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 3.25)

Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2022

1st to 8th 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 2022

(Scheme of Examination w.e.f. 2022-23 onward)

(Department of Computer Technology)

B. Tech in Computer Technology

SoE No. 22CT-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															
1	1	BS	GE/MTH	22CT101	Calculus Sequences and Series	T	3	1	0	4	4	30	20	50	3 Hrs
2	1	BS	GE/CHE	22CT102	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3 Hrs
3	1	BS	GE/CHE	22CT103	Lab: Engineering Chemistry	P	0	0	2	2	1		60	40	
4	1	HS	GE/HUM	22CT104	Professional Communication	T	3	0	0	3	3	30	20	50	3 Hrs
5	1	BES	CV/CV	22CT105	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3 Hrs
6	1	BES	CV/CV	22CT106	Lab: Engineering Mechanics	P	0	0	2	2	1		60	40	
7	1	BES	EE/EE	22CT107	Basic Electrical and Electronics Engineering	T	3	0	0	3	3	30	20	50	3 Hrs
8	1	BES	IT/IT	22CT108	Programming for Problem Solving	T	3	0	0	3	3	30	20	50	3 Hrs
9	1	BES	IT/IT	22CT109	Lab: Programming for Problem Solving	P	0	0	2	2	1		60	40	
					TOTAL		**18**	**1**	**6**	**25**	**22**				
List of Mandatory Learning Course (MLC)															
1	1	HS	GE/HUM	GE2131	Universal Human Value	**A**	2	0	0	2	0				
2	1	HS	GE/T&P	MLC2121	YCAP1-Get Set Go	**A**	2	0	0	2	0				

SECOND SEMESTER															
1	2	BS	GE/MTH	22CT201	Differential Equation and Complex Analysis	T	3	1	0	4	4	30	20	50	3 Hrs
2	2	BS	GE/PHY	22CT202	Engineering Physics	T	3	0	0	3	3	30	20	50	3 Hrs
3	2	BS	GE/PHY	22CT203	Lab: Engineering Physics	P	0	0	2	2	1		60	40	
4	2	HS	GE/HUM	22CT204	Social Science	T	3	0	0	3	3	30	20	50	3 Hrs
5	2	BES	ME/ME	22CT205	Engineering Graphics	T	1	0	0	1	1	30	20	50	3 Hrs
6	2	BES	ME/ME	22CT206	Lab: Engineering Graphics	P	0	0	4	4	2		60	40	
7	2	BES	CT/CT	22CT207	Elements of AIML	T	3	0	0	3	3	30	20	50	3 Hrs
8	2	BES	CT/CT	22CT208	Computer Workshop	P	0	0	2	2	1		60	40	
9	2	BES	CT/CT	22CT209	Data Structures	T	3	0	0	3	3	30	20	50	3 Hrs
10	2	BES	CT/CT	22CT210	Lab: Data Structures	P	0	0	2	2	1		60	40	
					TOTAL		**16**	**1**	**10**	**27**	**22**				
List of Mandatory Learning Course (MLC)															
1	2	HS	GE/T&P	MLC2122	YCAP2 -Functional English	**A**	2	0	0	2	0				
2	2	BES	GE/CHE	GE2132	Environmental Science	**A**	2	0	0	2	0				

MSEs* = Two MSEs of 15 Marks each will conducted and marks of these 2 MSEs will be considered for Continuous Assessment

TA ** = for Theory : TA1-5 marks on Proctored Online Exam, TA2-12 marks on activitied decided by course teacher, TA3 - 3 marks on class attendance

TA = for Practical : MSPA will be 15 marks each**

	June 2022	1.00	Applicable for AY 2022-23 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)

B.TECH SCHEME OF EXAMINATION 2022

(Scheme of Examination w.e.f. 2022-23 onward)

(Department of Computer Technology)

B. Tech in Computer Technology

SoE No. 22CT-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	PC	CT	22CT301	Discrete Maths and Probability Theory	T	3	1	0	4	4	30	20	50	3 Hrs
2	3	PC	CT	22CT302	Computer Architecture and Organisation	T	3	0	0	3	3	30	20	50	3 Hrs
3	3	PC	CT	22CT303	Database Management Systems	T	3	0	0	3	3	30	20	50	3 Hrs
4	3	PC	CT	22CT304	**Lab:** Database Management Systems	P	0	0	2	2	1		60	40	
5	3	PC	CT	22CT305	Object Oriented Programming	T	3	1	0	4	4	30	20	50	3 Hrs
6	3	PC	CT	22CT306	**Lab:** Object Oriented Programming	P	0	0	2	2	1		60	40	
7	3	PC	CT	22CT307	**Lab:** Python Programming	P	0	0	4	4	2		60	40	
8	3	PC	CT	22CT308	Ethics in Engineering Practice/Professional Ethics	T	1	0	0	1	1	30	20	50	3 Hrs
9	3	PC	CT	22CT309	**Lab:** Technical Writing	P	0	0	2	2	1		60	40	
					TOTAL THIRD SEM		**13**	**2**	**10**	**25**	**20**				
List of Mandatory Learning Course (MLC)															
1	3	HS	T&P	MLC123	YCCE Communication Aptitude Preparation (YCAP3)	**A**	3	0	0	3	0				
2	3	BES	CT	MLC111	Document Presentation and Computation	**A**	2	0	0	2	0				
Fourth Semester															
1	4	BS	GE	22CT401	Linear Algebra	T	3	0	0	3	3	30	20	50	3 Hrs
2	4	GE	GE/HUM	22CT402	Fundamentals of Management and Economics	T	3	0	0	3	3	30	20	50	3 Hrs
3	4	PC	CT	22CT403	Operating Systems	T	3	0	0	3	3	30	20	50	3 Hrs
4	4	PC	CT	22CT404	**Lab:** Operating Systems	P	0	0	2	2	1		60	40	
5	4	PC	CT	22CT405	Theoritical Foundations of Computer Science	T	3	1	0	3	3	30	20	50	3 Hrs
6	4	PC	CT	22CT406	Mathematical Foundations for Data Analysis	T	3	0	0	3	3	30	20	50	3 Hrs
7	4	PC	CT	22CT407	**Lab:** Mathematical Foundations for Data Analysis	P	0	0	2	2	1		60	40	
8	4	PC	CT	22CT408	Computer Networks	T	3	0	0	3	3	30	20	50	3 Hrs
9	4	PC	CT	22CT409	**Lab:** Computer Networks	P	0	0	2	2	1		60	40	
10	4	PC	CT	22CT410	**Lab:** Web Technology	P	0	0	4	4	2		60	40	
11	4	PC	CV/CT	22CT411	Environmental Sustainability, Pollution and Management	**T**	3	0	0	3	3	30	20	50	3 Hrs
					TOTAL FOURTH SEM		**21**	**1**	**10**	**31**	**26**				
List of Mandatory Learning Course (MLC)															
1	4	HS	T&P	MLC124	YCCE Communication Aptitude Prepartion (YCAP 4)	**A**	3	0	0	3	0				
2	4	BES	CT	MLC112	Data Visualization	**A**	2	0	0	2	0				

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		June 2022	1.00
Chairperson	**Dean (Acad. Matters)**	**Date of Release**	**Version**

Applicable for AY 2022-23 Onwards

Nagar Yuwak Shikshan Sanstha's

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SoE No. 22CT-101

B.TECH SCHEME OF EXAMINATION 2022

(Scheme of Examination w.e.f. 2022-23 onward)

(Department of Computer Technology)

B. Tech in Computer Technology

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	22CT501	Design & Analysis of Algorithms	T	3	0	0	3	3	30	20	50	3 Hrs
2	5	PC	CT	22CT502	**Lab:** Design & Analysis of Algorithms	P	0	0	2	2	1		60	40	
3	5	PC	CT	22CT503	Language Processor	T	3	0	0	3	3	30	20	50	3 Hrs
4	5	PC	CT	22CT504	**Lab:** Language Processor	P	0	0	2	2	1		60	40	
5	5	PC	CT	22CT505	Software Engineering	T	3	0	0	3	3	30	20	50	3 Hrs
6	5	PC	CT	22CT506	**Lab:** Software Engineering	P	0	0	2	2	1		60	40	
7	5	PC	CT	22CT507	Network Security	T	3	0	3	3	3	30	20	50	3 Hrs
8	5	PE	CT		**Lab: Professional Elective-I**	P	0	0	2	2	1		60	40	
9	5	STR	CT	22CT508	Industrial training, Seminar & Report	P	0	0	1	1	1		60	40	
10	5	OE	CT		**Open Elective - I**	T	3	0	0	3	3	30	20	50	3 Hrs
11	5	OE	CT		**Open Elective - II**	T	3	0	0	3	3	30	20	50	3 Hrs
					TOTAL FOURTH SEM		**18**	**0**	**12**	**27**	**23**				

List of Lab. Professional Electives-I *

1	5	PE-I	PC	22CT511	PE I: Lab: Mobile Operating System
2	5	PE-I	PC	22CT512	PE I: Lab: Introduction to Geographical Information System
3	5	PE-I	PC	22CT513	PE I: Lab: Advanced Web Technologies
4	5	PE-I	PC	22CT514	PE I: Lab: Computing Laboratory
5	5	PE-I	PC	22CT515	PE I: Lab: Parallel Programming
6	5	PE-I	PC	22CT516	PEI: Lab : UI/UX Design

Open Elective-I

1	5	OE-I	PC	22CT531	OE-I : Introduction to DBMS
2	5	OE-I	PC	22CT532	OE-I : Essentials of IT
3	5	OE-I	PC	22CT533	OE-I : Operating System Concepts
4	5	OE-I	PC	22CT534	OE-I : Introduction to Salesforce

Open Elective-II

1	5	OE-II	PC	22CT551	OE-II : Software Testing
2	5	OE-II	PC	22CT552	OE-II : Internet Technology
3	5	OE-II	PC	22CT553	OE-II : Multimedia and Animation
4	5	OE-II	PC	22CT554	OE-II : Current Trends and Technologies

List of Mandatory Learning Course (MLC)

1	5	HS	T&P	MLC2125	YCAP5: YCCE Communication Aptitude Preparation	A	3	0	0	3	0	
2	5	HS	R&D	MLC125	Design thinking	A	2	0	0	2	0	

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							L	T	P	Hrs		MSEs*	TA**	ESE	
Sixth Semester															
1	6	PC	CT	22CT601	Artificial Intelligence	T	3	0	0	3	3	30	20	50	3 Hours
2	6	PC	CT	22CT602	**Lab:** Artificial Intelligence	P	0	0	2	2	1		60	40	
3	6	PC	CT	22CT603	Digital Image Processing	T	3	0	0	3	3	30	20	50	3 Hours
4	6	PC	CT	22CT604	**Lab:** Digital Image Processing	P	0	0	2	2	1		60	40	
5	6	PC	CT	22CT605	Distributed Systems and Cloud Computing	T	3	0	0	3	3	30	20	50	3 Hours
6	6	PC	CT	22CT606	**Lab:** Distributed Systems and Cloud Computing	P	0	0	2	2	1		60	40	
7	6	PE	CT		**Professional Elective-II**	T	3	0	0	3	3	30	20	50	3 Hours
8	6	PE	CT		**Lab: Professional Elective-II**	P	0	0	2	2	1		60	40	
9	6	PR	CT	22CT607	Project Phase I	P	0	0	4	4	2		60	40	
10	6	OE	CT		**Open Elective - III**	T	3	0	0	3	3	30	20	50	3 Hours
11	6	OE	CT		**Open Elective - IV**	T	3	0	0	3	3	30	20	50	3 Hours
					TOTAL SIXTH SEM		**18**	**0**	**12**	**30**	**24**				

List of Professional Electives- II

Professional Electives-II

1	6	PE-II	CT	22CT611	PE II: Software Testing
	6	PE-II	CT	22CT612	PE II: **Lab**: Software Testing
2	6	PE-II	CT	22CT613	PE II: Internet of Things
	6	PE-II	CT	22CT614	PE II: **Lab**: Internet of Things
3	6	PE-II	CT	22CT615	PE II: Business Intelligence
	6	PE-II	CT	22CT616	PE II: **Lab**: Business Intelligence

Open Elective-III

1	6	OE-III	CT	22CT631	OE-III : Introduction to DBMS
2	6	OE-III	CT	22CT632	OE-III : Essentials of IT
3	6	OE-III	CT	22CT633	OE-III : Operating System Concepts
4	6	OE-III	CT	22CT634	OE-III : Introduction to Salesforce

Open Elective-IV

1	6	OE-IV	CT	22CT651	OE-IV : Software Testing
2	6	OE-IV	CT	22CT652	OE-IV : Internet Technology
3	6	OE-IV	CT	22CT653	OE-IV : Multimedia and Animation
4	6	OE-IV	CT	22CT654	OE-IV : Current Trends and Technologies

List of Mandatory Learning Course (MLC)

1	6	HS		MLC2126	**YCAP6:** YCCE Communication Aptitude Preparation	**A**	3	0	0	3	0

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TA = for Practical : MSPA will be 15 marks each**

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							L	T	P	Hrs		MSEs*	TA**	ESE	
Seventh Semester															
1	7	PC	CT	22CT701	Operation Research and Optimization	T	3	1	0	4	4	30	20	50	3 Hours
2	7	PE	CT		**Professional Elective-III**	T	3	0	0	3	3	30	20	50	3 Hours
3	7	PE	CT		**Professional Elective-IV**	T	3	0	0	3	3	30	20	50	3 Hours
4	7	PE	CT		**Lab: Professional Elective-IV**	P	0	0	2	2	1		60	40	
5	7	PE	CT		**Professional Elective-V**	T	3	0	0	3	3	30	20	50	3 Hours
6	7	PR	CT	22CT702	Project Phase-II	**P**	0	0	10	10	5		60	40	
7	7	STR	CT	22CT703	Campus Recruitment Training (CRT)	**P**	0	0	0	0	2		100		
					TOTAL SEVENTH SEM		**12**	**1**	**12**	**25**	**21**				

List of Professional Electives-III,IV & V

Professional Electives -III

1	7	PE-III	CT	22CT721	PE III: Neural Network & Fuzzy Logic
2	7	PE-III	CT	22CT722	PE III: Adhoc Wireless Network
3	7	PE-III	CT	22CT723	PE III: Information Retrival System
4	7	PE-III	CT	22CT724	PE III: Data Mining
5	7	PE-III	CT	22CT725	PE III: Graph Theory and Mining

Professional Electives -IV

1	7	PE-IV	CT	22CT741	PE IV: Cyber Forensic
2	7	PE-IV	CT	22CT742	PE IV: Lab: Cyber Forensic
3	7	PE-IV	CT	22CT743	PE IV: Machine Learning
4	7	PE-IV	CT	22CT744	PE IV: Lab: Machine Learning
5	7	PE-IV	CT	22CT745	PE IV: Design Patterns
6	7	PE-IV	CT	22CT746	PE IV: Lab: Design Patterns
7	7	PE-IV	CT	22CT747	PE IV: Customer Relationship Management
8	7	PE-IV	CT	22CT748	PE IV: Lab: Customer Relationship Management

Professional Electives -V

1	7	PE-V	CT	22CT761	PE V: Introduction to Natural Language Processing
2	7	PE-V	CT	22CT762	PE V: Embedded Systems
3	7	PE-V	CT	22CT763	PE V: Computer Vision
4	7	PE-V	CT	22CT764	PE V: Bioinformatics
5	7	PE-V	CT	22CT765	PE V: Cyber Physical Systems

Eighth Semester															
1	**8**	**STR**		22CT801	Internship - training / Seminar & Report	P	0	0	12	12	3		60	40	
2	**8**	**STR**		22CT802	Extra Curricular Activity Evaluation	P	0	0	0	0	2		100		
					TOTAL EIGHTH SEM		**0**	**0**	**12**	**12**	**5**				
					GRAND TOTAL		**116**	**5**	**84**	**202**	**163**				

MSEs* = Two MSEs of 15 Marks each will conducted and marks of of these 2 MSEs will be considered for Continuous Assessment

TA ** = for Theory : 12 marks on lecture quizzes, 12 marks on two TA2 activitied decided by course teacher, 2 marks on class attendance and 4 marks on TA4 activities

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		June 2022	1.00
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Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2022

1st Semester

(Department of Computer Technology)

B. Tech in Computer Technology

28 June 2019

Nagar Yuwak Shikshan Sanstha's

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B. Tech in Computer Technology

SoE No. 22CT-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															
1	1	BS	GE/MTH	22CT101	Calculus Sequences and Series	T	3	1	0	4	4	30	20	50	3 Hrs
2	1	BS	GE/CHE	22CT102	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3 Hrs
3	1	BS	GE/CHE	22CT103	Lab: Engineering Chemistry	P	0	0	2	2	1		60	40	
4	1	HS	GE/HUM	22CT104	Professional Communication	T	3	0	0	3	3	30	20	50	3 Hrs
5	1	BES	CV/CV	22CT105	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3 Hrs
6	1	BES	CV/CV	22CT106	Lab: Engineering Mechanics	P	0	0	2	2	1		60	40	
7	1	BES	EE/EE	22CT107	Basic Electrical and Electronics Engineering	T	3	0	0	3	3	30	20	50	3 Hrs
8	1	BES	IT/IT	22CT108	Programming for Problem Solving	T	3	0	0	3	3	30	20	50	3 Hrs
9	1	BES	IT/IT	22CT109	Lab: Programming for Problem Solving	P	0	0	2	2	1		60	40	
						TOTAL	**18**	**1**	**6**	**25**	**22**				
List of Mandetory Learning Course (MLC)															
1	1	HS	GE/HUM	GE2131	Universal Human Value	**A**	2	0	0	2	0				
2	1	HS	GE/T&P	MLC2121	YCAP1-Get Set Go	**A**	2	0	0	2	0				
SECOND SEMESTER															
1	2	BS	GE/MTH	22CT201	Differential Equation and Complex Analysis	T	3	1	0	4	4	30	20	50	3 Hrs
2	2	BS	GE/PHY	22CT202	Engineering Physics	T	3	0	0	3	3	30	20	50	3 Hrs
3	2	BS	GE/PHY	22CT203	Lab: Engineering Physics	P	0	0	2	2	1		60	40	
4	2	HS	GE/HUM	22CT204	Social Science	T	3	0	0	3	3	30	20	50	3 Hrs
5	2	BES	ME/ME	22CT205	Engineering Graphics	T	1	0	0	1	1	30	20	50	3 Hrs
6	2	BES	ME/ME	22CT206	Lab: Engineering Graphics	P	0	0	4	4	2		60	40	
7	2	BES	CT/CT	22CT207	Elements of AIML	T	3	0	0	3	3	30	20	50	3 Hrs
8	2	BES	CT/CT	22CT208	Computer workshop	P	0	0	2	2	1		60	40	
9	2	BES	CT/CT	22CT209	Data Structures	T	3	0	0	3	3	30	20	50	3 Hrs
10	2	BES	CT/CT	22CT210	Lab: Data Structures	P	0	0	2	2	1		60	40	
						TOTAL	**16**	**1**	**10**	**27**	**22**				
List of Mandetory Learning Course (MLC)															
1	2	HS	GE/T&P	MLC2122	YCAP2 -Functional English	**A**	2	0	0	2	0				
2	2	BES	GE/CHE	GE2132	Environmental Science	**A**	2	0	0	2	0				

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Applicable for AY 2022-23 Onwards

I SEMESTER

22CT101: Calculus, Sequences and Series

Course Outcomes :
Upon successful completion of the course the students will be able to
1. Apply the knowledge of differentiation, sequence and series to solve engineering problems.
2. Determine the derivatives of functions of several variables and develop the mathematical equation.
3. Apply the knowledge of Beta and Gamma functions to solve the integrals.
4. Evaluate the multiple integrals and apply it to compute the area and volume of various structures.

