenomena with formal grammars. 2. Design, implement and test algorithms for NLP problems 3. Apply NLP techniques to design real world NLP applications

Unit I:	**7 Hrs.**
Introduction: History of NLP, Generic NLP system, levels of NLP , Knowledge in language processing , Ambiguity in Natural language, stages in NLP, challenges of NLP, Applications of NLP.	
Unit II:	**8 Hrs.**
Morphology fundamentals: Morphological Diversity of Indian Languages, Morphology Paradigms, Shallow Parsing, Named Entities, Maximum Entropy Models, Random Fields. Word Level Analysis, Morphology analysis –survey of English and Indian language Morphology, Inflectional morphology & Derivational morphology, Lemmatization, Regular expression, finite automata, finite state transducers (FST) ,Morphological parsing with FST , Lexicon free FST Porter stemmer. N –Grams- N-gram language model, N-gram for spelling correction.	
Unit III:	**7 Hrs.**
Structures : Theories of Parsing, Parsing Algorithms; Robust and Scalable Parsing on noisy text as in Web documents, Hybrid of Rule Based and Probabilistic Parsing; Scope Ambiguity and Attachment Ambiguity resolution.	
Unit IV:	**8 Hrs.**
Meaning : Lexical Knowledge Networks, Wordnet Theory, Indian Language Wordnets and Multilingual Dictionaries, Semantic Roles, Word Sense Disambiguation, WSD and Multilinguality, Semantic Analysis: Lexical Semantics, Attachment for fragment of English- sentences, noun phrases, Verb phrases, prepositional phrases, Relations among lexemes & their senses – Homonymy, Polysemy, Synonymy, Hyponymy, Robust Word Sense Disambiguation (WSD), Dictionary based approach	
Unit V:	**7 Hrs.**
Pragmatics Discourse : Co-references, reference resolution, reference phenomenon , syntactic & semantic constraints on co reference	
Unit VI:	**8 Hrs.**
Natural language Processing applications (preferably for Indian regional languages) : Sentiment Analysis, Text Entailment, Robust and Scalable Machine Translation, Question Answering in Multilingual Setting, Cross Lingual Information Retrieval (CLIR)	
Total Lecture	**45 Hours**

Textbooks:	
1.	Speech and Language Processing:An Introduction to Natural Language Processing, Speech Recognition, and Computational Linguistics, Jurafsky, Daniel, and James, H. Martin, PrenticeHall, 2000
2.	Foundations of Statistical Natural Language Processing 1999 Christopher D. Manning and Hinrich Schütze, Cambridge, MIT Press,.

Reference Books:	
1.	Natural Language Understanding 2nd, 1995. James Allen Benjamin/Cummings
2.	Statistical Language Learning 1996 Eugene Charniak MIT Press
3.	Harald Clahsen, Andrew Redford, Linguistics 1999 Martin Atkinson, David Britain, Cambridge University Press

MOOCs Links and additional reading, learning, video material

VI SEMESTER
23CT1627 : DOT NET Full Stack Development

Course Outcomes :

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

1. Understand the fundamentals of the .NET Framework and develop basic C# console applications using control flow and error handling constructs.
2. Apply Object-Oriented Programming concepts in C# to create modular, reusable, and maintainable applications.
3. Develop dynamic web applications using ASP.NET Core MVC and RESTful APIs with proper routing, views, and controllers.
4. Integrate relational databases using Entity Framework Core to perform CRUD operations, manage data models, and ensure secure data access.
5. Design responsive web interfaces using HTML5, CSS, and JavaScript and integrate them with .NET Core backend applications.