Unit I: Sequence and Series	**(6 Hrs.)**
Sequence, types of sequence, test of convergence of sequences, Cauchy sequence, infinite series, power series, Alternating series, tests of convergence and absolute convergence of series. **(Contemporary Issues related to Topic)**	
Unit II: Ordinary Differentiation	**(7 Hrs.)**
Successive differentiation; Leibnitz theorem, Taylor's and Maclaurin's series for functions of single variable and its applications. **(Contemporary Issues related to Topic)**	
Unit III: Partial Differentiation	**(7 Hrs.)**
First and higher order derivatives of Functions of several variables, Euler's theorem, Chain Rule, Jacobians Maxima and minima and saddle point of functions of two variables. **(Contemporary Issues related to Topic)**	
Unit IV: Curve Tracing and Improper Integrals	**(6 Hrs.)**
Tracing of curves, Beta, Gamma functions and its applications. **(Contemporary Issues related to Topic)**	
Unit V: Multiple integrals	**(7 Hrs.)**
Elementary double integrals and triple integrals, Change of variables (simple transformations) and Jacobian of transformations, Change of order of integration (Cartesian and polar). **(Contemporary Issues related to Topic)**	
Unit VI: Application of Multiple Integral	**(6 Hrs.)**
Surface area, Calculation of mass, Centre of gravity of an arc and Centre of gravity of an area, Volume of solid by revolution of an area (Double integral). **(Contemporary Issues related to Topic)**	
Total Lecture	**39 Hours**

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

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, 43rd 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
3.	https://nptel.ac.in/courses/111/106/111106100/

I SEMESTER
22CT102: Engineering Chemistry

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Illustrate different thermodynamic functions and chemical reaction rates. (L3) 2. Apply concepts of electrochemistry for energy storage devices. (L3) 3. Develop awareness about global environmental concerns. (L2) 4. Establish insight into engineering materials. (L2)

Unit I : Unit-I Thermodynamics	**(7 Hrs.)**
Introduction, Spontaneous and non-spontaneous processes, Internal energy, enthalpy, Gibb's free energy, Free energy, types of equilibrium. I and II law of thermodynamics. Entropy and its significance. Numerically on Internal energy and enthalpy change. General applications of thermodynamics in engineering. **(Contemporary Issues related to Topic)**	
Unit II: Electrochemistry	**(7 Hrs.)**
Introduction, metallic and electrolytic conductance, resistance, specific resistance, conductance, specific conductance, equivalent and molar conductance. Variation of conductance with dilution. Electrode and electrode potentials. Nernst Equation. Faraday's laws and Numerical. Industrial applications: Electroforming, Electro winning, Electrolytic refining. **(Contemporary Issues related to Topic)**	
Unit III: Energy Storage Devices Basic concepts	**(6 Hrs.)**
Primary and secondary battery. Energy density, power density, energy efficiency, cycle life, shelf life. Secondary battery: Ni-metal hydride battery, Lithium-ion battery. H2-O2 Fuel cell: Principle, working, advantages, disadvantages, applications. Differences between battery and a fuel cell. Supercapacitors: Definition, types, characteristics, and application. **(Contemporary Issues related to Topic)**	
Unit IV: Chemical Kinetics	**(6 Hrs.)**
Introduction, Rate of reaction and factors influencing rate of reaction, order & molecularity of reaction. Kinetic equations of different orders: Zero Order, First Order, Second Order and numerical. **(Contemporary Issues related to Topic)**	
Unit V: e-waste Management	**(6 Hrs.)**
Introduction, e-waste pollution, its impact on environment, rules of regeneration of e-waste recycling and its managements as per government norms. e -waste on Battery waste management. Control measures for e-waste Management. Nanotechnology for waste reduction and improved energy efficiency. **(Contemporary Issues related to Topic)**	
Unit VI: Polymeric Materials	**(7 Hrs.)**
Conducting Polymers: Intrinsic and extrinsic conducting polymers, doping, factors responsible for conduction. General properties and applications of conducting polymers. Liquid Crystal Polymers: Phases of LCP's, general properties and applications. Silicon Chips: Introduction, properties and applications. Polymers in electronic industries: Piezo, pyroelectric, Ferroelectric polymers. Smart materials: Properties and applications of shape memory alloys, chromo active, photoactive and magneto rheological materials. **(Contemporary Issues related to Topic)**	
Total Lecture	**39 Hours**

Textbooks:	
1.	S S. Dara , A Text book 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	Erach Bharucha ,Textbook for Environmental studies for UGC,Universities press ,Third edition.

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.	T.G. Miller, Environmental Science Wadsworth Publishing Co, 13th 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.	Silicon Chips: What is Computer Chips Made Of? https://www.intel.com/content/www/us/en/history/museum-making-silicon.html
2.	https://www.youtube.com/watch?v=XTt3gXB0a84
3.	https://www.youtube.com/watch?v=iihYXx79QiE
4.	https://www.youtube.com/watch?v=JfJ7MlP9Dco
5.	https://www.youtube.com/watch?v=L2VSOccUrSk

I SEMESTER

22CT103: Lab : Engineering Chemistry

Course Outcomes
Upon successful completion of the course the students will be able to
1. Illustrate different thermodynamic functions and chemical reaction rates. (L3)
2. Apply concepts of electrochemistry for energy storage devices. (L3)
3. Develop awareness about global environmental concerns. (L2)
4. Establish insight into engineering materials. (L2)

Total 10 experiments are to be performed
(4 each from Phase I and Phase II and two demonstration experiments)

SN	Experiments based on
	List of Experiments-Phase I
1	Determination of total hardness of water sample.
2	Determination of alkalinity present in the water sample.
3	Estimation of Fe^{2+} ions by redox titration
4	Determination of copper by iodometric titration
5	Estimation of Nickel.
6	To determine the strength of a given potassium dichromate solution with N/20 sodium thiosulphate solution
7	Determination of COD of water sample.
8	Synthesis of polyaniline.
9	Determination of rate of the reaction of hydrolysis of ethyl acetate at room temperature and analysis of experimental data using Computational Software.
	List of Experiments-Phase II
1	Determination of viscosity of lubricating oil by Redwood Viscometer I or II
2	Determination of Cation exchange capacity of an ion exchange resin
3	Determination of molecular weight of a polymer.
4	Oil Testing for Flash Point / Cloud Point/Pour Point/Aniline Point
5	Proximate analysis of coal
6	Determination of surface tension of liquids using stalagmometer.
7	Determination of electrochemical equivalence of Copper using Faradays Law
8	To determine the heat of solution of potassium nitrate calorimetrically.
9	Determination of conductivity of water sample by conductivity meter.
10.	To verify Beer-Lambert law for KMnO4 and determine the concentration of the given solution of KMnO4

	List of Demonstration Experiments
1	Determination of pH of water sample by pH meter
2	Synthesis of urea formaldehyde resin.
3	Determination of consistency of grease sample by using penetrometer.
4	Determination of Drop Point of grease sample.

I SEMESTER

22CT104: Professional Communication

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

Unit I: Basics of Communication	**(7 Hrs.)**
Language as a tool of communication & characteristics of language Process of Communication, Levels of Communication, Flow of Communication, Networks of Communication, Classification of Barriers (Intrapersonal, Interpersonal, Organizational). **(Contemporary Issues related to Topic)**	
Unit II: English Phonetics	**(6 Hrs.)**
Speech Mechanism, Organs of speech, Consonant and Vowels sounds, Word stress rules. **(Contemporary Issues related to Topic)**	
Unit III: Presentation & Visual Communication	**(7 Hrs.)**
Presentation and audience analysis, Organizing content, Nuances of presentation, Visual Communication – Introduction & importance, Role & Psychology of color in visual communication. **(Contemporary Issues related to Topic)**	
Unit IV: Verbal Skills	**(7 Hrs.)**
Listening Skills -definition types and traits. Group Communication- (Purpose, Different types of Group Communication, Organizational GD, GD as a part of selection process), Meeting (purposes, preparation, procedure and minutes of meeting). **(Contemporary Issues related to Topic)**	
Unit V: Interview Skills	**(6 Hrs.)**
Purpose, expectations of employer and preparation for Interview, Types, Types of Questions & Answering Techniques, Telephonic Interviews – preparation and guidelines, Reading Techniques (Exercise based on Complex Unseen passages. **(Contemporary Issues related to Topic)**	
Unit VI: Technical Written Communication	**(6 Hrs.)**
Memo, Email, Report -Types, Characteristics, prewriting aspects of report and preparing writing aspects of report), Types of paragraphs.. **(Contemporary Issues related to Topic)**	
Total Lecture	**39 Hours**

			July 2022	1.00	Applicable for AY 2022-23 Onwards
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Textbooks:	
1.	Raman & Sharma, Technical Communication, Oxford University Press.
2.	T. Balasubramaniam, Textbook of English Phonetics for Indian Students, Macmillan India Ltd.

Reference Books:	
1.	Public Speaking, Dale Carnegie, How to Develop Self – Confidence & Influence People.
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-superior-vocabulary-e157841139.html
3	https://www.pdfdrive.com/improve-your-communication-skills-present-with-confidence-write-with-style-learn-skills-of-persuasion-e156963640.html
4	https://www.pdfdrive.com/21-days-of-effective-communication-everyday-habits-and-exercises-to-improve-your-communication-skills-and-social-intelligence-e158273760.html

I SEMESTER
22CT105: 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.	
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**

			July 2022	1.00	Applicable for AY 2022-23 Onwards
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Textbooks:	
1.	Nelson A., Engineering Mechanics (Statics and Dynamics), ed 2009, Tata Mc. Grew Hill Education Pvt. Ltd., New Delhi, 2009.
2.	Dubey N.H., Engineering Mechanics (Statics and Dynamics) first edition 2013, Tata Mc. Graw Hill Education Pvt. Ltd., New Delhi, 2013.
3.	Singer F.L, Engineering Mechanics (Statics and Dynamics), Harper and Rowe publication, New Delhi, 1994.
Reference Books:	
1.	Timoshenko S, Young D.H and Rao J.V, Engineering Mechanics, Mc. Graw Hill Publication, New Delhi, 2007.
2.	Bhattacharyya B., Engineering Mechanics, Oxford University Press, New Delhi, 2008.
3.	Hibbeler R.C, Engineering Mechanics (Statics and Dynamics), Pearson Publication, Singapore, 2000.
4.	Shames I.H. and Rao J.V., Engineering Mechanics (Statics and Dynamics), First Edition, Pearson Publication, New Delhi, 2003.
5.	Beer F.P. and Johnston E.R; Vector Mechanics for Engineers, 9th edition Tata Mc. Graw Hill Publication, New Delhi. 2007.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Civil%20Engineering/78.%20Engineering-Mechanics-Statics-and-Dinamics-E-W-Nelson-C-L-Best-W-G-McLean-1st-Ed-1997-Schaum-Outline-McGraw-Hill%20(1).pdf
2	chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Civil%20Engineering/79.%20Engineering%20Mechanics.%20Statics-%20MERIAM%20%20AND%20KRAIGE.pdf
3	chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Civil%20Engineering/81.%20Engineering%20Mechanics%201.pdf
MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=nGfVTNfNwnk
2.	https://www.youtube.com/watch?v=6nguX-cEsvw
3.	https://nptel.ac.in/courses/112103108

I SEMESTER

22CT106: Lab. : Engineering Mechanics

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

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

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

I SEMESTER

22CT107: Basic Electrical and Electronics Engineering

Course Outcomes :
Upon successful completion of the course the students will be able to 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. Analyse 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, Superposition Theorem, Thevenin's Theorem. **(Contemporary Issues related to Topic)**	
Unit III: TRANSFORMER AND MOTORS	**(7 Hrs.)**
Introduction to Transformer, Construction, Working principle, Types of transformers, Introduction to DC Motor, Working Principle of DC Motor, Types of Motors. **(Contemporary Issues related to Topic)**	
Unit IV: DIODE AND TRANSISTOR	**(7 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, Configuration and its Characteristics. **(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	**(7 Hrs.)**
Introduction to Measurement System, Generalized block diagram of Measurement System, Static & dynamic characteristics of measurement system, Types of errors & their sources, Statistical analysis. **(Contemporary Issues related to Topic)**	
Total Lecture	**42 Hours**

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Textbooks:	
1.	Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford Higher Education, First Edition 2005
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

I SEMESTER

22CT108: Programming for Problem Solving

Course Outcomes :
On completion of this course, the student will be able to
1) Describe the basics of computer system components and operation, basics of algorithms and flowcharts (L2)
2) Develop programs using conditional statements and loops user defined functions, and pointers.(L3)
3) Analyze single and multi-dimensional arrays as a data structure and its use in problem solving.(L4)
4) Describe the basics of Strings, Structures, Unions, and File handling and its use for problem solving.(L2)

Unit I: Computer System Basics:	**(6 Hrs.)**
Introduction to components of a computer system (disks, memory, processor), how program is executed, understanding of concepts such as operating system, compilers, source and object programs, etc. Introduction to algorithms and flowcharts. **Basic building blocks of C:** Character set, variables, identifiers & keywords, Data types, Operators: arithmetic, logical and relational operators, precedence of operators **(Contemporary Issues related to Topic)**	
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. **(Contemporary Issues related to Topic)**	
Unit III: Loop Structures:	**(6 Hrs.)**
While, do while and for loops, break and continue statement, "goto" statement, real life programming examples based on these loop structures, bitwise operators, real life programming examples. **(Contemporary Issues related to Topic)**	
Unit IV: Modular programming:	**(7 Hrs.)**
Concept of functions, user defined functions, function prototypes, formal parameters, actual parameters, return types, call by value , C programs using functions, Recursive functions, comparing recursion against iteration, C programs using recursive functions, Concepts of a pointer, call by reference, types of programming errors, real life programming examples **(Contemporary Issues related to Topic)**	
Unit V: Arrays:	**(7 Hrs.)**
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, programs for basic matrix operations such as addition, multiplication and transpose, Array as function arguments. Strings: string representation and string handling functions, real life programming examples **(Contemporary Issues related to Topic)**	
Unit VI: Structure and Union, Concepts of files:	**(7 Hrs.)**
Types of files, file opening in various modes, file opening and closing, fseek(), reading and writing text files, concept of pre-processor directives and macros, command line arguments, real life programming examples **(Contemporary Issues related to Topic)**	
Total Lecture	**39 Hours**

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

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

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology/27.c.pdf
2	http://103.152.199.179/YCCE/DTEL%20Material/7.Information%20Technology/DTEL%20PPTs/11.ITCP_E_SSG.pdf

MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/106/104/106104128/

I SEMESTER

22CT109: Lab: Programming for Problem Solving

Course Outcomes
Upon successful completion of the course the students will be able to
1) Describe the basics of computer system components and operation, basics of algorithms and flowcharts (L2)
2) Develop programs using conditional statements and loops user defined functions, and pointers.(L3)
3) Analyze single and multi-dimensional arrays as a data structure and its use in problem solving.(L4)
4) Describe the basics of Strings, Structures, Unions, and File handling and its use for problem solving.(L2)

SN	**Experiments based on**
1(A)	Introduction to Linux Operating system & it's different commands.
1(B)	Introduction to Vi editor, Compilation and Execution of a program in Linux.
2	Practical based on Arithmetic and Conditional operators.
3(A)	Practical based on Decision Control statements
3(B)	Practical based on Case Control statements (switch)
4	Practical based on Looping Statements. (for/while/do-while)
5	Practical based on Functions and Recursion.
6(A)	Practical based on 1-D Array. (Searching)
6(B)	Practical based on 1-D Array. (Sorting)
7	Practical based on 2-D Array.
8	Practical based on Strings
9	Practical based on Structures.
10	Practical based on Files.

I SEMESTER
Audit Course
GE2131: Universal Human Value

Course Outcomes
Upon successful completion of the course the students will be able to 1.Experiential validation through the way to verify right or wrong. 2. Practice living in harmony with natural acceptance. 3. Realize the importance of relationships**.** 4. Recognize the importance of sustainable co-existence in existence.

Unit I: Course Introduction Need, Basic Guidelines, Content and Process for Value Education	**(4 Hrs.)**
Understanding the need, basic guidelines, content and process for Value Education Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration Continuous Happiness and Prosperity- A look at basic Human Aspirations	
Unit II: Understanding Harmony in the Human Being - Harmony in Myself!	**(4 Hrs.)**
Understanding human being as a co-existence of the sentient 'I' and the material 'Body' Understanding the needs of Self ('I') and 'Body' Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) Understanding the characteristics and activities of 'I' and harmony in 'I'	
Unit III: Understanding Harmony in the Family	**(4 Hrs.)**
Understanding Harmony in the family – the basic unit of human interaction Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship Understanding the meaning of Vishwas; Difference between intention and competence Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship	
Unit IV: Understanding Harmony in the Society-	**(4 Hrs.)**
Difference between intention and competence, Understanding the meaning of Samman, Difference between respect and ,differentiation; the other salient values in relationship ,Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sahasttva as comprehensive Human Goals,Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhauma Vyavastha)- from family to world family! ,Practice Exercises and Case Studies will be taken up in Practice Sessions	

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Unit V: Understanding Harmony in the Nature -	**(4Hrs)**
Whole existence as Co-existence, Understanding the harmony in the Nature Interconnectedness and mut Practice Exercises and Case Studies will be taken up in the Practice Sessions.ual fulfillment among the four orders of nature- recyclability and self-regulation in nature, Practice Exercises and Case Studies will be taken up in the Practice Sessions.	
Unit VI :Understanding Harmony in the Existence -	**(4Hrs)**
Understanding Existence as Coexistence (Sah-astitva) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence ,Practice Exercises and Case Studies will be taken up in the Practice Sessions.	
Total Lecture	**24 Hours**

Textbooks:	
1.	**The primary resource material for teaching this course consists of text book** A foundation course in Human Values and professional Ethics, Excel books, 1st Edition 2011, R.R Gaur, R Sangal, G P Bagaria

Reference Books:	
1.	**The teacher's manual** A foundation course in Human Values and professional Ethics, Excel books,1st Edition 2011, R.R Gaur, R Sangal, G P Bagaria

I SEMESTER
Audit Course
MLC2121: YCAP1-Get Set Go

Objective	Outcomes
Get Set Go program is designed to introduce students to the real world. It gives them the skills they need to reach their goals and live up to their full potential at college, home and work. The program was developed with feedback from students; it consists of interactive sessions that include real-life scenarios and role-playing. It can help young adults become more confident and better able to cope with the pressure and stress they face.	The students gain more confidence and skills required to deal with the challenges they will face in college and at home. Their interpersonal and intrapersonal skills are enhanced pushing them to think towards their future and aim for their goals.

Syllabus Subject: Communication Skills – 1st Year, No. of hours - 18

Unit No.	Topic	Duration
1	Topic: Build a foundation for success - 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	2.5 Hours
2	Topic: 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	3.5 Hours
	Practice Conversations, Activity – Pause-Part-Punch, Group Activity	

Unit No.	Topic	Duration
3	Topic: Increase Self Confidence -• Use our experiences to communicate more confidently • Communicate with clarity and conciseness • Discover how past experiences influence behavior	2.5 Hours
4	Topic: 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	4 Hours
	Individual Activity – Sharing of defining moment, Skit to demonstrate Leadership Principles, Stranded on Island	

Unit No.	Topic	Duration
5	Topic: Fundamentals of Communication (Earn the right – Excite -Eagerness) ♣ Elevator Pitch ♣ Develop more Flexibility, ♣ Recap and Summarize	3.5 Hours
6	Activities - – Individual Presentation, Flexibility Drills, Individual Presentations – My Vision Assignment	2 Hours

Reference Books:

1. How to win friends & influence people – Dale Carnegie

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 3.25)

Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2022

2nd Semester

(Department of Computer Technology)

B. Tech in Computer Technology

28 June 2019

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 2022

(Scheme of Examination w.e.f. 2022-23 onward)

(Department of Computer Technology)

B. Tech in Computer Technology

SoE No. 22CT-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															
1	1	BS	GE/MTH	22CT101	Calculus Sequences and Series	T	3	1	0	4	4	30	20	50	3 Hrs
2	1	BS	GE/CHE	22CT102	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3 Hrs
3	1	BS	GE/CHE	22CT103	Lab: Engineering Chemistry	P	0	0	2	2	1		60	40	
4	1	HS	GE/HUM	22CT104	Professional Communication	T	3	0	0	3	3	30	20	50	3 Hrs
5	1	BES	CV/CV	22CT105	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3 Hrs
6	1	BES	CV/CV	22CT106	Lab: Engineering Mechanics	P	0	0	2	2	1		60	40	
7	1	BES	EE/EE	22CT107	Basic Electrical and Electronics Engineering	T	3	0	0	3	3	30	20	50	3 Hrs
8	1	BES	IT/IT	22CT108	Programming for Problem Solving	T	3	0	0	3	3	30	20	50	3 Hrs
9	1	BES	IT/IT	22CT109	Lab: Programming for Problem Solving	P	0	0	2	2	1		60	40	
						TOTAL	**18**	**1**	**6**	**25**	**22**				
List of Mandetory Learning Course (MLC)															
1	1	HS	GE/HUM	GE2131	Universal Human Value	**A**	2	0	0	2	0				
2	1	HS	GE/T&P	MLC2121	YCAP1-Get Set Go	**A**	2	0	0	2	0				
SECOND SEMESTER															
1	2	BS	GE/MTH	22CT201	Differential Equation and Complex Analysis	T	3	1	0	4	4	30	20	50	3 Hrs
2	2	BS	GE/PHY	22CT202	Engineering Physics	T	3	0	0	3	3	30	20	50	3 Hrs
3	2	BS	GE/PHY	22CT203	Lab: Engineering Physics	P	0	0	2	2	1		60	40	
4	2	HS	GE/HUM	22CT204	Social Science	T	3	0	0	3	3	30	20	50	3 Hrs
5	2	BES	ME/ME	22CT205	Engineering Graphics	T	1	0	0	1	1	30	20	50	3 Hrs
6	2	BES	ME/ME	22CT206	Lab: Engineering Graphics	P	0	0	4	4	2		60	40	
7	2	BES	CT/CT	22CT207	Elements of AIML	T	3	0	0	3	3	30	20	50	3 Hrs
8	2	BES	CT/CT	22CT208	Computer workshop	P	0	0	2	2	1		60	40	
9	2	BES	CT/CT	22CT209	Data Structures	T	3	0	0	3	3	30	20	50	3 Hrs
10	2	BES	CT/CT	22CT210	Lab: Data Structures	P	0	0	2	2	1		60	40	
						TOTAL	**16**	**1**	**10**	**27**	**22**				
List of Mandetory Learning Course (MLC)															
1	2	HS	GE/T&P	MLC2122	YCAP2 -Functional English	**A**	2	0	0	2	0				
2	2	BES	GE/CHE	GE2132	Environmental Science	**A**	2	0	0	2	0				

MSEs* = Two MSEs of 15 Marks each will conducted and marks of these 2 MSEs will be considered for Continuous Assessment

TA ** = for Theory : TA1-5 marks on Proctored Online Exam, TA2-12 marks on activitied decided by course teacher, TA3 - 3 marks on class attendance

TA = for Practical : MSPA will be 15 marks each**

		June 2022	**1.00**
Chairperson	**Dean (Acad. Matters)**	**Date of Release**	**Version**

Applicable for AY 2022-23 Onwards

II SEMESTER

22CT201: Differential Equation and Complex Analysis

Course Outcomes
Upon successful completion of the course 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 equation, Applications of differential equations to various field (only up to second order). **(Contemporary Issues related to Topic)**	
Unit IV: Complex Numbers	**(6 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 functions and their inverse, Logarithm of a complex number. **(Contemporary Issues related to Topic)**	
Unit V: Complex Variables	**(7 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)**	
Unit VI: Statistics	**(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)**	
Total Lecture	**39 Hours**

			July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

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

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

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

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

II SEMESTER

22CT202: Engineering 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 particle.
2. Justify the characteristics of semiconductor materials in terms of crystal structures, charge carriers and energy bands.
3. Illustrate working principle of lasers and optical fibers for their use in the field of industry.
4. Analyse the motion of charged particles in electric and magnetic field and its applications to electron optic devices.
5. Assess the characteristics of nano materials, synthesis methods and their applications.

Unit:1 Quantum Physics	**(6 Hrs.)**
Wave-particle duality, Davisson and Germer experiment, Wave packet, Heisenberg uncertainty principle, though 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 tunnelling Introduction to Bits and Qubits. **(Contemporary Issues related to Topic)**	
Unit III: Semiconductor Physics	**(7 Hrs.)**
Formation of energy bands in solids; Classification of solids, Energy band diagram of Si/Ge, Intrinsic and extrinsic semiconductors, Conductivity, Law of mass action, Hall effect, Direct and Indirect semiconductor materials **(Contemporary Issues related to Topic)**	
Unit IV: Fundamentals of Optical Communication	**(7 Hrs.)**
Interaction of radiation with matter, Population Inversion and Optical resonance cavity, diode laser, Properties and engineering applications of laser. Optical Fibre: Principle, structure and classification, Acceptance angle, Numerical aperture, Losses. **(Contemporary Issues related to Topic)**	
Unit V: 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 (CRO), Block diagram, Application of CRO for amplitude, frequency and phase determination **(Contemporary Issues related to Topic)**	
Unit VI: Physics of Advanced Materials	**(6 Hrs.)**
Introduction to Nanoscience and nanomaterials, types of nano structures (0-D, 1-D, 2-D and 3-D) and their properties (structural, electrical, optical, magnetic and mechanical), Synthesis of nanomaterials: Top down and Bottom – up approach, Applications of nanomaterials. **(Contemporary Issues related to Topic)**	
Total Lecture	**40 Hours**

Textbooks:	
1.	M. N. Avadhanulu, P. G. Kshirsagar, A Textbook of Engineering Physics, Revised 14th Edition, S. Chand & Company, 2014.
2.	Hitendra K Malik, A K Singh, Engineering Physics, 2nd Edition, Tata McGraw Hill Education Private Limited, 2015.

Reference Books:	
1.	John Wiley &Sons Inc, Fundamentals of Physics, 10th Edition, David Halliday, Robert Resnick and Jeryle Walker, John-Wiley India.
2.	Sanjay D Jain, Girish G Sahasrabudhe, Engineering Physics, 2nd Edition, Universities Press, 2015.
3.	P K Palanisamy, Engineering Physics, Revised Edition, SCITECH, 2015.
4.	John Allision, Electronic Engineering Materials and Devices, TMH edition, 10th reprint, Tata McGraw Hill.
5.	Arthur Beiser, Concept of Modern Physics, 6th edition, Tata McGraw - Hill Education, 2002.
6.	Subramanyam, Brijlal, M N Avadhanulu, Text Book of Optics, S. Chand & Company, 2006.
7.	M N Avadhanulu, An Introduction to Lasers: Theory & Applications, First Edition 2001, S. Chand & Company Pvt. Ltd, 2017.
8.	S O Pillai, Solid State Physics, 9th edition, New Edge International Publishers, 2021.

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	chrome-http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Physics/2016_Book_ThePhysicsOfSemiconductors.pdf
3	chrome-http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Physics/Dekker%20-%20Solid%20State%20Physics.pdf

MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/122/107/122107035/
2.	https://nptel.ac.in/courses/122104016
3.	https://freevideolectures.com/course/3531/engineering-physics-i

II SEMESTER
22CT203: Lab: Engineering 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 particle. 2. Justify the characteristics of semiconductor materials in terms of crystal structures, charge carriers and energy bands. 3. Illustrate working principle of lasers and optical fibers for their use in the field of industry. 4. Analyse the motion of charged particles in electric and magnetic field and its applications to electron optic devices. 5. Assess the characteristics of nano materials, synthesis methods and their applications.

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

SN	Experiments based on
1	Determination of Planck's constant.
2	To study V-I characteristics of a Tunnel Diode.
3	Determination of Hall coefficient and density of charge carriers using Hall effect.
4	Dependence of Hall coefficient on temperature.
5	To study V-I characteristics of a semiconductor diode (Germanium and Silicon) in forward and reverse bias mode.
6	To determine the forbidden energy gap of a semiconductor by studying the temperature variation of its resistivity using four probe method.
7	Determination of Band gap in a semiconductor using reverse biased p-n 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 fibre.
11	Determination of amplitude and frequency of sinusoidal using CRO.
12.	To measure the phase shift introduced by a phase shift network using dual beam CRO.

II SEMESTER

22CT204: Social Science

Course Outcomes
Upon successful completion of the course the students will be able to 1. Explain the basic concepts of social sciences. 2. Describe the development of various Civilizations and their culture. 3. Explain the basic idea of Constitution of India and aware about their rights & Duties. 4. Analyze the Impact of Industrialization on Society and discuss the Fundamental Concepts of Society.

Unit I: Social Sciences & Its Utility	**(6 Hrs.)**
Meaning & Scope of Social Science, General Utility of Social Sciences to Engineers, Applied Humanities, Social Engineering, Society its types & Characteristics. **(Contemporary Issues related to Topic)**	
Unit II: Human Civilization	**(7 Hrs.)**
Development of human civilization with specific reference to monumental studies of engineering skill, Ancient Indian Civilization:- a) Indus Valley Civilization b) Vedic Civilization, c) Indian Art & Architecture. **(Contemporary Issues related to Topic)**	
Unit III: Fundamental Concept in Social Science	**(7 Hrs.)**
Social Structure and Social System, Socialization, Social Control and Social Change, Culture: Characteristics and Features. **(Contemporary Issues related to Topic)**	
Unit IV: Introduction to Constitution of India	**(7 Hrs.)**
Significance of Preamble, Fundamental Rights and Duties, Directive principles of state policy. Federal System Concept of industrial Democracy. **(Contemporary Issues related to Topic)**	
Unit V: Industrial Organization & Society	**(6 Hrs.)**
Industrialization and its impact on society, Selection, Training & Motivation of workers, Industrial Psychology, Industrial sociology, Work Organization, Power, Authority and Status system. **(Contemporary Issues related to Topic)**	
Unit VI: Industrial Management	**(6 Hrs.)**
Labour Union Organization, Discipline in Industry, Labour Turnover, Industrial Fatigue of workers, Health and Safety of Workers. **(Contemporary Issues related to Topic)**	
Total Lecture	**39 Hours**

			July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

Textbooks:	
1.	S. Shabbir & Sheikh, A New Look Into Social Sciences, S.Chand , New Delhi,1993.
2.	C N Shankar Rao, Sociology Principles of Sociology With An Introduction To Social Thought, S. Chand, New Delhi, 2010.
3.	O P Khanna, Industrial Engineering And Management, Dhanpat Rai Publication, New Delhi, 2010.
4.	Dr. G. N. Nimbarte, Social Science, Sankalp Publications, Nagpur.

Reference Books:	
1.	C. N. Shankar Rao, Sociology: Principal of Sociology with an introduction to social thought, Publication: S. Chand, New Delhi.
2.	O. P. Khanna, Industrial Engineering and Management, Dhanpat Rai Publication, New Delhi.
3.	Reader's Digest Vanished Civilizations, The Reader's Digest Association Limited, New York.
4.	Constitution of India: Dr B. R. Ambedkar: Government of India, Government of India.
5.	B. L. Kayastha, Recent trends in Humanities and Social Sciences, 1st Ed., Akinik Publications, New Delhi.

MOOCs Links and additional reading, learning, video material	
1.	https://mobidrive.com/sharelink/r/4I2bDsxN9YrVI03vMZaInJ5VBpojBmR9EqKv7nin9pkN
2.	https://mobidrive.com/sharelink/r/4I2bDsxN9YrVI03vMZaInJ2sUn37wK4V3CpGhemYRKnz

II SEMESTER

22CT205: 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. **(Contemporary Issues related to Topic)**	
Unit II: Theory of Isometric Projections:	**(2 Hrs.)**
Theory of isometric projection, Method for drawing isometric views, Different problems on isometric projections. **(Contemporary Issues related to Topic)**	
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. **(Contemporary Issues related to Topic)**	
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. **(Contemporary Issues related to Topic)**	
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. **(Contemporary Issues related to Topic)**	
Unit VI: Intersection of Surfaces of solids:	**(2 Hrs.)**
Intersection between similar solids, Intersection between dissimilar solids, Lines and Curves of Intersection. **(Contemporary Issues related to Topic)**	
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.	https://nptel.ac.in/courses/112105294

II SEMESTER

22CT206: 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**

II SEMESTER

22CT207: Elements of AIML

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Develop an understanding what is involved in AIML. 2. Understand learning algorithms of AIML. 3. Understand the deep learning. 4. Apply the knowledge for the selection of tool and languages for problem solving 5. Understand the use of AIML for real world problems.

Unit I: Introduction to Artificial Intelligence	**(7 Hrs.)**
What Is Artificial Intelligence? History, AI and Society, Agents and Knowledge based systems, Components of AI. **(Contemporary Issues related to Topic)**	
Unit II: Propositional Logic	**(7 Hrs.)**
Propositional Logic, First order logic, limitations of logic, Search, Games and Problem Solving, Reasoning with Uncertainty. **(Contemporary Issues related to Topic)**	
Unit III: Machine Learning	**(7 Hrs.)**
Supervised learning, Unsupervised learning, Reinforcement learning: Model based learning, Regression, Decision trees, Linear Discrimination, Kernel Machines and Graphical Models. **(Contemporary Issues related to Topic)**	
Unit IV: Artificial Neural Networks and Deep Learning	**(7 Hrs.)**
Biological neural network, Artificial neural network, Hopfield network, Neural Associative memory, Linear networks, Backpropogation algorithm, Support Vector Machines, Basics of deep learning. **(Contemporary Issues related to Topic)**	
Unit V: Introduction to Platforms, Tools, Frameworks and languages for AIML	**(6 Hrs.)**
Top AIML Softwares: Salesforce Einstein, IBM Watson, Deep Vision, Cloud Machine Learning Engine, Azure Machine Learning Studio, Nvidia Deep Learning AI, Playment; Machine learning tools: TensorFlow, Amazon Machine Learning, Accord.NET, Apache Mahout, Shogun; Programming languages: Python, R, Java, Julia, C/C++, Others: Scikit Learn, Theano, Caffe, MxNet, Keras, PyTorch, CNTK, Auto ML, OpenNN, H20: Open Source AI Platform, Google ML Kit. **(Contemporary Issues related to Topic)**	
Unit VI: Applications of AI and ML	**(6 Hrs.)**
Working with software based AI Applications, Working with AI in hardware Applications, Health, Banking and Finance, Automobile, Surveillance, Social Media, Education, Space, etc. **(Contemporary Issues related to Topic)**	
Total Lecture	**40 Hours**

Textbooks:	
1.	Wolfgang Ertel, "Introduction to Artificial Intelligence" 2nd Edition, UTiCS, Springer
2.	Ethem Alpaydın ,"Introduction to Machine Learning" 3rd Edition,The MIT Press, Cambridge, Massachusetts London, England.

Reference Books:	
1.	John Paul Mueller, Luca Massaron, , "Artificial Intelligence for Dummies" John Wiley & Son, 1st edition 2018
2.	Steven W. Knox, "Machine Learning A Concise Introduction", Wiley publications, 1st edition, 2018

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=kwSTs0QVRfU
2.	https://www.youtube.com/watch?v=GHpchgLoDvI&list=PLp6ek2hDcoNB_YJCruBFjhF79f5ZHyBuz
3.	https://nptel.ac.in/courses/106105077

II SEMESTER

22CT208: 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 **(Contemporary Issues related to Topic)**	
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 **(Contemporary Issues related to Topic)**	
Unit III: Unix tools	**(4 Hrs.)**
Unix tools - Awk, sed, Emacs **(Contemporary Issues related to Topic)**	
Unit IV: Scripting	**(4 Hrs.)**
Scripting – variables, conditionals, loops, finding logged in users , Parameter passing to C program from shell (argc / argv) **(Contemporary Issues related to Topic)**	
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 **(Contemporary Issues related to Topic)**	
Unit VI: IDE for code development	**(4 Hrs.)**
IDE for code development Using DevCpp and/or Visual Studio, Create a project using multiple .c and .h files with cross-references, Setting compiler options and linker options, Understanding different settings **(Contemporary Issues related to Topic)**	
Total Lecture	**24 Hours**

			July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

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

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

II SEMESTER

22CT209: Data Structures

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

Unit I:	**(7 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 **(Contemporary Issues related to Topic)**	
Unit II:	**(7 Hrs.)**
Linked list, self-referential data structure, types: singly, doubly, circular, application for polynomial evaluation, implementation of stacks and queue using linked list **(Contemporary Issues related to Topic)**	
Unit III:	**(7 Hrs.)**
Binary trees, binary search trees, terminologies, AVL, Red-Black **(Contemporary Issues related to Topic)**	
Unit IV:	**(7 Hrs.)**
Splay trees, B and B+ trees, Multidimensional trees, Tries **(Contemporary Issues related to Topic)**	
Unit V:	**(6 Hrs.)**
Directed and Undirected Graphs, Terminologies, Graph traversals, connected and bi-connected components, Topological sort, Applications of BFS and DFS **(Contemporary Issues related to Topic)**	
Unit VI:	**(6 Hrs.)**
Minimum Spanning Trees, Shortest Path Algorithms and Applications, All pair shortest paths, Introduction to Network flow Problems **(Contemporary Issues related to Topic)**	
Total Lecture	**40 Hours**

			July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

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

II SEMESTER

22CT210: 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	**Program 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

II SEMESTER

Audit Course

MLC2122: YCAP2 -Functional English

MLC2122 YCAP-II	**No of Evaluations**	**Result of successful completion of YCAP II shall be calculated based on the basis of evaluations.** **To pass the exam a students must score 50% marks**
Evaluation Scheme	EVAL-I	
	100 marks	

Objective	**Objective**
The aim of this course is to get the students to a common level in spoken English. The majority of the target group is expected to know English as a foreign/official language. Thus the objective of the course is to make the students comfortable in using it as a spoken language when the situation demands	Students will heighten their awareness of correct usage of English grammar in writing and speaking.

Syllabus Subject: Functional English – 2nd Sem , No. of hours - 20

Unit No.	**Topic**	**Duration**
1	Introduction to Functional English - 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	2 hours
2	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	2 hours
	Practice exercises, Practice Conversations, Script Activity	1.5 Hours
	Quiz on the above Topics, Exercises for Evaluation	0.5 Hours

Unit No.	Topic	Duration
3	Topic: Internet & Social Media Communication Introduction & Basics to Social Networking, Texting & Instant messaging, Blogs & Discussion Board- discussion with examples, Ethics of Social media & communication	3 Hours
	Topic: Introduction to Creative Ads Why Ads, Whats in it for me?, Characteristics of ads, Assignment	
4	Topic: Tenses -1 Introduction & Basics, Simple Tense (Past, Present, Future), Continuous Tense (Past, Present, Future) – discussion with examples	4 Hours
	Assignment Presentation on Mad Ads, Quiz on Tenses and Social Media-Internet Communication	

Unit No.	Topic	Duration
5	Topic: Tenses -2 Introduction & Basics, Perfect Tense (Past, Present, Future), Perfect Continuous Tense (Past, Present, Future) – discussion with examples	3.5 Hours
	Topic: Introduction to Movie Magic Learn English with films, Film Vocabulary, Describing a film, Types of Films,	
6	Topic: Written Communciation 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	3.5 Hours
	Assessment – Letter and Email Writing, Tenses - Quiz	

Reference Books:	
1.	Soft Skills and Professional Communication, Francis Peters SJ, Mcgraw Hill Education
2.	Bringing out the best in People, Aubrey Daniels, Mcgraw Hill

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/channel/UCLsI5-B3rIr27hmKqE8hi4w
2.	https://www.youtube.com/channel/UC1Y1I4shF84scQ4HBThahcg

II SEMESTER
Audit Course
GE2132: Environmental Science

Course Outcome :
Upon successful completion of the course the students will be able 1. To understand the basic concepts and problems and follow sustainable development practices 2. To enhance knowledge skills and attitude towards environment 3. To understand natural environment and its relationship with human activities. 4. To evaluate local, regional and global environmental topics related to resource use and management.

Unit I: : Introduction	**(2Hrs.)**
Definition, scope and importance; Need for public awareness – institutions in environment, people in environment.	

Unit II: : Natural Resources	**(2 Hrs.)**
Renewable and non-renewable and associated problems; Role of an individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.	

Unit III: Ecosystems	**(4 Hrs.)**
Concept of an ecosystem – understanding ecosystems, ecosystem degradation, resource utilization. Structure and functions of an ecosystem – producers, consumers and decomposers. Energy flow in the ecosystem – water, carbon, oxygen, nitrogen and energy cycles, integration of cycles in nature. Ecological succession; Food chains, food webs and ecological pyramids; Ecosystem types – characteristic features, structure and functions of forest, grassland, desert and aquatic ecosystems.	

Unit IV: Bio-diversity	**(4 Hrs.)**
Introduction – biodiversity at genetic, species and ecosystem levels Bio-geographic classification of India. Value of biodiversity – Consumptive use value, productive use value, social, ethical, moral, aesthetic and optional vlue of biodiversity. India as a mega-diversity nation; hotspots of biodiversity.Threats to bio-diversity – habitat loss, poaching of wildlife, man-wild life conflicts. Common endangered and endemic plant and animal species of India. Insitu and Exsitu conservation of biodiversity. Role of individual and institutions in prevention of pollution.Disaster management – Floods, earthquake, cyclone, landslides.	

Unit V: Pollution	**(4 Hrs.)**
Definition; Causes, effects and control measures of air, water, soil, marine, noise and thermal pollutions and nuclear hazards. Solid waste management – Causes, effects and control measures of urban and industrial waste.	