Unit I:	**8 Hrs.**
Introduction to .NET and C#: Understanding the .NET Framework, Overview of C# Programming Language, Installing Visual Studio IDE, Writing Your First C# Program, Variables, Data Types, and Operators, Control Flow (if statements, loops), Methods and Functions, Debugging and Error Handling	
Unit II:	**7 Hrs.**
Object-Oriented Programming (OOP) with C#: Introduction to Object-Oriented Programming (OOP), Classes and Objects, Encapsulation and Access Modifiers, Inheritance and Polymorphism, Interfaces and Abstract Classes, Exception Handling and Custom Exceptions, Working with Collections (Lists, Arrays), Design Patterns in C#	
Unit III:	**7 Hrs.**
.NET Core and ASP.NET Core: Introduction to .NET Core and ASP.NET Core, Setting Up .NET Core Development Environment, Building Web Applications with ASP.NET Core MVC, Routing and Controllers, Views and Razor Syntax, Model Binding and Validation, Middleware and Configuration, Building RESTful APIs with ASP.NET Core	
Unit IV:	**8 Hrs.**
Entity Framework and Database Integration: Introduction to Entity Framework Core, Creating Database Models, CRUD Operations with Entity Framework, Data Annotations and Fluent API, Working with Migrations, Advanced Querying and LINQ, Using Repository Pattern, Securing APIs and Data Access	
Unit V:	**7 Hrs.**

Frontend Development with HTML, CSS, and JavaScript: Introduction to Frontend Development, HTML5 Markup and Elements, CSS Styling and Layout, JavaScript Fundamentals, DOM Manipulation and Events, Frontend Libraries (e.g., Bootstrap), Building Responsive Web UIs, Integrating Frontend with .NET Core	
Unit VI:	**8 Hrs.**
Single-Page Applications (SPA) with Angular/React/Vue: Introduction to SPAs and Frontend Frameworks, Setting Up Angular/React/Vue, Components and Routing, State Management, Services and API Integration, Form Handling and Validation, Building SPAs with Authentication, Optimizing SPA Performance	
Total Lecture	**45 Hours**

Textbooks:	
1.	**"C# 10 and .NET 6 – Modern Cross-Platform Development"** Mark J. Price, Packt Publishing Latest (6th or 7th Edition preferred) *Coverage*: Unit I, II, III (C#, OOP, .NET Core basics)
2.	**"Entity Framework Core in Action"** Jon P Smith, Publisher: Manning Publications Edition: Second Edition, Coverage: Unit IV (EF Core, Database Integration, Migrations, LINQ)
3.	**"Web Design with HTML, CSS, JavaScript and jQuery Set"** Jon Duckett, Publisher: Wiley, Coverage: Unit V (Frontend Development)
4.	**"Pro Angular"** Adam Freeman, *Publisher*: Apress, *Edition*: Latest, *Coverage*: Unit VI (Angular SPA development) **OR "Learning React"***Alex Banks & Eve Porcello, Publisher: O'Reilly Media, Coverage: Unit VI (React SPA development)*

Reference Books:	
1.	**"The C# Programming Yellow Book"** Rob Miles, *Publisher*: Self-published, *Free PDF Available Coverage*: Unit I, II (Beginner to Intermediate C#)
2.	**"ASP.NET Core in Action"** Andrew Lock, *Publisher*: Manning Publications, *Edition*: Second Edition, *Coverage*: Unit III (ASP.NET Core in depth)
3.	**"Front-End Development Projects with HTML, CSS, and JavaScript"** Peter Smith *Publisher*: Packt Publishing, *Coverage*: Unit V (Hands-on frontend projects)
4.	**"Vue.js Up and Running"** Callum Macrae, *Publisher*: O'Reilly Media, *Coverage*: Unit VI (Vue.js for SPA)

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	
MOOCs Links and additional reading, learning, video material	
1.	https://onlinecourses.nptel.ac.in/noc22_cs40/preview

VI SEMESTER

23CT1628 : LAB DOT NET Full Stack Development

Course Outcomes

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

1. Apply C# programming constructs including data types, control flow, functions, and exception handling to develop console-based applications.
2. Implement Object-Oriented Programming concepts in C# using classes, inheritance, polymorphism, interfaces, and collections.
3. Develop ASP.NET Core MVC applications using routing, controllers, views, and RESTful APIs with model binding and validation.
4. Integrate and manage databases using Entity Framework Core, including data modeling, CRUD operations, LINQ queries, and validation.
5. Design responsive front-end interfaces using HTML, CSS, JavaScript, and Bootstrap, and integrate them with .NET Core backend services.