Unit VI: Social Issues and the Environment	**(4 Hrs.)**
Unsustainable to sustainable development; Urban problems related to energy; Water conservation, rainwater harvesting, watershed management; Problems and concerns of resettlement and rehabilitation of affected people. Environmental ethics – issues and possible solutions – Resource consumption patterns and need for equitable utilization; Equity disparity in Western and Eastern countries; Urban and rural equity issues; need for gender equity. Preserving resources for future generations. Te rights of animals; Ethical basis of environment education and awareness; Conservation ethics and traditional value systems of India. Climate change, global warming, acid rain, Ozone layer depletion, nuclear accidents and holocasts. Wasteland Reclamation; Consumerism and Waste products. Environment legislations – The Environment (Protection) Act; The water (Prevention and Control of Pollution) Act; The Wildlife Protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislations – environment impact assessment (EIA), Citizens actions and action groups. Public awareness – Using an environmental calendar of activities, self-initiation.	
Unit VII : Human Population and the Environment	**(4Hrs.)**
Global population growth, variation among nations. Population explosion; Family Welfare Programmes – methods of sterilization; Urbanization. Environment and human health – Climate and health, infectious diseases, water-related diseases, risk due to chemicals in food, Cancer and environment. Human rights – equity, Nutrition and health rights, Intellectual property rights (IPRS), Community Biodiverstity registers (CBRs). Value education – environmental values, valuing nature, valuing cultures, social justice, human heritage, equitable use of resources, common property resources, ecological degradation. HIV / AIDS; Women and Child Welfare; Information technology in environment and human health.	
Total Lecture	**24 Hours**

Textbooks:	
1.	Perspectives in environmental studies by A. Kaushik and C. P. Kaushik.
2.	Textbook for Environmental studies by Erach Bharucha for UGC
3.	Textbook of Environmental studies by Shanta Satyanarayan, Dr. Suresh Zade, Dr. Shashikant Sitre & Dr. Pravin Meshram.
4.	Fundamental concepts in Environmental studies by Dr. D.D. Mishra. S. Chand publications

Reference Books:	
1.	Essentials of Ecology and Environmental Science by Dr. S .V .S. Rana,PHI Learning Pvt. Ltd, Delhi
2.	Environmental Chemistry by Anil Kumar De, Wiley Eastern Limited
3.	Environmental Science by T.G. Miller, Wadsworth Publishing Co, 13th edition.
4.	Ecology and Environment by P. D. Sharma, Rastogi publications

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 3.25)

Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2022

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 2022

(Scheme of Examination w.e.f. 2022-23 onward)

(Department of Computer Technology)

B. Tech in Computer Technology

SoE No. 22CT-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	PC	CT	22CT301	Discrete Maths and Probability Theory	T	3	1	0	4	4	30	20	50	3 Hrs
2	3	PC	CT	22CT302	Computer Architecture and Organisation	T	3	0	0	3	3	30	20	50	3 Hrs
3	3	PC	CT	22CT303	Database Management Systems	T	3	0	0	3	3	30	20	50	3 Hrs
4	3	PC	CT	22CT304	**Lab:** Database Management Systems	P	0	0	2	2	1		60	40	
5	3	PC	CT	22CT305	Object Oriented Programming	T	3	1	0	4	4	30	20	50	3 Hrs
6	3	PC	CT	22CT306	**Lab:** Object Oriented Programming	P	0	0	2	2	1		60	40	
7	3	PC	CT	22CT307	**Lab:** Python Programming	P	0	0	4	4	2		60	40	
8	3	PC	CT	22CT308	Ethics in Engineering Practice/Professional Ethics	T	1	0	0	1	1	30	20	50	3 Hrs
9	3	PC	CT	22CT309	**Lab:** Technical Writing	P	0	0	2	2	1		60	40	
					TOTAL THIRD SEM		**13**	**2**	**10**	**25**	**20**				
List of Mandatory Learning Course (MLC)															
1	3	HS	T&P	MLC123	YCCE Communication Aptitude Preparation (YCAP3)	**A**	3	0	0	3	0				
2	3	BES	CT	MLC111	Document Presentation and Computation	**A**	2	0	0	2	0				
Fourth Semester															
1	4	BS	GE	22CT401	Linear Algebra	T	3	0	0	3	3	30	20	50	3 Hrs
2	4	GE	GE/HUM	22CT402	Fundamentals of Management and Economics	T	3	0	0	3	3	30	20	50	3 Hrs
3	4	PC	CT	22CT403	Operating Systems	T	3	0	0	3	3	30	20	50	3 Hrs
4	4	PC	CT	22CT404	**Lab:** Operating Systems	P	0	0	2	2	1		60	40	
5	4	PC	CT	22CT405	Theoritical Foundations of Computer Science	T	3	1	0	3	3	30	20	50	3 Hrs
6	4	PC	CT	22CT406	Mathematical Foundations for Data Analysis	T	3	0	0	3	3	30	20	50	3 Hrs
7	4	PC	CT	22CT407	**Lab:** Mathematical Foundations for Data Analysis	P	0	0	2	2	1		60	40	
8	4	PC	CT	22CT408	Computer Networks	T	3	0	0	3	3	30	20	50	3 Hrs
9	4	PC	CT	22CT409	**Lab:** Computer Networks	P	0	0	2	2	1		60	40	
10	4	PC	CT	22CT410	**Lab:** Web Technology	P	0	0	4	4	2		60	40	
11	4	PC	CV/CT	22CT411	Environmental Sustainability, Pollution and Management	**T**	3	0	0	3	3	30	20	50	3 Hrs
					TOTAL FOURTH SEM		**21**	**1**	**10**	**31**	**26**				
List of Mandatory Learning Course (MLC)															
1	4	HS	T&P	MLC124	YCCE Communication Aptitude Prepartion (YCAP 4)	**A**	3	0	0	3	0				
2	4	BES	CT	MLC112	Data Visualization	**A**	2	0	0	2	0				

MSEs* = Two MSEs of 15 Marks each will conducted and marks of of these 2 MSEs will be considered for Continuous Assessment

TA ** = for Theory : 12 marks on lecture quizzes, 12 marks on two TA2 activitied decided by course teacher, 2 marks on class attendance and 4 marks on TA4 activities

TA = for Practical : MSPA will be 15 marks each**

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

Applicable for AY 2022-23 Onwards

III Semester

22CT301 : Discrete Mathematics and Probability Theory

Course Outcomes :

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:	**(7 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:	**7 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:	**(7 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:	**(7 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:	**(6 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.	

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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	**40 Hours**

Textbooks:	
1.	Discrete Mathematics and Its Applications 7th Edition Kenneth H. Rosen McGraw-Hill
2.	Discrete Mathematical Structures with Applications to Computer ScienceTata 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

22CT302 : 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:	**(6 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:	**(7 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:	**(7 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:	**(7 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:	**(7 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	**40 Hours**

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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

22CT303 : Database Management Systems

Course Outcomes :

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

1. Understand database management system, through modelling and designing concepts.
2. Apply the knowledge of query language to perform the operations on database.
3. Apply the knowledge of database concepts to perform the transaction and concurrency control
4. Design database using the entity relation diagrams and relational database aspects..

Unit I:	**(6 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:	**(7Hrs.)**
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:	**(7 Hrs.)**
Transaction Management: ACID Properties, Implementation of ACID Properties, Database processes to support ACID Properties, Schedules, and Testing of Serializability.	
Unit VI:	**(6 Hrs.)**
Concurrency Control: Lock-based Protocols, Timestamp Based Protocols, **Crash Recovery**: Failure Classification, Log Based Recovery, Checkpoints.	
Total Lecture	**40 Hours**

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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

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	https://onlinelibrary.wiley.com/doi/epdf/10.1002/0471728993

MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/106/105/106105175/
2.	https://nptel.ac.in/courses/106104135
3.	https://www.youtube.com/watch?v=6Iu45VZGQDk

III SEMESTER

22CT304 : Lab. Database Management Systems

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	**Program based on**
1	Study of File System (Excel)
2	Draw the ER diagram
3	Implementation of DDL and DML queries
4	Perform select queries using predicates
5	To Perform various data manipulation queries, aggregate functions, sorting concept, single row functions
6	Displaying data from Multiple Tables (join)
7	To apply the concept of Aggregating Data using Group functions.
8	To solve queries using the concept of sub query
9	To apply the concept of Cursor
10	To apply the concept of procedure and function

III SEMESTER

22CT305 : 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 modeling. 2. Apply the knowledge of object-oriented programming to solve the given problem. 3. Analyze the problem to provide the object-oriented solution using advanced programming concepts. 4. Design the event driven web based solution for the problem.

Unit I:	**(5 Hrs.)**
Introduction to object oriented programming paradigm, procedure oriented programming vs OOP, features of OOP, benefits of OOP, defining class, instantiating a class. UML diagrams to represent class, objects and various relationships. Code of ethics for programmer.	
Unit II:	**(7 Hrs.)**
Functions in OOP, function overloading, Passing & returning Objects, pointers to members, constructors and its types, Access specifiers and packages. Inheritance, types of inheritance, run time polymorphism, abstract classes, Interface, collection interface	
Unit III:	**(7 Hrs.)**
Exceptions – exception hierarchy – throwing and catching exceptions – built-in exceptions, creating own exceptions, Stack Trace Elements. Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files	
Unit IV:	**(7 Hrs.)**
Multithreading, Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, daemon threads, thread groups. Generic Programming – Generic classes – generic methods – Bounded Types – Restrictions and Limitations	
Unit V:	**(7 Hrs.)**
MVC architecture, Java web components and its architecture Graphics programming – Frame – Components – working with 2D shapes – Using color, fonts, and images	
Unit VI:	**(7 Hrs.)**
Basics of event handling – event handlers – adapter classes – actions – mouse events – AWT event hierarchy – Introduction to Swing – layout management – Swing Components – Text Fields, Text Areas – Buttons- Check Boxes – Radio Buttons – Lists- choices- Scrollbars – Windows –Menus – Dialog Boxes.	
Total Lecture	**40 Hours**

Textbooks:	
1.	Thinking in Java , 4th Edition , Bruce Eckel, Prentice Hall

Reference Books:	
1.	Java Complete Reference 7th Edition, Herbert Schildt ,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/106105191/L01.html
2.	https://www.youtube.com/watch?v=-HafzawNlUo

II SEMESTER

22CT306 : 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 modeling. 2. Apply the knowledge of object-oriented programming to solve the given problem. 3. Analyze the problem to provide the object-oriented solution using advanced programming concepts. 5. Design the event driven web based solution for the problem.

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 in Java/C++
2	Implement the concept of function and operator overloading in Java/C++
3	Implement the concept of friend function
4	Implement the concept of class constructor and its type in Java/C++
5	Implement the concept of Abstraction in Java/C++
6	Implement the concept of all types of inheritance in Java/C++
7	Implement he collection listener to solve the problem in Java
8	Implement the concept of run time polymorphism in Java/C++
9	Implement the concept of Files using command line arguments in Java/C++
10	Implement the concept of function templates and class template in C++
11	Implement the concept of exception in Java/C++
12	Implement the concept of applet to prepare a web application in Java
13	Implement the event driven approach to prepare the web application in Java

III SEMESTER

22CT307 : 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:	**(6 Hrs.)**
Control flow statements: continue, break, Loops: while, for and Functions	
Unit III:	**(6 Hrs.)**
Data structures: list, dictionary, arrays, tuples, sets, strings Unit IV: [06Hrs] File handling, Classes and objects	
Unit IV:	**(8 Hrs.)**
File handling, Classes and objects	
Unit V:	**(7 Hrs.)**
Introduction to Various Libraries: NumPy: Fundamental package for scientific computing NLTK- Natural language toolkit	
Unit VI:	**(6 Hrs.)**
Python patterns- Implementing Graphs NetworkX- A package for the creation, manipulation, and study of the structure, dynamics, and functions of complex networks.	
Total Lecture	**40 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

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

III SEMESTER

22CT307: 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.

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

SN	Program based on
1	Informal introduction to programming IDEs Downloading and installing Python
2	Python programs using variables, operations, control flow - assignments, condition-als, loops, functions
3	Python programs implementing types, expressions, strings, lists, tuples, dictionaries
4	Python memory model creation using names, mutable and immutable values Operations pertaining to various data structures
5	More Python functions demonstrating- optional arguments, default values Passing functions as arguments Higher order functions on lists: map, list comprehension
6	Python programs demonstrating Exception handling, Basic input/output
7	Python programs demonstrating Handling files
8	Python Programs using Classes and Objects
9	Various packages in Python
10	Mini project covering all data structures

III SEMESTER
22CT308 : Ethics in Engineering Practice/Professional Ethics

Course Outcomes :
Upon successful completion of the course the students will be able to
1. Understand the role of ethics in professional practice, engineering and design.
2. Understand the sense of responsibilities and rights.
3. Describe computer, IPR and digital information.
4. Explain the responsibility for the environment.

Unit I:	**(7 Hrs.)**
Introduction to Ethical Reasoning and Engineer Ethics, Professional Practice in Engineering	
Unit II:	**(7 Hrs.)**
Ethics as Design - Doing Justice to Moral Problems	
Unit III:	**(7 Hrs.)**
Central Professional Responsibilities of Engineers	
Unit IV:	**(7 Hrs.)**
Computers, Software, and Digital Information	
Unit V:	**(6 Hrs.)**
Rights and Responsibilities Regarding Intellectual Property	
Unit VI:	**(6 Hrs.)**
Workplace Rights and Responsibilities, Responsibility for the Environment	
Total Lecture	**40 Hours**

Textbooks:	
1.	Ethics in Engineering practice and Research by (2nd Edition) Caroline Whitbeck Cambridge publications
2.	Ethics in Engineering , MW Martin and R Schinzinger , MC Graw Hill

Reference Books:	
1.	Engineering Ethics and Environment, P a Vesilind and AS Gunn , Cambridge

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/110105097/L01.html

III SEMESTER
22CT309 : Lab. Technical Writing

Course Outcomes :
1. Plan and write communications that solve technical problems or help readers make decisions about technical problems and solutions 2. Prepare documents that are well-planned, researched, drafted, and designed 3. Collect and report information thoroughly and accurately 4. Communicate ethically and with sensitivity to diverse audiences

Unit I:	**(7 Hrs.)**
The Nature of Technical Writing and Technical Writing Basics **Nature:** Taxonomy of Technical Writing, Technical Reporting, Business Communications, Scientific Writing: Books, Journals, Magazines, Conference Proceedings, Newsletters, Websites and Blogs, **Basics:** Structuring Your Writing, Positioning Your Writing, Choosing the Right Words: Conciseness, Precision and Hedging, Universal and Existential Quantification, Negatives; Avoiding Traps: Clichés, Anthropomorphic Writing, Malapropisms: Erroneous Heterographs, Opinion versus Fact, Acronyms, Domain-Specific Terms, and Jargon, Making Your Technical Writing More Interesting, The 5 Cs of Technical Writing, Referencing.	
Unit II:	**(7 Hrs.)**
The Writing Process and Scientific Writing **Process:** The Traditional Writing Process, Environment, Dealing with Writer's Block, Meeting Deadlines, Writing Tools, Permissions and Plagiarism, Making Your Writing Understandable, **Scientific Writing:** Technical Reports, Tutorials, Opinion, Research Papers: Survey of the Field, Based on Survey Data, Based on Experimentation, Reviews of Books, Papers, and Reports, Reviews, Journal and Conference Paper Reviews, Book Reviews, Blind Reviews.	
Unit III:	**(7 Hrs.)**
Business Communications Résumés, Transmittal Letters, Writing Letters of Reference, Letter of Reference for a Subordinate, Letter of Reference for a Casual Acquaintance, Generic Letter of Reference, Form-Based Letter of Reference, Memos, Meetings, Agendas, Customer Relations Writing, Press Releases, Presentations, Marketing and Sales Materials.	
Unit IV:	**(7 Hrs.)**
Technical Reporting and Tools Technical Procedures, Proposals, Panel Sessions, Strategic Plans, Problem Reports, User Manuals	
Unit V:	**(6 Hrs.)**
Using Graphical Elements and Publishing Your Work **Graphical Elements:** Modeling Ideas with Graphics, Selecting the Best Model for a Schedule, Dealing with Figures, Dealing with Tables, Dealing with Equations: Using Microsoft Equation Editor, Using MathType, Using LaTeX; Dealing with Dynamic Content, **Publishing:** What Kinds of Work Can Be Published?, Why Publish Your Work?, Making a Living as a Writer, The Review Process, Handling Rejection, Open Access Publishing, Self-Publishing.	

Unit VI:	(6 Hrs.)
Writing for E-Media and Writing with Collaborators **E-Media:** E-Mail, E-Newsletters, Blogging, Social Networks, E-Magazines, E-Readers, Common Features, Distribution Model, Online Courses, **Collaborators**: Writing in Different Voices, Very Large Collaborative Writing Projects, Behavior of Groups, Other Paradigms for Team Building, Antipatterns in Organizations.	
Total Lecture	**40 Hours**

Textbooks:	
1.	Ethics in Engineering practice and Research by (2nd Edition) Caroline Whitbeck Cambridge publicationsTechnical Writing: A Practical Guide for Engineers, Scientists, and Nontechnical Professionals 2nd Edition Phillip A. Laplante CRC Press
2.	Handbook of Technical Writing 9th Edition Gerald J. Alred, Charles T. Brusaw, Walter E. Oliu Bedford/St. Martin's

Reference Books:	
1.	Effective Technical Communication by Dr. Bharti Kukerja, Dr. Anupama Jain, S.K. Kataria & Sons

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://onlinecourses.nptel.ac.in/noc20_hs06/preview

III Semester

Audit Course

MLC2123 - YCCE Communication Aptitude Preparation (YCAP3)

III Semester

Department Specific Audit Course

MLC111 : Document Presentation and Computation

Course Outcomes :
Upon successful completion of the course the students will be able to 6. To do Professional & Advanced Document Formatting & Layout in Microsoft Word 7. To create sheets and manage data using Microsoft Excel 8. To Create a Eye Catchy Presentation using Microsoft PowerPoint

Unit I: Editing with Microsoft Word: Introduction to Microsoft Word Interface. Font and Paragraph formatting, Insert Table, Picture, Shapes, Icons & 3d Models, SmartArt, Charts, Hyperlink	**(4 Hrs.)**
Unit II: Page Setup in Microsoft Word: Page Setup Options, Header, Footer & Page Number Options, Water Mark, Page Color & Page Border Options in Microsoft Word, View Tab Options in Microsoft Word	**(4 Hrs.)**
Unit III: Calculations with Microsoft Excel: Introduction to Microsoft Excel Interface, Basic Math Functions, AutoSum Functions, Sum IF & Sum IFs, Count IF & Count IFs Functions, Absolute & Relative References, Copy, Paste & Paste Special Options	**(4 Hrs.)**
Unit IV: Advance Excel: Conditional Formatting, Sort & Filter, Logical Function (IF, Nested IF, OR), VLOOKUP Function, Pivot Table & Chart, Text Functions, Text to Columns Tool	**(4 Hrs.)**
Unit V: Designing with Microsoft PowerPoint: Introduction to Microsoft PowerPoint Interface, Font & Slide Options, Drawing Tools, Inserting Tables, Pictures, Videos, WordArt	**(4 Hrs.)**
Unit VI: Presentation in PowerPoint: Transitions, Animations, Slide Show, Built-in Presentation Templates, Printing Slides	**(4 Hrs.)**
Total Lecture	**24 Hours**

MOOCs Links and additional reading, learning, video material	
1.	https://link.springer.com/chapter/10.1007/3-540-63614-5_54

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 3.25)

Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2022

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 2022

(Scheme of Examination w.e.f. 2022-23 onward)

(Department of Computer Technology)

B. Tech in Computer Technology

SoE No. 22CT-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	PC	CT	22CT301	Discrete Maths and Probability Theory	T	3	1	0	4	4	30	20	50	3 Hrs
2	3	PC	CT	22CT302	Computer Architecture and Organisation	T	3	0	0	3	3	30	20	50	3 Hrs
3	3	PC	CT	22CT303	Database Management Systems	T	3	0	0	3	3	30	20	50	3 Hrs
4	3	PC	CT	22CT304	**Lab:** Database Management Systems	P	0	0	2	2	1		60	40	
5	3	PC	CT	22CT305	Object Oriented Programming	T	3	1	0	4	4	30	20	50	3 Hrs
6	3	PC	CT	22CT306	**Lab:** Object Oriented Programming	P	0	0	2	2	1		60	40	
7	3	PC	CT	22CT307	**Lab:** Python Programming	P	0	0	4	4	2		60	40	
8	3	PC	CT	22CT308	Ethics in Engineering Practice/Professional Ethics	T	1	0	0	1	1	30	20	50	3 Hrs
9	3	PC	CT	22CT309	**Lab:** Technical Writing	P	0	0	2	2	1		60	40	
					TOTAL THIRD SEM		**13**	**2**	**10**	**25**	**20**				
List of Mandatory Learning Course (MLC)															
1	3	HS	T&P	MLC123	YCCE Communication Aptitude Preparation (YCAP3)	**A**	3	0	0	3	0				
2	3	BES	CT	MLC111	Document Presentation and Computation	**A**	2	0	0	2	0				
Fourth Semester															
1	4	BS	GE	22CT401	Linear Algebra	T	3	0	0	3	3	30	20	50	3 Hrs
2	4	GE	GE/HUM	22CT402	Fundamentals of Management and Economics	T	3	0	0	3	3	30	20	50	3 Hrs
3	4	PC	CT	22CT403	Operating Systems	T	3	0	0	3	3	30	20	50	3 Hrs
4	4	PC	CT	22CT404	**Lab:** Operating Systems	P	0	0	2	2	1		60	40	
5	4	PC	CT	22CT405	Theoritical Foundations of Computer Science	T	3	1	0	3	3	30	20	50	3 Hrs
6	4	PC	CT	22CT406	Mathematical Foundations for Data Analysis	T	3	0	0	3	3	30	20	50	3 Hrs
7	4	PC	CT	22CT407	**Lab:** Mathematical Foundations for Data Analysis	P	0	0	2	2	1		60	40	
8	4	PC	CT	22CT408	Computer Networks	T	3	0	0	3	3	30	20	50	3 Hrs
9	4	PC	CT	22CT409	**Lab:** Computer Networks	P	0	0	2	2	1		60	40	
10	4	PC	CT	22CT410	**Lab:** Web Technology	P	0	0	4	4	2		60	40	
11	4	PC	CV/CT	22CT411	Environmental Sustainability, Pollution and Management	**T**	3	0	0	3	3	30	20	50	3 Hrs
					TOTAL FOURTH SEM		**21**	**1**	**10**	**31**	**26**				
List of Mandatory Learning Course (MLC)															
1	4	HS	T&P	MLC124	YCCE Communication Aptitude Prepartion (YCAP 4)	**A**	3	0	0	3	0				
2	4	BES	CT	MLC112	Data Visualization	**A**	2	0	0	2	0				

MSEs* = Two MSEs of 15 Marks each will conducted and marks of of these 2 MSEs will be considered for Continuous Assessment

TA ** = for Theory : 12 marks on lecture quizzes, 12 marks on two TA2 activitied decided by course teacher, 2 marks on class attendance and 4 marks on TA4 activities

TA = for Practical : MSPA will be 15 marks each**

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Applicable for AY 2022-23 Onwards

IV Semester

22CT401 : 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:1	**Elementary matrix operations**	**6 Hours**
Introduction to Matrices and Determinants, Solution of Linear Equations, Cramer's rule, Inverse of a Matrix. **Contemporary Issues related to Topic**		
Unit:2	**Matrix Algebra**	**6 Hours**
Rank of a matrix, Gaussian elimination, LU Decomposition (Crout's method), Solving Systems of Linear Equations using the tools of Matrices. **Contemporary Issues related to Topic**		
Unit:3	**Diagonalization of matrix**	**7 Hours**
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. **Contemporary Issues related to Topic**		
Unit:4	**Vector Space**	**7 Hours**
Vector Space, Subspace, Sum of Sub space, linear combination, Linear dependence and independence, Span and basis, Spanning sets, Generators. **Contemporary Issues related to Topic**		
Unit:5	**Linear Transformation**	**7 Hours**
Linear transformation, Ranges and Kernel (null space) of linear transformation, Inverse of linear transformation, Algebra of linear transformation, Singular and non-singular linear transformation. . **Contemporary Issues related to Topic**		
Unit :6	**Inner product Spaces**	**6 Hours**
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 . **Contemporary Issues related to Topic**		
	Total Lecture Hours	**39 Hours**

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Text books	
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)
6	Swapan Kumar Sarkar, A Textbook of Discrete Mathematics, S.Chand Company Limited, Delhi.
7	Seymour Lipschutz, Linear Algebra, Schaum's Solved Problem Series, McGraw-Hill Book Company.
8	Vijay M. Soni, Mathematics, B.Sc. Semester VI, Himalaya Publishing House.

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	N.P. Bali & Manish Goyal, A textbook of Engineering Mathematics (Reprint 2008), 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/111106051
2	https://archive.nptel.ac.in/courses/111/104/111104137/
3	https://archive.nptel.ac.in/courses/111/106/111106135/

IV Semester

22CT402 : Fundamentals of Management and Economics

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Explain the Functions of Management and identify tools and techniques of Marketing of goods and services
2. Analyze the role of Financial Accountancy and 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:1	**Principles of Management**	**7 Hours**
Evolution of Management Thought: Scientific and Administrative Theory of Management, Definition and Concept of Management, Functions of Management: Planning, Organizing, Directing, Coordinating and Controlling, Motivational Theories, Concept of Leadership **Contemporary Issues related to Topic**		
Unit:2	**Marketing Management**	**6 Hours**
Marketing Management - Definition & scope, Selling & Modern Concepts of Marketing, Market Research, Customer Behaviors, Product Launching, Sales Promotion, Pricing, Channels of Distribution, Advertising, Market Segmentation, Marketing Mix, Positioning, Targeting **Contemporary Issues related to Topic**		
Unit:3	**Financial Accountancy and Management**	**6 Hours**
Definition & Functions of Finance department, Sources of finance, Types of capital, Types of Taxes, Introduction of Accountancy and its rules, Preparation of Books of Account- Jounal, Posting of transaction into ledger and preparation of trial balance, Introduction of trading account, profit and loss account and balance sheet **Contemporary Issues related to Topic**		
Unit:4	**Introduction to Economics and engineering Economy:**	**6 Hours**
Economics and engineering economy, Utility analysis- Cardinal, ordinal, Law of diminishing marginal utility, Laws of demand and supply, elasticity of demand, its measurement and application. **Contemporary Issues related to Topic**		
Unit:5	**Engineering Production and Costs**	**7 Hours**
Factors of Production: Land, Labour, Capital, Enterprise and their peculiarities, Concepts and types of costs, Law of Variable proportions (Law of diminishing marginal returns) and Return to Scale (Increasing, constant and decreasing), Economies and diseconomies of scale. Inflation: Meaning, types, causes and consequences, measures to control inflation, Concepts of deflation and Stagflation. **Contemporary Issues related to Topic**		

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Unit :6	Market structures - equilibrium output and price	7 Hours
Forms of market structures: Perfect competition, monopolistic competition, oligopoly, duopoly and monopoly, Demand and revenue curves for firm and industry in various forms of market structure, Total, average and marginal revenue curves, equilibrium of firms and industries under various forms of market structures, Price discrimination. **Contemporary Issues related to Topic**		
Total Lecture Hours		**39 Hours**

Textbooks	
1.	Principle of Management, 9th edition , Harold Koontz Ramchandra, Tata McGrow hills
2.	Marketing Management: Planning, Implementation and Control, 3rd Edition, Ramaswamy V.S. and Namakumari S, Macmillian
3.	Financial Services, 19th Edition, Khan M Y, Tata McGraw Hill, 19
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
8.	Economics of Development and Planning, 12th edition, S. K. Misra and V. K. Puri, Himalaya Publishing House, 2006.

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://nptel.ac.in/
3	https://onlinecourses.nptel.ac.in/noc20_mg31/preview
4	https://onlinecourses.nptel.ac.in/noc21_hs52/preview
5	https://onlinecourses.nptel.ac.in/noc22_hs67/preview

IV Semester
22CT403 : 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.

Unit I:	**(6 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. **Contemporary Issues related to Topic**	
Unit II:	**(8 Hrs.)**
CPU scheduling, goals of scheduling, CPU scheduling algorithms: FCFS, SJF, SRTF, RR, Priority based. Inter-process communication: process cooperation and synchronization, race condition, critical section, mutual exclusion and implementation, semaphores, classical inter-process communication problems. **Contemporary Issues related to Topic**	
Unit III:	**(7 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. **Contemporary Issues related to Topic**	
Unit IV:	**(6 Hrs.)**
Memory management techniques-contiguous and non-contiguous, paging and segmentation, translation look aside buffer (TLB) and overheads. **Contemporary Issues related to Topic**	
Unit V:	**(6 Hrs.)**
Virtual memory and demand paging, page faults, page replacement algorithms, thrashing and working set model **Contemporary Issues related to Topic**	

Unit VI:	(6 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 **Contemporary Issues related to Topic**	
Total Lecture	**39 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

22CT404 : 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

22CT405 : Theoretical Foundations of Computer Science

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

Unit I:	**(8 Hrs.)**
Alphabet, Symbols, Sets, Strings, Language, Operations, Relations, Design of Finite State Machines, Acceptance of strings and languages, Non-Deterministic Finite Automation, Deterministic Finite Automation, Equivalence between NFA and DFA, NFA with ε-transition, Minimization of FA. **Contemporary Issues related to Topic**	
Unit II:	**(7 Hrs.)**
Regular Regular sets, Regular expressions, Manipulation of regular expressions, Equivalence between RE and FA. Pumping Lemma, closure properties of regular sets (Proofs not required), Regular grammars, Right linear and left linear regular grammars, inter-conversion between LLG & RLG, Equivalence between regular grammar and F.A., Inter-conversion between RE and RG. **Contemporary Issues related to Topic**	
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. **Contemporary Issues related to Topic**	
Unit IV:	(6 Hrs.)
Push down automata, definition, and model, acceptance of CFL by empty Stack and by final state, equivalence CFL and PDA, Inter-conversion, Closure of properties of CFL, DPDA & NDPDA. **Contemporary Issues related to Topic**	
Unit V:	(6 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 Machin **Contemporary Issues related to Topic**	

			July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

Unit VI:	(6 Hrs.)
Un-decidability 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 **Contemporary Issues related to Topic**	
Total Lecture	**40 Hours**

Textbooks:	
1.	Introduction to Automata Theory, Languages, and computation ,3rd Edition ,Hopcroft J.E., Rajeev Motwani, Jeffrey D. Ullman Pearson Education.
2.	Introduction to languages and the Theory of Computation,3rd Edition ,John C.Martin ,Mc Graw Hill.

Reference Books:	
1.	Introduction to the Theory of Computation,2nd Edition,Michael Sipser, GALE CENGAGE Learning
2.	Theory of Computation, 1st Edition , Dr. O. G. Kakde ,Laxmi Publication

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	https://onlinelibrary.wiley.com/doi/epdf/10.1002/0471224642

MOOCs Links and additional reading, learning, video material	
1.	https://www.digimat.in/nptel/courses/video/106104028/L01.html
2.	https://www.digimat.in/nptel/courses/video/106104148/L38.html

IV SEMESTER

22CT406 : Mathematical Foundations for Data Analysis

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Use the mathematical concepts, statistical formulae, visualization techniques and linear algebra concepts in the field of data analysis. 2. Apply logical thinking to understand and solve the problem using probability theory and linear algebra in the given context 3. Employ the sampling techniques and estimation methods to predict the solution related to the area of data analysis in variety of applications 4. Write conclusion using hypothesis testing

Unit I:	**(6 Hrs.)**
Introduction: The role of statistics. Numerical and graphical methods for describing and summarizing data. **Contemporary Issues related to Topic**	

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 **Contemporary Issues related to Topic**	

Unit III:	**(7 Hrs.)**
Linear Algebra Review and Distance Metrics: Vectors and Matrices, Norms, Linear Independence, Rank, Inverse, Orthogonality, Metrics: Distances and their Relatives, Distances for Sets and Strings, Modeling Text with Distances, Similarities **Contemporary Issues related to Topic**	

Unit IV:	**(7 Hrs.)**
Sampling and Sampling Distributions: introduction to sampling, random sampling, non-random sampling, Introduction to sampling distributions (sampling distribution of the mean, sampling distribution of the proportion, T-distribution), design of experiments, convergence and sampling **Contemporary Issues related to Topic**	

Unit V:	**(6 Hrs.)**
Estimation: Introduction, Point estimates, Interval estimates and confidence interval, interval estimates using t distribution, determining the sample size in estimations **Contemporary Issues related to Topic**	

Unit VI:	(7 Hrs.)
Testing Hypothesis: Introduction, Basic to the Hypothesis-testing Procedure, Testing Hypotheses, One sample test: Hypothesis Testing of Means when the population standard deviation is Known, Hypothesis Testing of Means when the population standard deviation is not known, Hypothesis Testing of proportions, Limitations of the tests of hypotheses **Contemporary Issues related to Topic**	
Total Lecture	**40 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

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.	

IV SEMESTER

22CT407 : Lab. Mathematical Foundations for Data Analysis

Course Outcomes
Upon successful completion of the course the students will be able to 1. Use the mathematical concepts, statistical formulae, visualization techniques and linear algebra concepts in the field of data analysis. 2. Apply logical thinking to understand and solve the problem using probability theory and linear algebra in the given context 3. Employ the sampling techniques and estimation methods to predict the solution related to the area of data analysis in variety of applications 4. Write conclusion using hypothesis testing

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

SN	**Program based on**
1	Implement basic functionality of R
2	Implement data import and export functionality in R
3	Implement various central tendencies and dispersion technique of data source and apply the basic visualization techniques in R to understand data
4	Apply some advanced visualization techniques in R to analyze the data
5	Solve the problems using probability distributions in R for discrete random variables
6	Solve the problems using probability distributions in R for continuous random variable
7	Implement different algebra operations and distance metric.
8	Analyze the data using sampling technique
9	Analyze the data to find out estimated value
10	Draw conclusion using hypothesis.

IV SEMESTER

22CT408 : 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:	**(7 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 **Contemporary Issues related to Topic**	
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 **Contemporary Issues related to Topic**	
Unit III:	(7 Hrs.)
The Data Link Layer: Data link layer design issues- Framing, Error Control, Flow Control, Link Management, Error detection and Correction-Error-Correcting Codes, error-detecting codes, 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. **Contemporary Issues related to Topic**	
Unit IV:	(7 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. **Contemporary Issues related to Topic**	
Unit V:	(6 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) **Contemporary Issues related to Topic**	

Unit VI:	(6 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. **Contemporary Issues related to Topic**	
Total Lecture	**40 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

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://archive.nptel.ac.in/courses/106/105/106105183/
2.	https://nptelvideos.com/course.php?id=393

IV SEMESTER
22CT409 : 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	**Program based on**
1	How to bring two computers in the network. Configure TCP/IP to configure Internet on your computer.
2	Use Network Utility Command like ping, ipconfig, netstat, tracert to observe the network details.
3	To implement Hamming Code using C and C++.
4	To implement Dijkstra's Routing algorithm using backtracking approach.
5	Use traffic monitoring tool Wireshark to observe network traffic with packet details.
6	Configure router. Configure network using Cisco Packet Tracer software and show packet transmission from source to destination.
7	Configure network using Distance vector routing protocol in Cisco Packet Tracer
8	Use Openssl command to perform Asymmetric key encryption (RSA) and also implement RSA algorithm.
9	Client server communication using socket programming
10	Advanced Practical: Study of NSG tool

IV SEMESTER

22CT410 : 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.

IV SEMESTER

22CT411 : 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, Natural Resources and Sustainable Development**	**6 Hours**
The man-environment interaction; Environmental Ethics and emergence of environmentalism; Overview of natural resources: Definition of resource; Classification of natural resources- biotic and abiotic, water, soil and mineral resources, renewable, and non-renewable energy resources; Introduction to sustainable development: Sustainable Development Goals (SDGs)- targets and indicators, challenges and strategies for SDGs		
Unit:2	**Environmental Issues, Conservation of Biodiversity and Ecosystems**	**6 Hours**
Environmental issues and scales: Land use and Land cover change, Global change; Biodiversity and its distribution, Ecosystems and ecosystem services, Threats to biodiversity and ecosystems, National and international policies for conservation.		
Unit:3	**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 human health		
Unit:4	**Climate Change: Impacts, Adaptation and Mitigation**	**7 Hours**
Understanding climate change, Impacts, vulnerability and adaptation to climate change, Mitigation of climate change		
Unit:5	**Environmental Management**	**7 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 :6	**Environmental Treaties and Legislation**	**6 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	**39 Hours**

			July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

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

IV Semester
Audit Course
MLC2124 - YCCE Communication Aptitude Preparation (YCAP4)

IV Semester
Department Specific Audit Course
MLC112 : Data Visualization

Course Outcomes :
Upon successful completion of the course the students will be able to
1. Understand the fundamental concepts of Data Visualization
2. Apply the various operations on data from the visualization tool
3. Connect to different data sources using the data visualization tool

Unit I: Basics of Design	**(4 Hrs.)**
Key components of a visualization, represent data using channels like color, size, and position, and some ground rules for honest and effective visualization	
Unit II: User Needs	**(4 Hrs.)**
how to choose the right visualization for a given scenario, align your design with that task, basics of task analysis, methods for task elicitation, and foundational knowledge of visual perception for design	
Unit III: Evaluation	**(4 Hrs.)**
assess the effectiveness of your visualization, qualitative and quantitative approaches for evaluating visualizations, basics of insight-based evaluation, interview studies, and experimental design and analysis	
Unit IV: Getting to Know Tableau for Data Visualization	**(4 Hrs.)**
welcome screen, worksheet screen, and dashboard screen, preliminary analysis of the data set, three different charts: a line chart, a tree map, and a bar chart,	
Unit V: Dashboard creation	**(4 Hrs.)**
Create a dashboard with those charts, and be able to add some simple dashboard interactions	
Unit VI: Project based on the case study	**(4 Hrs.)**
Study the data for specific case study. Prepare the dashboard for the same data set.	
Total Lecture	**24 Hours**

MOOCs Links and additional reading, learning, video material	
1.	https://in.coursera.org/learn/fundamentals-of-data-visualization#syllabus
2.	https://in.coursera.org/learn/data-visualization-tableau?specialization=data-visualization#syllabus

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 3.25)

Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2022

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)

SoE No. 22CT-101

B.TECH SCHEME OF EXAMINATION 2022

(Scheme of Examination w.e.f. 2022-23 onward)

(Department of Computer Technology)

B. Tech in Computer Technology

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	22CT501	Design & Analysis of Algorithms	T	3	0	0	3	3	30	20	50	3 Hrs
2	5	PC	CT	22CT502	**Lab:** Design & Analysis of Algorithms	P	0	0	2	2	1		60	40	
3	5	PC	CT	22CT503	Language Processor	T	3	0	0	3	3	30	20	50	3 Hrs
4	5	PC	CT	22CT504	**Lab:** Language Processor	P	0	0	2	2	1		60	40	
5	5	PC	CT	22CT505	Software Engineering	T	3	0	0	3	3	30	20	50	3 Hrs
6	5	PC	CT	22CT506	**Lab:** Software Engineering	P	0	0	2	2	1		60	40	
7	5	PC	CT	22CT507	Network Security	T	3	0	3	3	3	30	20	50	3 Hrs
8	5	PE	CT		**Lab: Professional Elective-I**	P	0	0	2	2	1		60	40	
9	5	STR	CT	22CT508	Industrial training, Seminar & Report	P	0	0	1	1	1		60	40	
10	5	OE	CT		**Open Elective - I**	T	3	0	0	3	3	30	20	50	3 Hrs
11	5	OE	CT		**Open Elective - II**	T	3	0	0	3	3	30	20	50	3 Hrs
					TOTAL FOURTH SEM		**18**	**0**	**12**	**27**	**23**				

List of Lab. Professional Electives-I *

1	5	PE-I	PC	22CT511	PE I: Lab: Mobile Operating System
2	5	PE-I	PC	22CT512	PE I: Lab: Introduction to Geographical Information System
3	5	PE-I	PC	22CT513	PE I: Lab: Advanced Web Technologies
4	5	PE-I	PC	22CT514	PE I: Lab: Computing Laboratory
5	5	PE-I	PC	22CT515	PE I: Lab: Parallel Programming
6	5	PE-I	PC	22CT516	PEI: Lab : UI/UX Design

Open Elective-I

1	5	OE-I	PC	22CT531	OE-I : Introduction to DBMS
2	5	OE-I	PC	22CT532	OE-I : Essentials of IT
3	5	OE-I	PC	22CT533	OE-I : Operating System Concepts
4	5	OE-I	PC	22CT534	OE-I : Introduction to Salesforce

Open Elective-II

1	5	OE-II	PC	22CT551	OE-II : Software Testing
2	5	OE-II	PC	22CT552	OE-II : Internet Technology
3	5	OE-II	PC	22CT553	OE-II : Multimedia and Animation
4	5	OE-II	PC	22CT554	OE-II : Current Trends and Technologies

List of Mandatory Learning Course (MLC)

1	5	HS	T&P	MLC2125	YCAP5: YCCE Communication Aptitude Preparation	A	3	0	0	3	0	
2	5	HS	R&D	MLC125	Design thinking	A	2	0	0	2	0	

MSEs* = Two MSEs of 15 Marks each will conducted and marks of of these 2 MSEs will be considered for Continuous Assessment

TA ** = for Theory : 12 marks on lecture quizzes & TA2 activitied decided by course teacher, 2 marks on class attendance and 4 marks on TA4 activities

TA = for Practical : MSPA will be 15 marks each**

		June 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

V SEMESTER
22CT501 : Design & Analysis of Algorithms

Course Outcomes :

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

1. Compare different types of asymptotic notations and find the time complexity in terms of asymptotic notations
2. Solve recurrences using various techniques.
3. Implement divide and conquer strategy, greedy strategy, dynamic programming algorithms and backtracking strategy
4. Identify and differentiate between various types of complexity classes.