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

SN	**Experiments based on**
1	Implement a program using different data types, variables, and arithmetic operators.
2	Create a C# program demonstrating control flow using **if-else**, **switch**, and loops (**for**, **while**).
3	Write a program using user-defined methods and function overloading.
4	Develop a program to demonstrate exception handling using **try-catch-finally**.
5	Implement a program demonstrating classes, objects, and access modifiers.
6	Create a C# program that demonstrates inheritance and polymorphism.
7	Build a program using interfaces and abstract classes.
8	Write a program that creates and manages a collection using **List<T>** and **Array**.
9	Implement a simple design pattern (e.g., Singleton or Factory) in C#.
10	Create an ASP.NET Core MVC application with routing, controller, and views.
11	Develop a simple RESTful API using ASP.NET Core with GET and POST endpoints.
12	Implement form input with model binding and server-side validation.
13	Use middleware for logging or error handling in an ASP.NET Core project.
14	Create a -first Entity Framework Core model and generate a database using migrations.

15	Implement CRUD operations using Entity Framework Core in an ASP.NET Core application.
16	Apply data annotations and Fluent API for model validation and relationships.
17	Perform advanced LINQ queries on a sample database.
18	Create a responsive web page using HTML5 and CSS3.
19	Implement JavaScript functions for DOM manipulation and handling events.
20	Use Bootstrap to design a responsive form and integrate it with a .NET Core backend.
21	Develop a simple frontend UI with user input that connects to an ASP.NET Core API.

VI SEMESTER
23CT1641 : Wireless Sensor Networks

Course Outcomes :

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

1. Describe the overview of wireless sensor networks and enabling technologies for wireless sensor networks.
2. Apply the design principles of WSN architectures and operating systems for simulating environment situations.
3. Apply various concepts for assignment of MAC addresses.
4. Select the appropriate infrastructure, topology, joint routing and information aggregation for wireless sensor networks
5. Analyse the sensor network platform and tools state-centric programming.

Unit I:	**7 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 NetworksScenarios- Design Principle, Physical Layer and Transceiver Design Considerations, Optimization Goals and Figures of Merit, Gateway Concepts, Operating Systems and Execution Environments- Introduction to TinyOS 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, - B-MAC Protocol, IEEE 802.15.4 standard and ZigBee,	
Unit IV:	**8 Hrs.**
The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols EnergyEfficient Routing, Geographic Routing.	
Unit V:	**8 Hrs.**
INFRASTRUCTURE ESTABLISHMENT: Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control	
Unit VI:	**7 Hrs.**
SENSOR NETWORK PLATFORMS AND TOOLS: Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node level Simulators, State-centric programming.	
Total Lecture	**45 Hours**

Textbooks:	
1.	Holger Karl & Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley, 2005.
2.	Feng Zhao & Leonidas J.Guibas, "Wireless Sensor Networks-An Information Processing Approach", Elsevier, 2007 3.
3	Waltenegus Dargie , Christian Poellabauer, "Fundamentals Of Wireless Sensor Networks - Theory And Practice", John Wiley & Sons Publications, 2011

Reference Books:	
1.	. KazemSohraby, Daniel Minoli, & TaiebZnati, "Wireless Sensor Networks-Technology, Protocols, and Applications"
2.	John Wiley, 2007. 2. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003

MOOCs Links and additional reading, learning, video material
https://www.youtube.com/watch?v=GUSrkWJ_Z2g

VI SEMESTER

23CT1642 : Industrial and Social Applications of Digital Twins

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand the fundamental concepts and architecture of digital twins. 2. Analyze the role of digital twins in smart cities and sustainable urban planning. 3. Evaluate the societal impacts, challenges, and ethical concerns in the deployment of digital twins. 4. Develop simple digital twin models using IoT and simulation tools.