Unit I:	**(5 Hrs.)**
Mathematical foundations, summation of arithmetic and geometric series, ∑n, ∑n 2 , bound summations using integration, analyzing control structures, worst case and average case analysis, Asymptotic notations, sorting algorithms such as selection sort, insertion sort, bubble sort, heap sort, External Sorting, lower bound proof	
Unit II:	**(5 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.	
Unit III:	**(5 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.	
Unit IV:	**(5 Hrs.)**
Dynamic Programming basic strategy, multistage graphs, all pair shortest path, single source shortest paths, optimal binary search trees, traveling salesman problem.	
Unit V:	**(5 Hrs.)**
Basic Traversal and Search Techniques, breadth first search, connected components, Backtracking basic strategy, 8 – Queen"s problem, graph coloring, Hamiltonian cycles etc.	
Unit VI:	**(5 Hrs.)**
NP-hard and NP-complete problems, basic concepts, non-deterministic algorithms, NP-hard and NP-complete, Cook"s Theorem, decision and optimization problems, polynomial reduction.	
Total Lecture	**30 Hours**

Textbooks:

1. "Computer Algorithms", Horowitz, Sahni, Rajasekaran, Universities press
2. "Introduction to Algorithms", Cormen ,Leiserson, Rivest, Stein, Prentice Hall of India
3. "Fundamentals of Algorithms", Brassard, Bratley, Prentice Hall of India

V SEMESTER
22CT502: Lab Design & Analysis of Algorithms

Course Outcomes
Upon successful completion of the course the students will be able to 1. Compare different types of asymptotic notations and find the time complexity in terms of asymptotic notations 2. Solve recurrences using various techniques. 3. Implement divide and conquer strategy, greedy strategy, dynamic programming algorithms and backtracking strategy 4. Identify and differentiate between various types of complexity classes.

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

SN	**Program based on**
1	WAP to implement basic sorting algorithms
2	WAP to implement basic sorting algorithms.
3	WAP to implement divide and conquer algorithms.
4	WAP to implement divide and conquer algorithms.
5	WAP to implement greedy algorithms.
6	WAP to implement greedy algorithms.
7	WAP to implement dynamic programming algorithms
8	WAP to implement dynamic programming algorithms
9	WAP to implement backtracking algorithms
10	WAP to implement backtracking algorithms

V SEMESTER
22CT503 : Language Processor

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Design lexical analyzer using FLEX tool. 2. Implement syntax analyzer using YACC tool. 3. Create a syntax-directed definition and an annotated parse tree. 4. Demonstrate the use of a symbol table throughout compilation. 5. Apply various code optimizing transformations and code generation techniques.

Unit I:	**(6 Hrs.)**
Introduction to Compilation Process, Compilers & Translators, Phase structure of Compiler, Design of Lexical Analysis.	
Unit II:	**(7 Hrs.)**
Specifying Syntactic Structure of Programming Language using Context Free Grammars, The role of Parser, Top-down Parsing, Bottom Up Parsing, Predictive Parsers, Recursive Decent Parser.	
Unit III:	**(7 Hrs.)**
Construction of efficient LR Parsers (SLR, CLR & LALR), Canonical Collection of set of items and construction of Parsing table, Implementation of LR Parsing table.	
Unit IV:	**(7 Hrs.)**
Syntax Directed Translation: Intermediate Code, Postfix notation, Parse tree and Syntax Trees, Three address codes, quadruples, triples, Translation of Arithmetic Expression, Boolean expressions, Control Statements. Array references, Procedure Calls, Declarations, Case Statements, Use of Compiler writing tools (Lex/ Flex, Yacc / Biason).	
Unit V:	**(6 Hrs.)**
Symbol Tables: Contents, Representing scope information. Error detection and Recovery: Error handling, Lexical-phase, Syntactic phase and semantic phase.	
Unit VI:	**(7 Hrs.)**
Introduction to Code Optimization, the principle sources of optimization, Loop optimization, The DAG representation, Introductory Data Flow analysis, Introduction to Code Generation: Object programs, Problems in Code Generation, Register allocation and assignment, Code generation from DAG, Peephole optimization.	
Total Lecture	**40 Hours**

			July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

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

Reference Books:	
1.	"Compiler Design", Dr. O.G. Kakde, Laxmi Publication
2.	"Introduction to Compiling Techniques: First Course Using ANSI C, Lex and Yacc", J. P. Bennett, McGrawHill Publication
3	"Building Your Own Compiler with C++", Jim Holmes, Prentice Hall

V SEMESTER
22CT504 : Lab. Language Processor

Course Outcomes
Upon successful completion of the course the students will be able to
1. Design lexical analyzer using FLEX tool. 2. Implement syntax analyzer using YACC tool. 3. Create a syntax-directed definition and an annotated parse tree. 4. Demonstrate the use of a symbol table throughout compilation. 5. Apply various code optimizing transformations and code generation techniques.

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

SN	**Program based on**
1	To Study Fast Lexical Analyzer Generator i.e. FLEX.
2	Write a Flex program to check whether the entered word is VOWEL or NOT with and without Function. Note: The word is called vowel if its first alphabet is a vowel.
3	Write a Flex program to recognize identifiers, constants, keywords, etc.
4	Write a Flex program to count the number of a. characters, words, spaces, and lines in each input text file b. . b. printf and scanf present in each input program fragment.
5	Write a Flex program to check whether the entered string of parenthesis is balanced or not in each input text file.
6	Write a Flex program to recognize a valid arithmetic expression and to recognize the identifier and operators present and print them separately.
7	Write a Flex program to Count the number of IF conditions in a program using the Lexical Analyzer.
8	Study of YACC and Write a YACC Program to display message "Have a good Day".
9	Write a YACC Program to recognize strings „aaab", „abbb", „ab" and „a" using the grammar for L= (an b n , n>= 0
10	Write a YACC program to recognize a valid arithmetic expression that uses operators +, -, *, / .

V SEMESTER
22CT505 : Software Engineering

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. 5. Perform basic operations on Sub-version for software version control.

Unit I:	**(6 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, Developing Use Case, Analysis Model, Negotiation, Validation	
Unit II:	**(7 Hrs.)**
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 III:	**(7 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 IV:	**(5 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.	
Unit V:	**(5 Hrs.)**
Project Management, Metrics for Process and Projects, Project Estimation, Risk Management: Reactive vs. Proactive Risk Strategies, Software Risks, Risk Identification, Risk Projection.	
Unit VI:	**(5 Hrs.)**
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	**35 Hours**

			July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

Textbooks:	
1.	Software Engineering–A Practitioner's Approach , Sixth , Roger S. , Pressman– McGraw Hill.
2.	Object Oriented Software Engineering, Second , Leth Bridge Pearson Edu..

Reference Books:	
1.	
2.	
3	
4	

V SEMESTER
22CT506 : Lab. Software Engineering

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. 5. Perform basic operations on Sub-version for software version control.

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

SN	**Program based on**
1	Introduction to Software Engineering fundamentals, UML and RATIONAL ROSE Interface.
2	To study and create Software Requirement Specification document for given case study
3	To study and draw UML Use Case diagram for the given case study.
4	To study and draw UML Class diagram for given Case Study.
5	To study and draw UML Activity diagram for given Case Study.
6	To study and draw UML Sequence Diagram for given Case Study.
7	To study and draw State Diagram for given Case Study.
8	Write a Program to find out the Estimation (cost and effort) by using COCOMO model.
9	To Perform Manual and Automated testing using CASE tool for given Case Study
10	To Study and execute Version Control using Subversion

V SEMESTER
22CT507 : Network Security

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Identify threats to network security, associated attacks and countermeasures against attack. 2. Use appropriate mathematical techniques in cryptography. 3. Apply various algorithms/ mechanisms to formulate appropriate solution. 4. Use of different security protocols at various networking layers

Unit I:	**(7 Hrs.)**
Introduction: Security goals,cryptographic attacks, Services and mechanism, techniques. Mathenatics of cryptography:Integer arithmetic, modular arithmetic, matrices,linear congruence. Mathematics of symmetric key cryptography: Algebraic structure, GF(2n) Fields,Ehtics in security	
Unit II:	**(7 Hrs.)**
Traditional symmetric key ciphers: Introduction, substitution ciphers, Transposition ciphers, stream and block ciphers. Introduction to modern symmetric-key ciphers: Modern block ciphers, modern stream ciphers.	
Unit III:	**(8 Hrs.)**
DES, AES, Encipherment using modern symmetric key ciphers: Use of modern block ciphers, use of stream ciphers: RC4. Mathematics of asymmetric key cryptography: Primes, primality testing, factorization, Chinese remainder theorem, Exponentiation and logarithms. Asymmetric key cryptography: RSA	
Unit IV:	**(8 Hrs.)**
Message integrity and authentication: Message integrity, Random oracle model, message authentication. Cryptographic hash functions: Introduction, Description of MD hash family, Digital signature: Comparison, process, services, attacks on digital signature, Digital signature schemes. Entity authentication: Introduction, passwords, Challenge-Response, Zero knowledge, Biometric. Key management: Symmetric key distribution, Kerberos, symmetric key agreement, Public key distribution.	
Unit V:	**(6 Hrs.)**
Security at application layer: E-mail, PGP, S/MIME. Security at transport layer: SSL architecture, four protocols, SSL message formats, Transport layer security. Security at network layer IPSec: Two modes, two security protocols, security association, security policy, ISAKMP	
Unit VI:	**(6 Hrs.)**
System security: Description of the system, Users, Trust and trusted systems, Buffer overflow and malicious software, malicious programs, worms, viruses, Intrusion detection systems, Firewalls: Definitions, construction and working principles	
Total Lecture	**42 Hours**

Textbooks:	
1.	Cryptography and Network Security Behrouz A. Forouzan, and DebdeepMukhopadhyay McGraw-Hill Publication

			July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

V SEMESTER
22CT511: PE1:Lab. Mobile Operating System

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

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

SN	**Program based on**
1	Create a dialog box having login functionality.
2	Create an application which has following features: • Show list of numbers on screen along with the type. • Bottom of the screen there should be a row that contains three elements: I . Spinner (Show the predefined phone number type like home, office, mobile, etc) ii. Text box to enter actual number iii. Button saying "Add" - Clicking on this should take the input from the first two items and add a new row item to the list. • On pressing back key (exiting from the application), it should show a confirmation dialog with appropriate title, message and two action buttons "OK" and "Cancel"
3	Create an application which has following features: • Clicking on "Cancel" should show a toast message "We are happy to be with you." and close the dialog. • Clicking on "OK" should close the dialog, exit from the application and generate a notification that says "Press me to go back to application". Then clicking on the notification should restart the application.
4	Create an application which has following features: • Launch phone contacts, display the selected contact in your application. • Try to launch Camera, Gallery & SMS application.

5	Create an application using Listview, Services, Navigation drawer & tab view
6	Create an application for changing background color based on selection from list view
7	Create an application for applying different themes on text views.
8	Create an application using Launch Modes.
9	Create an application displaying any animation

V SEMESTER

22CT512 : PE1: Lab. Introduction to Geographical Information System

Course Outcomes
Upon successful completion of the course the students will be able to 1. Demonstrate the fundamental concepts of GIS 2. Develop the apprehension of various concepts in GIS 3. Design and share maps.

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

SN	Program based on
1	To explore different proprietary GIS and Open GIS software.
2	To study the installation of GIS Desktop Software and explore various components of the GIS Desktop Software.
3	To explore various coordinate systems. Download any shape file and explore its coordinate system and change the existing coordinate system.
4	To create Geodatabase, layer files and shape files from the scratch.
5	To explore data formats using GIS Desktop Software and vector data points such as points, lines and polygon and create the map using simple vector data structure.
6	To create map in data view and layout view.
7	To install GIS Server, creating web services out of GIS maps or data, sharing maps, using GIS web services.
8	Geo-processing tools
9	Model builder
10	Project

V SEMESTER
22CT513: PE1: Lab.Advanced Web Technologies

Course Outcomes
Upon successful completion of the course the students will be able to 1. Design Web pages using HTML5, CSS3 2. Perform various operations using AJAX 3. Use features of Client side programming 4. Develop Web pages using JavaScript

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

SN	**Program based on**
1	Write a JavaScript function that creates a table, accept row, column numbers from the user, and input row-column number as content (e.g. Row-0 Column-0) of a cell.
2	Create employee registration webpage using HTML5 form objects
3	Implement CSS3 for Online shopping system
4	Create a dynamic web page which displays arithmetic operations [addition, subtraction, division, multiplication and modulus] using HTML Frame
5	Write a suitable script which show methods of Server object [HTML Encode, URL Encode, Mappath, Execute and Transfer]
6	Write a script which creates and retrieves Cookies information
7	Create a dynamic web page which displays capabilities of a web browser using Browser Capabilities Component using JavaScript
8	Create a simple XMLHttpRequest and retrieve data from a TXT file.
9	Create a simple XMLHttpRequest and retrieve data from a TXT file.
10	Create a simple script to download Images Using AJAX,
11	Create a simple script to Auto-Populate Select Boxes using AJAX

V SEMESTER
22CT533 : OE I: Operating System Concepts

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Use LINUX operating system. 2. Write Shell scripts

Unit I:	**(8 Hrs.)**
Introduction: History of Linux and Unix, Linux Overview, Linux releases, open linux	
Unit II:	**(8 Hrs.)**
Linux Commands and Filters : Mkdir, CD, rmdir, pwd, ls, who, whoami, cat, more, fail, head, concept of, mv, chmod, grep,wc, comm., split, sort, diff, kill, write, wall, merge, mail, news	
Unit III:	**(8 Hrs.)**
Shell: The command line special characters and file arguments, standard input/output and redirection, pipes, redirecting and piping with standard errors, shell scripts, jobs.	
Unit IV:	**(8 Hrs.)**
Linux file Structure: Linux files, file structure, listing displaying and printing files, managing directories, file and directory operations.	
Unit V:	**(8 Hrs.)**
Vi Editor: Vi editing commands advanced Vi editing commands, line editing commands, options in Vi.	
Unit VI:	**(8 Hrs.)**
System Administration: System management, managing users, installing and managing devices, floppy disk management, file system administration, backups.	
Total Lecture	**33 Hours**

Textbooks:	
1.	Linux – The Complete Reference by Richard Peterson, Tata McGraw Hill, New Delhi
2.	Linux – Install and Configuration Black Book by Die Annleblanc and Issac Yates, IDG Books India Private Ltd., Delhi
3.	Unleashed Linux by Tech Media Publishers.

V SEMESTER
22CT534: OE I: Introduction to Salesforce

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Employ 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. Represent a customize a CRM application for organization to suit their business needs. 3. Determine CRM strategies by understanding customers' preferences for the long-term sustainability of the Organizations.

Unit I:	**(8 Hrs.)**
Introduction to Cloud: Definition of Cloud Computing, Cloud Architecture, Cloud Types, Service models, Deployment models, Examining the Characteristics of Cloud Computing, Benefits of cloud computing, Disadvantages of cloud computing.	
Unit II:	**(7 Hrs.)**
CRM Concepts and its tools: Definition, History, Key Benefits, Service Level Agreements (SLAs), creating and managing effective SLAs. Architecture, Service Nature of Salesforce, Features, Products and its overviews, Traditional CRM vs. Salesforce CRM	
Unit III:	**(7 Hrs.)**
CRM Administration and Data Model Design: Lightning and classic UI and differences, Creation of org, 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 IV:	**(8 Hrs.)**
Data Management with CRM Tool: Record details, List Views, Filters, Actions Page layouts, Compact Layouts, Introduction to Workflows, email templates, Limitation of workflows, approval processes, Process Builder, Lightning Flow, Community Creation, Reports and Dashboards.	
Unit V:	**(7 Hrs.)**
Security Model: Introduction to Profiles and Permission Set, Overview of Data Security, Control access to org, object, field, record, OWD, Role and Roles Hierarchy, Sharing Rule, Sharings Objects, Apex Sharing.	
Unit VI:	**(8 Hrs.)**
CRM Tool Development: Introduction to Apex, Collections, SOQL and SOSL, DML Operations. Lightning Aura Component: Introduction to Aura component, Advantages, attributes handling in aura component.	
Total Lecture	**45 Hours**

Textbooks:	
1.	Salesforce CRM: The Definitive Admin Handbook Paperback, 2 nd ,Paul GoodeyPackt Publishing Limited
2.	Customer Relationship Management Concept & Cases ,1 st (2013), Alok Kumar Rai Prentice Hall of India
3.	Customer Relationship Management, 1 st (2012) ,V. Kumar & Werner J. Wiley

Reference Books	
1.	CRM Tool Links (Online) http://help.salesforce.com

V SEMESTER
22CT553: OE II: Multimedia and Animation

Course Outcomes :
Upon successful completion of the course the students will be able to 1. To understand multimedia basics - hardware and software. 2. To develop skills in design, illustration, image manipulation, graphic designing, video editing, visual effects and game designing. 3. To develop the skills in animation software

Unit I:	**(7 Hrs.)**
Multimedia definitions, CD-ROM and the multimedia highway. Applications of multimedia, introduction to making multimedia, the stages of project, requirements to make good multimedia, multimedia skills and training, the multimedia tech.	
Unit II:	**(6 Hrs.)**
Multimedia hardware, Macintosh and windows production platforms, hardware peripherals, connections, memory and storage devices, input devices output hardware, communication devices, media software, basic tools, making instant multimedia authoring tools.	
Unit III:	**(6 Hrs.)**
Multimedia building blocks –text-using text in multimedia, computers and text, font editing and design tools, Sound-the power of sound , multimedia system sound, Digital audio, preparing digital audio files, Audio file format, images-Making still Images, Color, Image file format, video-Broadcast video standard, Analog video, Digital video, optimizing video files for CDROM	
Unit IV:	**(6 Hrs.)**
What is meant by Animation, why we need Animation, History of Animation, Uses of Animation. Types of Animation, Principles of Animation, Some Techniques of Animation, and Animation on the WEB, Special Effects, and Creating Animation.	
Unit V:	**(6 Hrs.)**
Creating Animation in Adobe Animate: Introduction to Animate –Working with the Timeline and Frame-based Animation-Working with the Timeline and Tween-based Animation –Understanding Layers–Action script.	
Unit VI:	**(6 Hrs.)**
3D Animation & its Concepts, Types of 3D Animation, Skeleton & Kinetic, 3D Animation Texturing and Lighting of 3D Animation, 3D Camera Tracking, Applications & Software of 3D Animation.	
Total Lecture	**36 Hours**

Textbooks:	
1.	Multimedia Making Work by Tay Vaughan (TMH), 3 rd Ed.
2.	Principles of Multimedia by Ranjan Parekh, 2007, TMH.
3.	Multimedia Technologies by Ashok Banerji, Ananda Mohan Ghosh, McGraw Hill Publication

Reference Books:	
1.	Multimedia systems design by K. Andleigh, K. Thakkrar, Phi Pub.
2.	Multimedia: Computing, Communications & Applications by Raif Stein Metz and KiaraNahrstedt.
3.	Advanced Multimedia Programming by Steve Rimmer, McGraw Hill Pub.

V SEMESTER
22CT554: OE II: Current Trends and Technologies

Course Outcomes :
Upon successful completion of the course the students will be able to 1. To understand multimedia basics - hardware and software. 2. To develop skills in design, illustration, image manipulation, graphic designing, video editing, visual effects and game designing. 3. To develop the skills in animation software

Unit I:	**(7 Hrs.)**
Fundamentals of Communications: Types of communication-Wired, wireless, mobile, Modes of transmission: Simplex, Half Duplex, Full Duplex, Multiplexing techniques, History and evolution of wireless and mobile systems, Transition and characteristics of 1G, 2G, 3G, 4G, Spectrum, regulations, and frequency allocation	
Unit II:	**(6 Hrs.)**
Fundamental of INTERNET: History, Internet working, Connections, Internet services, The World Wide Web, Tools for the WWW, Web servers, Web browsers, Web page makers and editors, Plug-ins and delivery vehicles.	
Unit III:	**(7 Hrs.)**
e-Technologies: Electronic Commerce: Framework, Media Convergence of Applications, Consumer, Applications, Organization Applications, Electronic Payment Systems: Digital Token, Smart Cards, Credit Cards, Risks in Electronic, Payment System, Designing Electronic Payment Systems, Electronic Data Interchange (EDI): Concepts, Applications, (Legal, Security and Privacy) issues, EDI and Electronic Commerce, Standardization and EDI, EDI Software, Implementation, EDI Envelope for Message Transport, Internet-Based EDI.	
Unit IV:	**(6 Hrs.)**
e-Learning: Definition, Introduction, Types of e-Learning: Learner-led e-Learning, Facilitated eLearning, Instructor-led e-Learning, Embedded e-Learning, Telemonitoring And e-Coaching ELearning Models: WBT, CBT, LMS, LCMS, Virtual School Systems, E-Learning Tools And Technologies: e-mail, Online Discussion, Chat and Instant Messaging, Voting, Whiteboard, Application Sharing, Conferencing, Online Meeting Tools, Case study.	
Unit V:	**(6 Hrs.)**
Green Computing: Introduction, Why....Green Computing? Approaches to Green ComputingVirtualization, Power Management, Power supply, Storage, Video Card, Display, IT Equipment, Recycling, Remote Conferencing & Telecommuting Strategies, Product longevity, Resource allocation, Terminal servers, Operating system support, How to Implement? Industrial implementations of Green Computing- Blackle, Fit-PC, Zonbu computer, Sunray thin client.	
Unit VI:	**(7 Hrs.)**
Social Networking: Definition, Overview of Social Networking Sites, Types of Social Networking Sites: General purpose, Niche. Advantages of Social Networking Sites, Drawbacks of Social Networking Sites, Features and Need of Social Networking, Security Issues with Social Networking Sites, Case Studies	
Total Lecture	**39 Hours**

Textbooks:	
1.	. Impact of E-Business Technologies on Public and Private Organizations by OzlemBak, Nola Stair.
2.	Mobile Computing by Tomasz Imielinski , Henry F. Korth .
3.	Broadband telecommunications technology by ByeongGi Lee, Minho Kang, Jonghee Lee.

Reference Books:	
1.	Introduction to broadband communication systems by Cajetan M. Akujuobi, Matthew, N. O. Sadiku.
2.	E-Learning Tools and Technologies William Hortan, Katherine Hortan,Wiley Pub
3.	Internet (Use of Search Engines Google & Yahoo etc).

V SEMESTER

Audit Course

MLC2125 : YCAP5: YCCE Communication Aptitude Preparation

V SEMESTER
Audit Course
MLC125 : Design thinking

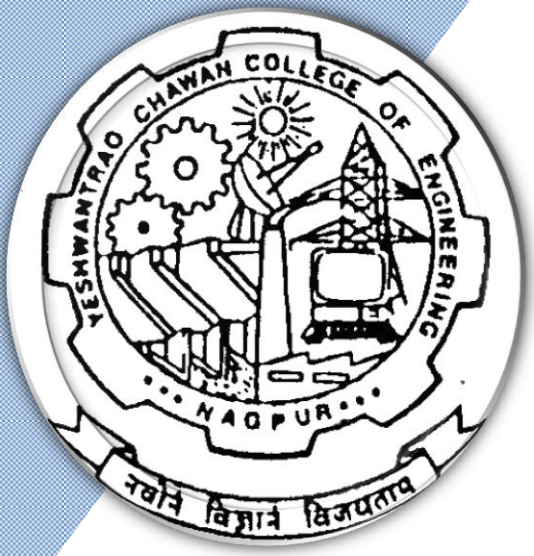
Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

(Accredited 'A++' Grade by NAAC with a score of 3.25)

Hingna Road, Wanadongri, Nagpur - 441 110



Bachelor of Technology

SoE & Syllabus 2022

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)

SoE No. 22CT-101

B.TECH SCHEME OF EXAMINATION 2022

(Scheme of Examination w.e.f. 2022-23 onward)

(Department of Computer Technology)

B. Tech in Computer Technology

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	22CT601	Artificial Intelligence	T	3	0	0	3	3	30	20	50	3 Hours
2	6	PC	CT	22CT602	**Lab:** Artificial Intelligence	P	0	0	2	2	1		60	40	
3	6	PC	CT	22CT603	Digital Image Processing	T	3	0	0	3	3	30	20	50	3 Hours
4	6	PC	CT	22CT604	**Lab:** Digital Image Processing	P	0	0	2	2	1		60	40	
5	6	PC	CT	22CT605	Distributed Systems and Cloud Computing	T	3	0	0	3	3	30	20	50	3 Hours
6	6	PC	CT	22CT606	**Lab:** Distributed Systems and Cloud Computing	P	0	0	2	2	1		60	40	
7	6	PE	CT		**Professional Elective-II**	T	3	0	0	3	3	30	20	50	3 Hours
8	6	PE	CT		**Lab: Professional Elective-II**	P	0	0	2	2	1		60	40	
9	6	PR	CT	22CT607	Project Phase I	P	0	0	4	4	2		60	40	
10	6	OE	CT		**Open Elective - III**	T	3	0	0	3	3	30	20	50	3 Hours
11	6	OE	CT		**Open Elective - IV**	T	3	0	0	3	3	30	20	50	3 Hours
					TOTAL SIXTH SEM		**18**	**0**	**12**	**30**	**24**				

List of Professional Electives- II

Professional Electives-II

1	6	PE-II	CT	22CT611	PE II: Software Testing
	6	PE-II	CT	22CT612	PE II: **Lab**: Software Testing
2	6	PE-II	CT	22CT613	PE II: Internet of Things
	6	PE-II	CT	22CT614	PE II: **Lab**: Internet of Things
3	6	PE-II	CT	22CT615	PE II: Business Intelligence
	6	PE-II	CT	22CT616	PE II: **Lab**: Business Intelligence

Open Elective-III

1	6	OE-III	CT	22CT631	OE-III : Introduction to DBMS
2	6	OE-III	CT	22CT632	OE-III : Essentials of IT
3	6	OE-III	CT	22CT633	OE-III : Operating System Concepts
4	6	OE-III	CT	22CT634	OE-III : Introduction to Salesforce

Open Elective-IV

1	6	OE-IV	CT	22CT651	OE-IV : Software Testing
2	6	OE-IV	CT	22CT652	OE-IV : Internet Technology
3	6	OE-IV	CT	22CT653	OE-IV : Multimedia and Animation
4	6	OE-IV	CT	22CT654	OE-IV : Current Trends and Technologies

List of Mandatory Learning Course (MLC)

1	6	HS		MLC2126	**YCAP6:** YCCE Communication Aptitude Preparation	**A**	3	0	0	3	0

MSEs* = Two MSEs of 15 Marks each will conducted and marks of of these 2 MSEs will be considered for Continuous Assessment

TA ** = for Theory : 12 marks on lecture quizzes, 12 marks on two TA2 activitied decided by course teacher, 2 marks on class attendance and 4 marks on TA4 activities

TA = for Practical : MSPA will be 15 marks each**

		June 2022	1.00
Chairperson	Dean (Acad. Matters)	Date of Release	Version

Applicable for AY 2022-23 Onwards

VI SEMESTER
22CT601 : Artificial Intelligence

Course Outcomes :
Upon successful completion of the course the students will be able to
1. To understand basic concepts in Artificial Intelligence, intelligent agents and to define the problem as a state space search 2. To understand the blind search and heuristic search techniques and apply them in problem solving 3. To understand the knowledge representation and its issues and inference methods for intelligent decision making 4. To understand the knowledge representation and reasoning under uncertainty 5. To understand basics of learning and development of expert systems

Unit I:	**(7 Hrs.)**
Introduction to AI: Definition of AI, early work in AI, the importance of AI,AI and related fields, distributed AI, task domains of AI, Introduction to intelligent agents, agents and environments, rationality, the nature of environments, the structure of agents. Problems, problem spaces and searches, defining the problem as a state space search,	
Unit II:	**(7 Hrs.)**
Production systems and control strategies: depth first and breadth first search, back tracking, problem characteristics, issues in the design of search programs. Heuristic search techniques: generate and t e s t , hill climbing, best first search, A* search, problem reduction, constraint satisfaction problems	
Unit III:	(7 Hrs.)
Knowledge representation: issues, representation and mapping approaches, procedural Vs declarative k n o w l e d g e, introduction to propositional logic, knowledge representation using predicate logic, unification and resolution algorithms. Introduction to Prolog language: Representation of Predicates, rules, and facts in prolog.	
Unit IV:	**(7 Hrs.)**
Representation of knowledge using rules, logic programming, forward and backward reasoning, matching, control knowledge. Knowledge representation using semantics nets and frames, scripts	
Unit V:	**(6 Hrs.)**
Introduction to non-monotonic reasoning, logics for non-montonic reasoning, Statistical reasoning: probability and Bay‟s theorem, certainty factors and rule based system.	
Unit VI:	**(6 Hrs.)**
Learning: general learning model, overview of different forms of learning, Expert Systems: Design & Development of Expert System, knowledge based Systems, Rule Based Expert System, Expert System Shell, Application Areas of Expert System	
Total Lecture	**40 Hours**

			July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

Textbooks:				
1.	Artificial Intelligence A Modern Approach	Third	Stuart Russell,PeterNorvig	Pearson
2.	Artificial Intelligence	Third	by E. Richand K. Knight and S. Nair.	McGraw Hill

Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Introduction to Artificial Intelligence and Expert System		D. W. Patterson	PHI

VI SEMESTER
22CT602: Artificial Intelligence Lab

Course Outcomes
Upon successful completion of the course the students will be able to 1. To understand basic concepts in Artificial Intelligence, intelligent agents and to define the problem as a state space search 2. To understand the blind search and heuristic search techniques and apply them in problem solving 3. To understand the knowledge representation and its issues and inference methods for intelligent decision making 4. To understand the knowledge representation and reasoning under uncertainty 5. To understand basics of learning and development of expert systems

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

SN	**Program based on**
1	Implementing Breadth First Search
2	Implementing Depth First Search
3	Implementing Heuristic search Algorithm
4	Implementing A* Algorithm
5	Solving a Constraint Satisfaction Problem
6	Developing a small Expert System Using Prolog
7	Solving Classification Problem using Bayes Theorem
8	Implementing Breadth First Search

VI SEMESTER
22CT603: Digital Image Processing

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Describe and understand Basic relationships between pixels. 2. Compare and Implement various image enhancement techniques in spatial domain and frequency domain. 3. Compare and illustrate different image compression techniques to understand the advantage of image compression 4. Identify and demonstrate the applications of similarity based and dissimilarity-based approaches for image segmentation. 5. Interpret and illustrate various representation techniques.

Unit I:	**(7 Hrs.)**
Introduction: Fundamental Steps in Image Processing, Elements of DIP systems, A Simple Image Model, Sampling and Quantization, Some Basic Relationships between Pixels.	
Unit II:	**(7 Hrs.)**
Image Enhancement in the Spatial Domain: Introduction to Spatial domain, Basic Gray Level Transformations, Histogram Processing, Histogram Equalization, Spatial Domain Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters	
Unit III:	**(7 Hrs.)**
Transforms: Introduction to the Fourier Transform, Discrete Fourier Transformation, Fourier Properties, 2DFT, inverse Fourier transforms, Typical Applications. Filtering in the Frequency Domain, Correspondence between Filtering in the Spatial and Frequency Domain, Smoothing Frequency-Domain Filters, Sharpening Frequency-Domain Filters.	
Unit IV:	**(7 Hrs.)**
Image Compression:Fundamentals of Image compression, coding redundancy, spatial and temporal redundancy, Irrelevant Information, Measuring Image Information, Image compression models, Various compression methods.	

Unit V:	**(6 Hrs.)**
Image Segmentation: Point Detection, Line Detection, Edge Detection, Gradient Operator, Edge Linking and Boundary Detection, Thresholding, Region-oriented Segmentation.	
Unit VI:	**(6 Hrs.)**
Image Representation: Chain Codes, Polygonal Approximations, Signatures, Skeleton of a Region. Description: Boundary Descriptors, Shape Numbers, Regional Descriptors, Simple Descriptors, Topological Descriptors. Introduction to various color image processing models.	
Total Lecture	**40 Hours**

Textbooks:				
1.	Digital Image Processing Hall	3rd edition	Rafael C. Gonzalez and Richard, E. Woods	Prentice
2.	Digital Image Processing McGrawHill.	3rd edition	Jayaraman, S. Esakkirajan, T. Veerakumar	Tata

Reference Books				
1.	Fundamentals of Digital Image Processing	2nd Edition	A.K.Jain	Prentice Hall.
2.	Image Processing Principles & Applications Inter-Science.	2nd Edition	TinkuAcharya&Ajoy K. Ray	Willey

VI SEMESTER
22CT604: Digital Image Processing Lab

SN	Program based on
1	Write a program in MATLAB for following Point processing techniques in spatial domain a. Negation of an image b. Thresholding of an image c. Contrast Stretching of an image
2	Write a Program in MATLAB to Create a Histogram of a given Image.
3	Write a program in MATLAB to perform following smoothing operations on an image a. Average filter b. Ordered Statistics filter
4	Write a program to sharp an image using Laplacian mask.
5	Write a program to compress an image using Huffman Coding
6	Write a program to segment an image using multilevel thresholding.
7	Write a program to apply split and merge algorithm on a given image.
8	Write a program to find the code chain of a given image.
9	Write a program to find the shape number of a given image.
10	Write a program to find Euler number of image a given image.

VI SEMESTER
22CT605: Distributed Systems and Cloud Computing

COURSEOUTCOMES

1. Understand the basic concepts of distributed systems and cloud computing.
2. Understand the concepts, characteristics, delivery models and benefits of cloud computing
3. To enable students exploring some important cloud computing driven commercial systems and applications.
4. To expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research.

Unit:1	Introduction To Distributed System Concepts	8 Hours

Introduction to Distributed Systems, Characteristics, Issues in Distributed Systems, Distributed System Model, Request/Reply Protocols, RPC, RMI, Logical Clocks and Casual Ordering of Events, Election Algorithm, Distributed Mutual Exclusion, Distributed Deadlock Detection Algorithms.

Unit:2	Distributed Transaction Processing	7 Hours

Transactions - Nested transactions - Locks - Optimistic concurrency control - Timestamp ordering - Flat and nested distributed transactions - Atomic commit protocols - Concurrency control in distributed transactions - Distributed deadlocks - Transaction recovery - Overview of replication, Distributed shared memory and Web services.

Unit:3	Introduction to Cloud Computing, Services and Applications	8 Hours

Defining Cloud Computing; Cloud Types and different models-The NIST model, The Cloud Cube Model, Deployment models, Service models; Examining the Characteristics of Cloud Computing; Benefits of cloud computing; Disadvantages of cloud computing; Assessing the Role of Open Standards.

Exploring the Cloud: Cloud Computing Stack, Connecting to the Cloud, Infrastructure as a Service, Platform as a Service, SaaS Vs. Paas, Using PaaS Application Frame works, Software as a Service, Identity as a Service, and Compliance as a Service.

Unit:4	Abstraction and Virtualization	8 Hours

Introduction to Virtualization Technologies, Load Balancing and Virtualization, Understanding Hyper visors, Understanding Machine Imaging, Porting Applications, Virtual Machines Provisioning and Manageability Virtual Machine Migration Services, Virtual Machine Provisioning and Migration in Action, Provisioning in the Cloud Context.

Unit:5	Managing & Securing the Cloud	8 Hours

Managing the Cloud- Administrating the Clouds, Management responsibilities, Lifecycle management Cloud Management Products, Emerging Cloud Management Standards, and Understanding Service Oriented Architecture- Introducing Service Oriented Architecture.

Securing the cloud: Securing the Cloud, Securing Data, the security boundary, Security service boundary, Security mapping, Brokered cloud storage access, Establishing Identity and Presence.

Infrastructure Security (Network level security, Host level security, Application level security) Data security and Storage (Data privacy and security Issues, Jurisdictional issues raised by Data location), Identity & Access Management, Access Control,

Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations.		
Unit :6	**Advance Clouds and Case Studies**	**8 Hours**
Cloud Computing Cost Analysis, basic, Selecting an IaaS Provider, Capacity Planning and Disaster, Recovery in Cloud Computing, AWS Cloud architectural principles, basic/core characteristics of deploying and operating in the AWS Cloud, the key services on the AWS Platform and their common use cases, Define the billing, account management, and pricing models, Introduction to Amazon EC2. Case Studies: Microsoft Azure, Dropbox,, Amazon EC2, GCP		
	Total Lecture Hours	**48 Hours**

Text books	
1	Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online. Springer
2	RajkumarBuyya, JamesBroberg, AndrzejGoscinski, Cloud Computing (Principles and Paradigms), Edited by RajkumarBuyya, James Broberg, AndrzejGoscinski, John Wiley & Sons, Inc. A John Wiley & Sons, Inc. Publication
3	Tim Mather, Subra Kumara swamy, ShahedLatif, Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, O'Reilly Media, 2009.
Reference Books	
1	Rajkumarbuyya, Christian vecchiola, S ThamaraiSelvi, Mastering cloud computing, Tata Mc-Graw Hill Education Private Limited
2	Anthony T .Velte, Toby J. Velte, Robert Elsenpeter, Cloud Computing a Practical Approach, Tata Mc-Graw-HILL
3	Barrie sosinsky, Cloud computing bible, Wiley publishing.
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://nptel.ac.in/courses/112/103/112103280/
2	https://nptel.ac.in/courses/106/106/106106179/
3	https://nptel.ac.in/courses/127/105/127105007/
Reference Web Links	
1	https://cloud.google.com/appengine/docs
2	https://www.chef.io/solutions/cloud-management/
3	https://aws.amazon.com/documentation
4	https://dev.twitter.com/overview/documentation https://developers.facebook.com/
5	https://www.cloudfoundry.org/
6	https://puppet.com/blog/implement-a-message-queue-your-cloud-applicati
Links for online courses including SWAYAM / NPTEL/ COURSERA/ UDHEMI	
1	https://onlinecourses.nptel.ac.in/noc22_cs20/preview

VI SEMESTER
22CT606: Lab. Distributed Systems and Cloud Computing

Course Outcomes
Upon successful completion of the course the students will be able to 1. Formulate problem by following Software testing life cycle. 2. Design Manual Test cases for Software Project. 3. Demonstrate utilization of testing automation though testing tool.

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

SN	**Program based on**
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VI SEMESTER
22CT611 : PE- II: Software Testing

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Formulate problem by following Software testing life cycle. 2. Design Manual Test cases for Software Project. 3. Demonstrate utilization of testing automation though testing tool.

Unit I:	**(6 Hrs.)**
Basic concepts of Testing: Need of Testing, Basic concepts-errors, faults, defects, failures, objective of testing, central issue in testing, Testing activities, V-Model, Sources of information for test cases, Monitoring and Measuring Test Execution, Test tools and Automation, Limitation of Testing.	
Unit II:	**(5 Hrs.)**
Unit Testing: Concepts of Unit Testing, Static Unit Testing, Defect Prevention, Dynamic Unit Testing, Mutation Testing, Debugging, Tools for Unit Testing.	
Unit III:	**(6 Hrs.)**
Control Flow Testing: Outline of Control Flow Testing, Control Flow Graphs, Path in Control Flow Graph, Path selection criteria, All path coverage criteria, Statement coverage, Path coverage.	
Unit IV:	**(5 Hrs.)**
Data Flow and System Integration Testing: Introduction Data flow testing, Data flow graph, Data flow testing criteria, Fundamentals of System Integration: Types of interfaces and interface errors, System integration testing, Software and Hardware integration.	
Unit V:	**(6 Hrs.)**
System Testing: Taxonomy of system test, Basic Test, Functionality test, Robustness test, Performance test, Scalability test, Stress test, Load and Stability test, Reliability test, Regression test, Documentation Test.	
Unit VI:	**(6 Hrs.)**
Test Design: Test cases, Necessity of test case documentation, Test case design methods, Functional specification-based test case design, Use case bases, application based test case design, level of test execution.	
Total Lecture	**34 Hours**

			July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

Textbooks:	
1.	Software Testing and Quality Assurance ,KshirsagarNaik and PriyadarshiniTripathi,Wiley
2.	Software Testing Concepts and Tools ,NageswaraRaoPusuluri Dream Tech Press
3.	Software Testing Principles,Techniques and tools,1st Edition M.G. Limaye ,McGraw Hills

Reference Books:	
1.	Foundations of Software Testing, 2nd Edition Aditya P. Mathur, Pearson Education
2.	Software Testing Tools,Dr. K. V. K. K., Prasad Dream Tech

VI SEMESTER
22CT612: Lab: PE II: Software Testing

Course Outcomes
Upon successful completion of the course the students will be able to 1. Formulate problem by following Software testing life cycle. 2. Design Manual Test cases for Software Project. 3. Demonstrate utilization of testing automation though testing tool.