Unit I:	**8 Hrs.**
Introduction to Digital Twins: Definition, history, and evolution of digital twins. Key components: physical entity, digital model, and data connection. Overview of digital twin lifecycle. Technologies enabling digital twins: IoT, AI/ML, sensors, cloud computing, and simulation.	
Unit II:	**7 Hrs.**
Industrial Applications: Smart factories and Industry 4.0. Use cases in manufacturing: predictive maintenance, production optimization, asset management. Digital twins in supply chain and logistics. Case studies from aerospace, automotive, and energy sectors.	
Unit III:	**8 Hrs.**
Healthcare and Biomedical Applications: Digital twins for personalized medicine, patient monitoring, and surgery planning. Integration with wearable sensors and health data platforms. Ethical and regulatory considerations in healthcare digital twins.	
Unit IV:	**7 Hrs.**
Urban and Smart City Applications: Digital twins in urban planning, infrastructure monitoring, traffic management, and disaster response. Role in sustainable development and smart governance. Examples from real-world smart city projects.	
Unit V:	**8 Hrs.**
Simulation, Data Integration and Platforms: Modeling techniques: physics-based, data-driven, and hybrid models. Tools and platforms for creating digital twins (e.g., Siemens MindSphere, Azure Digital Twins). Real-time data integration, feedback mechanisms, and analytics.	
Unit VI:	**7Hrs.**
Challenges and Future Trends: Scalability, interoperability, and data security. Addressing privacy and ethical concerns. Emerging trends: metaverse integration, autonomous systems, and AI-driven twins. Roadmap and future research directions.	
Total Lecture	**45 Hours**

Textbooks:	
1.	Michael Grieves, "Digital Twin: Manufacturing Excellence through Virtual Factory Replication", 2016.
2.	Rajiv Ranjan et al., "Digital Twin Technologies and Smart Cities", Springer, 2020.

Reference Books:	
1.	John Soldatos, "Digital Twins for Smart Cities", River Publishers, 2022.
2.	Mark Asch, "Data Assimilation: Methods, Algorithms, and Applications", SIAM, 2016.

MOOCs Links and additional reading, learning, video material	
1.	Siemens Digital Industries – MindSphere Learning Hub
2.	Microsoft Learn – Azure Digital Twins

VI SEMESTER
23CT1643 : PE-III: Cyber and Digital Forensics

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand the fundamentals of Computer & Digital Forensics. 2. Describe the usage of tools to collect data useful for investigation. 3. Understand various types of reports prepared during investigation.

Unit I:	**7Hrs.**
Types of Cyber Crime, Security Attacks, Overview of computer forensics in today's world, computer hardware basics, Computer forensics investigation process, understanding hard disks and file systems, Types of computer forensics.	
Unit II:	**8 Hrs.**
Computer forensic: Data acquisition and duplication, defeating anti-forensics techniques, operating system forensics, Log analysis and event viewer, File auditing, identifying rogue machines, Malware forensic Database forensic.	
Unit III:	**7 Hrs.**
IT fraud, Recovery of deleted files, Live Data collection and investigating Linux environment. Password recovery (tools like John the ripper, L0phtcrack, and THCHydra), email crimes.	
Unit IV:	**8 Hrs.**
Network forensics, investigating web attacks, Gathering Tools to create a response toolkit. Hidden files and unauthorized access points. Analyzing network traffic, sniffers Hardware forensic tools like Port scanning and vulnerability assessment tools like Nmap, Netscan etc.	
Unit V:	**8 Hrs.**
Mobile Forensics, Live Data collection and investigating on android, ios, windows environment, Investigating report generation, investigation process, acquisition types, tools, report generation	
Unit VI:	**8 Hrs.**
Forensics report writing and presentation, Case studies	
Total Lecture	**45 Hours**

Textbooks:	
1.	Incident Response & Computer Forensics, Jason T. Luttgens, Matt Pepe, and Kevin Mandia, McGraw Hill
2.	Guide to Computer Forensics and Investigations: Processing Digital Evidence, Bill Nelson, Amelia Phillips, Christopher Steuart, Cengage Learning

Reference Books:	
1.	Digital Evidence and Computer Crime, Eoghan Casey, Academic Press
2.	File System Forensic Analysis, Brian Carrier, Wesley
3.	Windows Forensic Analysis DVD Toolkit (Book with DVDROM), Harlan Carvey, Syngress Publication
4.	EnCE: The Official EnCase Certified Examiner Study Guide, Steve Bunting, Sybex Publication

VI SEMESTER
23CT1644 : PE III- Model Driven Software Engineering

Course Outcomes :
1. Upon successful completion of the course the students will be able to 2. Understand Model Driven Engineering, UML diagram 3. Analyse structure of various M2M models and M2T tools

Unit I:	**7 Hrs.**
Introduction to Model-Driven Engineering (MDE), Software Engineering Paradigms and Evolution, Role and Benefits of Models in Software Engineering, Meta-Modeling Fundamentals, Model-Driven Architecture (MDA) and Key Standards (OMG, MOF, XMI)	
Unit II:	**8 Hrs.**
Unified Modeling Language (UML) and its Key Diagrams, Domain-Specific Modeling Languages (DSML), Meta-Object Facility (MOF), Ecore and EMF (Eclipse Modeling Framework), Overview of Modeling Tools (Papyrus, MagicDraw, Enterprise Architect)	
Unit III:	**7Hrs.**
Model-to-Model (M2M) Transformations, ATL (Atlas Transformation Language), QVT (Query/View/Transformation), Model Transformation Patterns and Best Practices, Verification and Validation of Model Transformations	
Unit IV:	**8 Hrs.**
Model-to-Text (M2T) Transformation Concepts, Generation with Acceleo, Integration with Build Tools and IDEs, Round-trip Engineering, Challenges in Synchronization and Reverse Engineering	
Unit V:	**7 Hrs.**
Model Consistency Checking and Static Analysis, Model Simulation and Execution, Test Case Generation from Models, Model-Based Testing (MBT), Formal Methods in Model Validation	
Unit VI:	**8 Hrs.**
Model Management and Evolution, Co-evolution of Models and , Models@Runtime and Self-Adaptive Systems, Application of MDSE in Industry (e.g., Automotive, Embedded Systems, IoT), Future Trends and Research Directions in MDSE	
Total Lecture	**45 Hours**

Textbooks:	
1.	Marco Brambilla, Jordi Cabot, and Manuel Wimmer, Morgan & Claypool Publishers, Second Edition (2017).
2.	Sami Beydeda, Matthias Book, and Volker Gruhn, SpringerLink: https://link.springer.com/book/10.1007/3-540-28554-7

Reference Books:	
1.	Model-Driven Software Development: Technology, Engineering, Management by Thomas Stahl and Markus Völter, Wiley Publication

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 Computer Technology)

B.Tech in Computer Technology

SoE No. 23CT-101

VI SEMESTER

23CT1645 : PE-III: Data Mining

Course Outcomes :
Upon successful completion of the course the students will be able to
1. Understand the concepts related to data preparation, data modeling, and knowledge extraction
2. Apply the techniques for data pre-processing and modeling for knowledge extraction
3. Apply the supervised and unsupervised data mining techniques for knowledge extraction
4. Analyze the data to apply appropriate data modeling and mining technique.

Unit I:	**7 Hrs.**
Introduction to data mining (DM) and Data Pre-processing: Introduction to data mining, KDD process. Data pre-processing, Data cleaning, Data transformation, Data reduction, Discretization and generating concept hierarchies.	
Unit II:	**8 Hrs.**
Data Modelling to perform Data Mining: Data warehouse concepts, Data warehouse modelling, Data warehouse implementation, Data generalization by Attribute – Oriented Induction.	
Unit III:	**7 Hrs.**
Data mining using pattern mining algorithms: Association rules Motivation and terminology, Example, Basic idea: item sets, generating item sets and rules efficiently, Advanced Association Rule Techniques, Measuring the Quality of rules, Correlation analysis.	
Unit IV:	**8 Hrs.**
Data mining using Prediction methods: Linear and nonlinear regression, Multiple regression, Logistic Regression.	
Unit V:	**8 Hrs.**
Data mining using Clustering Algorithm: Fundamentals of Clustering, Partitioning Clustering -K-Means Algorithm, K-Means Additional issues, Evaluation of Clustering Algorithms	
Unit VI:	**7 Hrs.**
Outlier Detection Techniques: Outliers and outlier analysis, Outlier detection methods, Statistical approaches, Proximity based approaches, Clustering based approaches, classification based approaches	
Total Lecture	**45 Hours**

Textbooks:	
1.	Data Mining: Concepts and Techniques, J. Han, M. Kamber, 3rd Edition, 2012, Morgan Kaufman

Reference Books:	
1.	Data Mining Techniques, Arun Pujari

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

VI SEMESTER

Mandatory Learning Course (MLC)

MLC2126 : YCAP6 - YCCE Communication Aptitude Preparation