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

SN	**Program based on**
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VI SEMESTER
22CT613: PE II: Internet of Things

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Develop various IOT environments 2. Demonstrate IOT architecture and its enabling technologies 3. Analyze IOT environments using various communication technologies 4. Apply various IOT enabling technologies for creation of IOT environments

Unit I:	**(6 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:	**(6 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:	**(6 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:	**(6 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:	**(6 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	**37 Hours**

Reference Books:	
1.	Internet of Things: A hands on approach by ArshdeepBahga and Vijay K. Madisetti
2.	NPTEL course material on Introduction to Internet of Things

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VI SEMESTER
22CT614 : PE II: Lab: Internet of Things

Course Outcomes
Upon successful completion of the course the students will be able to 1. Develop various IOT environments 2. Demonstrate IOT architecture and its enabling technologies 3. Analyse IOT environments using various communication technologies 4. Apply various IOT enabling technologies for creation of IOT environments

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

SN	Program based on
1	To study Arduino Uno IoT Kit with ATMega 328 Microcontroller.
2	Design a sketch for running of LEDs.
3	Design a sketch to monitor state of switch by establishing serial communication between Arduino and computer.
4	Design a sketch to read analog value of potentiometer by establishing serial communication between arduino and computer.
5	Design a sketch for blinking LEDs without using delay.
6	Design a sketch to develop switch based binary LED counter. Also observe output on serial monitor.
7	Design a sketch to create a simple digital clock using LCD display.
8	Design a sketch to make use of EEPROM to control devices (LED).
9	To log data of temperature sensor over internet and analysis it.
10	Advance Practical: Study and setup of ESP -32 board

VI SEMESTER
22CT615: PE II: Business Intelligence

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Reveal the knowledge of basic concepts of Business Intelligence and multidimensional modelling and able to compare digital data types. 2. Build and operate the multidimensional data model for the specific scenario to extract the information. 3. Analyze the business information to construct the reports from it. 4. Decide the mode / channel to implement the businessintelligence solution for the specific problem.

Unit I:	**(6 Hrs.)**
Introduction to Business Intelligence: Introduction to digital data and its types – structured, semi-structured and unstructured, BI Definitions & Concepts, BI Framework, BI Infrastructure Components – BI Process, BI Technology, BI Roles & Responsibilities, Business Applications of BI, BI best practices	
Unit II:	**(6 Hrs.)**
Introduction to OLTP and OLAP (MOLAP, ROLAP, HOLAP) Introduction to MultiDimensional Data Modeling: Introduction to data and dimension modeling, multidimensional data model, ER Modeling vs. multi-dimensional modeling, concepts of dimensions, facts, cubes, attribute, hierarchies, star and snowflake schema, Data Warehousing concepts and its role in BI	
Unit III:	**(7 Hrs.)**
Basics of Data Integration (Extraction Transformation Loading): Concepts of data integration, needs and advantages of using data integration, introduction to common data integration approaches, Meta data – types and sources, Introduction to data quality, data profiling concepts and applications, introduction to ETL using Pentaho data Integration (formerly Kettle).	
Unit IV:	**(7 Hrs.)**
Identifying Dimension tables and fact table, designing of dimension and fact tables‟ schema, design of snowflake schema, query redirection. Aggregations: Why aggregate? designing Summary tables, which summaries to create	
Unit V:	**(6 Hrs.)**
Introduction to business metrics and KPIs, creating cubes using Microsoft Excel, Basics of Enterprise Reporting: A typical enterprise, Malcolm Baldrige - quality performance framework, balanced scorecard, enterprise dashboard, balanced scorecard vs. enterprise dashboard, enterprise reporting using MS Access / MS Excel, best practices in the design of enterprise dashboards	
Unit VI:	**(7 Hrs.)**
Case study: Overview and use of products from Pentaho and other open software. BI road Ahead: BI and mobility, BI and cloud computing, BI for ERP systems, Social CRM and BI	
Total Lecture	**39 Hours**

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Textbooks:	
1.	Fundamentals of Business Analytics by R. N. Prasad, SeemaAcharya Wiley India
2.	Data Warehousing in the real world A practical guide for building Decision Support System by Sam Anahory, Dennis Murray, PEARSON

Reference Books:	
1.	Business Intelligence by David Loshin.
2.	Business intelligence for the enterprise by Mike Biere.
3.	Business intelligence roadmap by Larissa Terpeluk Moss, ShakuAtre
4.	An introduction to Building the Data Warehouse, IBM.
5.	Business Intelligence For Dummies, Swain Scheps.
6.	Successful Business Intelligence: Secrets to making Killer BI Applications by CindiHowson Information dashboard design by Stephen Few

VI SEMESTER
22CT615: PE II: Lab: Business Intelligence

Course Outcomes
Upon successful completion of the course the students will be able to
1. Reveal the knowledge of basic concepts of Business Intelligence and multidimensional modeling and able to compare digital data types. 2. Build and operate the multidimensional data model for the specific scenario to extract the information. 3. Analyze the business information to construct the reports from it. 4. Decide the mode / channel to implement the business intelligence solution for the specific problem.

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

SN	**Program based on**
1	Design a conceptual multidimensional model for the given data.
2	Create a table for Time dimension using existing data source
3	Extract the data from various sources and move it to backup area. Load the data from backup area to staging area and then Load data in data warehouse from staging area.
4	Create a chart report, by considering module names on the X-axis, Percentage Scored in the Various Modules on Y-axis.
5	Create a table report to display Year, Quarter, Month, Module name of the assessment conducted in the current month, Assessment type of the module conducted in the current month. Enable drill down for "Year," "Quarter, and "Month."
6	Graph the percentage sales over time to see the trends using given dataset. Also Pivot the data to see total sales by quarter and category and analyze the data
7	Report the sales by category and the corresponding freight charges. Filtering should be enabled in the Year and Quarter columns, and the selected Year and Quarter need to be visible. Also Sort the Sales data in terms of Year, Quarter and Month.
8	Extract the data from various sources using PENTAHO and apply the transformation on the data.
9	Describe the characteristics of data imported in R by using R functions.
10	Consider a data set and visualize it using appropriate visualization technique in „R"
11	Apply data transformation and represent the data model in Orange tool
12	Perform data visualization using Tableau

VI SEMESTER
22CT631: OE III: Introduction to DBMS

Course Outcomes :
Upon successful completion of the course the students will be able to **1**.Students should be able to design database forgiven situation, write appropriate queries for accessing database

Unit I:	**(6 Hrs.)**
An Overview of the Database Management System: What is database? Why database? database system, database management system (DBMS), advantages of DBMS	
Unit II:	**(6 Hrs.)**
An Architecture of the Database system: Three levels of architecture, mappings, role of database administrator (DBA), E-R model, three approaches of DBMS relational, hierarchical and network.	
Unit III:	**(5 Hrs.)**
Relational Database Management System (RDBMS): Introduction, RDBMS terminology, relational model, base tables, ke	
Unit IV:	**(5 Hrs.)**
The SQL Language: Introduction, Characteristics of SQL, data definition command	
Unit V:	**(5 Hrs.)**
Data manipulation commands	
Unit VI:	**(6 Hrs.)**
Introduction to XML	
Total Lecture	**33Hours**

Textbooks:	
1.	Data base System Concepts Fifth Edition Silberschatz A, Korth,H.F and Sudarshan S Tata McGraw-Hill
2.	Fundamentals of Database System R. Elmasri, S. B Navathe Pearson Education

Reference Books:	
1.	Fundamentals of DBMS Leon A and Leon M Tata McGraw-Hill
2.	DBMS Gill P. S I.K. International
3	Database Management Systems Leon A and Leon M Vikas Publishing House
4	Database Systems: Concepts, Design & Applications Singh S. K Pearson Education

VI SEMESTER
22CT632 : OE III: Essentials of IT

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Develop algorithm and write pseudo code for a given problem statement. 2. Construct Entity-Relationship Model and design RDBMS for a given problem statement. 3. Design static and dynamic web pages using HTML and Java script and write simple programs in Java script. 4. Apply software engineering concepts in any software project implementation.

Unit I:	**(8 Hrs.)**
Programming fundamentals of Java: problem solving skills, Algorithm – representation using pseudo code, algorithm properties. Programming in java- programming constructs in JAVA, control structures type casting, SDLC overview and need for Object oriented approach, objectoriented concepts, introduction to UML.	
Unit II:	**(8 Hrs.)**
OO fundamentals – Java Implementation: OO fundamentals, coding standards, reference variables and objects in memory, methods, „this" reference. Data structures: data structures, linear data structures, non- linear data structures.	
Unit III:	**(8 Hrs.)**
Data base basics- data storage, need for DBMS, functions of DBMS, data perspectives in DBMS, types of data models, relational model and keys, Database Design – Database life cycle, Data requirements, logical design – ER modeling, converting ER model to relational schema, functional dependency, normalization.	
Unit IV:	**(8 Hrs.)**
SQL – need for SQL, types of SQL statements, data types in SQL, SELECT statement with various operators, single row and multi row functions, group by and having clauses.	
Unit V:	**(8 Hrs.)**
Introduction to web technologies: Computer Networks, HTML tags and CSS, Implementation of Java Scripts, Operators and control structures, function and dialog boxes, DOM element.	
Unit VI:	**(8 Hrs.)**
Software Engineering – Basics, SE models and approaches, Requirement developing activities, software design and construction, software testing, introduction to user experience, Project categories and project management phases, software quality.	
Total Lecture	**48 Hours**

Textbooks:	
1.	Java: The complete reference 7th Edition Herbert Schildt. McGraw-Hill
2.	Database System Concepts 5th Edition Silberschatcz, Korth, Sudarshan McGraw-Hill Education
3.	Software Engineering: A Practitioner's Approach 6h Edition Roger Pressman McGraw Hill Higher Education

VI SEMESTER
22CT633 : OE III: Operating System Concepts

Course Outcomes :
Upon successful completion of the course the students will be able to **1.** Use LINUX operating system. **2.** 2. Write Shell scripts

Unit I:	**(6 Hrs.)**
Introduction: History of Linux and Unix, Linux Overview, Linux releases, open linux.	
Unit II:	**(5 Hrs.)**
Linux Commands and Filters : Mkdir, CD, rmdir, pwd, ls, who, whoami, cat, more, fail, head, concept of, mv, chmod, grep,wc, comm., split, sort, diff, kill, write, wall, merge, mail, news	
Unit III:	**(5 Hrs.)**
Shell: The command line special characters and file arguments, standard input/output and redirection, pipes, redirecting and piping with standard errors, shell scripts, jobs.	
Unit IV:	**(5 Hrs.)**
Linux file Structure: Linux files, file structure, listing displaying and printing files, managing directories, file and directory operations.	
Unit V:	**(6 Hrs.)**
Vi Editor: Vi editing commands advanced Vi editing commands, line editing commands, options in Vi	
Unit VI:	**(6 Hrs.)**
System Administration: System management, managing users, installing and managing devices, floppy disk management, file system administration, backups.	
Total Lecture	**33 Hours**

Textbooks:	
1.	Linux – The Complete Reference Richard Peterson ,Tata McGraw Hill, New Delh
2.	Linux – Install and ConfigurationBlack BookDie Annleblanc andIssac YatesIDG Books India Private Ltd.,Delhi
3.	Unleashed Linux ,Tech Media Publishers

			July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

VI SEMESTER
22CT634: OE III: Introduction to Salesforce

Course Outcomes :
Upon successful completion of the course the students will be able to
1. Employ the knowledge of customer-cantered organization and implement the integral processes within an organization that are automated and how does the automation create predictability and efficiencies. 2. Represent a customize a CRM application for organization to suit their business needs. 3. Determine CRM strategies by understanding customers' preferences for the long-term sustainability of the Organizations.

Unit I:	**(6 Hrs.)**
An Overview of the Database Management System: What is database? Why database? database system, database management system (DBMS), advantages of DBMS	
Unit II:	**(6 Hrs.)**
An Architecture of the Database system: Three levels of architecture, mappings, role of database administrator (DBA), E-R model, three approaches of DBMS relational, hierarchical and network.	
Unit III:	**(5 Hrs.)**
Relational Database Management System (RDBMS): Introduction, RDBMS terminology, relational model, base tables, ke	
Unit IV:	**(5 Hrs.)**
The SQL Language: Introduction, Characteristics of SQL, data definition command	
Unit V:	**(5 Hrs.)**
Data manipulation commands	
Unit VI:	**(6 Hrs.)**
Introduction to XML	
Total Lecture	**33 Hours**

Textbooks:	
1.	Data base System Concepts Fifth Edition Silberschatz A, Korth ,H.F and Sudarshan S Tata McGraw-Hill
2.	Fundamentals of Database System R. Elmasri, S. B Navathe Pearson Education

Reference Books:	
1.	Fundamentals of DBMS Leon A and Leon M Tata McGraw-Hill
2.	DBMS Gill P. S I.K. International
3	Database Management Systems Leon A and Leon M Vikas Publishing House
4	Database Systems: Concepts, Design & Applications Singh S. K Pearson Education

VI SEMESTER

22CT651 : OE-IV : Software Testing

VI SEMESTER

22CT652 : OE-IV : Internet Technology

VI SEMESTER
22CT653 : OE -IV: Multimedia and Animation

Course Outcomes :
Upon successful completion of the course the students will be able to
1. To understand multimedia basics - hardware and software.
2. To develop skills in design, illustration, image manipulation, graphic designing, video editing, visual effects and game designing.
3. To develop the skills in animation software.

Unit I:	**(7 Hrs.)**
Multimedia definitions, CD-ROM and the multimedia highway. Applications of multimedia, introduction to making multimedia, the stages of project, requirements to make good multimedia, multimedia skills and training, the multimedia tech	
Unit II:	**(6 Hrs.)**
Multimedia hardware, Macintosh and windows production platforms, hardware peripherals, connections, memory and storage devices, input devices output hardware, communication devices, media software, basic tools, making instant multimedia authoring tools.	
Unit III:	**(7 Hrs.)**
Multimedia building blocks –text-using text in multimedia, computers and text, font editing and design tools, Sound-the power of sound , multimedia system sound, Digital audio, preparing digital audio files, Audio file format, images-Making still Images, Color, Image file format, video-Broadcast video standard, Analog video, Digital video, optimizing video files for CDROM	
Unit IV:	**(6 Hrs.)**
What is meant by Animation, why we need Animation, History of Animation, Uses of Animation. Types of Animation, Principles of Animation, Some Techniques of Animation, and Animation on the WEB, Special Effects, and Creating Animation.	
Unit V:	**(6 Hrs.)**
Creating Animation in Adobe Animate: Introduction to Animate –Working with the Timeline and Frame-based Animation-Working with the Timeline and Tween-based Animation –Understanding Layers–Action script.	
Unit VI:	**(7 Hrs.)**
3D Animation & its Concepts, Types of 3D Animation, Skeleton & Kinetic, 3D Animation Texturing and Lighting of 3D Animation, 3D Camera Tracking, Applications & Software of 3D Animation.	
Total Lecture	**39 Hours**

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Textbooks:	
1.	Multimedia Making Work 3rd Ed. Tay Vaughan TMH
2.	Principles of Multimedia 2007 Ranjan Parekh TMH
3.	Multimedia Technologies Ashok Banerji, Ananda Mohan Ghosh McGraw Hill Publication

Reference Books:	
1.	Multimedia systems design K. Andleigh, and K. Thakkrar PHI
2.	Multimedia: Computing, Communications and Applications Raif Stein Metz and KiaraNahrstedt
3.	Advanced Multimedia Programming Steve Rimmer McGraw Hill

VI SEMESTER
22CT654 : OE- IV: Current Trends and Technologies

Course Outcomes :
Upon successful completion of the course the students will be able to
1. Use the basics of internet for deployment of various servers and recourses.
2. Design and implement technologies for e-Commerce and e-Learning.
3. Choose appropriate implementation of Green Computing.
4. Make use of Social Networking properly and securely

Unit I:	**(7 Hrs.)**
Fundamentals of Communications: Types of communication-Wired, wireless, mobile, Modes of transmission: Simplex, Half Duplex, Full Duplex, Multiplexing techniques, History and evolution of wireless and mobile systems, Transition and characteristics of 1G, 2G, 3G, 4G, Spectrum, regulations, and frequency allocation	
Unit II:	**(6 Hrs.)**
Fundamental of INTERNET: History, Internet working, Connections, Internet services, The World Wide Web, Tools for the WWW, Web servers, Web browsers, Web page makers and editors, Plug-ins and delivery vehicles.	
Unit III:	**(7 Hrs.)**
e-Technologies: Electronic Commerce: Framework, Media Convergence of Applications, Consumer, Applications, Organization Applications, Electronic Payment Systems: Digital Token, Smart Cards, Credit Cards, Risks in Electronic, Payment System, Designing Electronic Payment Systems, Electronic Data Interchange (EDI): Concepts, Applications, (Legal, Security and Privacy) issues, EDI and Electronic Commerce, Standardization and EDI, EDI Software, Implementation, EDI Envelope for Message Transport, Internet-Based EDI	
Unit IV:	**(6 Hrs.)**
e-Learning: Definition, Introduction, Types of e-Learning: Learner-led e-Learning, Facilitated eLearning, Instructor-led e-Learning, Embedded e-Learning, Telemonitoring And e-Coaching ELearning Models: WBT, CBT, LMS, LCMS, Virtual School Systems, E-Learning Tools And Technologies: e-mail, Online Discussion, Chat and Instant Messaging, Voting, Whiteboard, Application Sharing, Conferencing, Online Meeting Tools, Case study.	
Unit V:	**(6 Hrs.)**
Green Computing: Introduction, Why....Green Computing? Approaches to Green ComputingVirtualization, Power Management, Power supply, Storage, Video Card, Display, IT Equipment, Recycling, Remote Conferencing & Telecommuting Strategies, Product longevity, Resource allocation, Terminal servers, Operating system support, How to Implement? Industrial implementations of Green Computing- Blackle, Fit-PC, Zonbu computer, Sunray thin client	

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Unit VI:	**(7 Hrs.)**
Social Networking: Definition, Overview of Social Networking Sites, Types of Social Networking Sites: General purpose, Niche. Advantages of Social Networking Sites, Drawbacks of Social Networking Sites, Features and Need of Social Networking, Security Issues with Social Networking Sites, Case Studies	
Total Lecture	**39 Hours**

Textbooks:	
1.	Impact of E-Business Technologies on Public and Private Organizations OzlemBak, Nola Stair
2.	Mobile Computing Tomasz Imielinski Henry F. Korth
3.	Broadband telecommunications technology ByeongGi Lee, Minho Kang, Jonghee Lee

Reference Books:	
1.	Introduction to broadband communication systems Cajetan M. Akujuobi, Matthew, N. O. Sadiku
2.	E-Learning Tools and Technologies William Hortan, Katherine Hortan Wiley

VI SEMESTER

Audit Course

MLC2126 : YCAP6: YCCE Communication Aptitude Preparation

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 3.25)

Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2022

7th & 8th 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 2022

(Scheme of Examination w.e.f. 2022-23 onward)

(Department of Computer Technology)

B. Tech in Computer Technology

SoE No. 22CT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
Seventh Semester															
1	7	PC	CT	22CT701	Operation Research and Optimization	T	3	1	0	4	4	30	20	50	3 Hours
2	7	PE	CT		**Professional Elective-III**	T	3	0	0	3	3	30	20	50	3 Hours
3	7	PE	CT		**Professional Elective-IV**	T	3	0	0	3	3	30	20	50	3 Hours
4	7	PE	CT		**Lab: Professional Elective-IV**	P	0	0	2	2	1		60	40	
5	7	PE	CT		**Professional Elective-V**	T	3	0	0	3	3	30	20	50	3 Hours
6	7	PR	CT	22CT702	Project Phase-II	**P**	0	0	10	10	5		60	40	
7	7	STR	CT	22CT703	Campus Recruitment Training (CRT)	**P**	0	0	0	0	2		100		
					TOTAL SEVENTH SEM		**12**	**1**	**12**	**25**	**21**				

List of Professional Electives-III,IV & V

Professional Electives -III

1	7	PE-III	CT	22CT721	PE III: Neural Network & Fuzzy Logic
2	7	PE-III	CT	22CT722	PE III: Adhoc Wireless Network
3	7	PE-III	CT	22CT723	PE III: Information Retrival System
4	7	PE-III	CT	22CT724	PE III: Data Mining
5	7	PE-III	CT	22CT725	PE III: Graph Theory and Mining

Professional Electives -IV

1	7	PE-IV	CT	22CT741	PE IV: Cyber Forensic
2	7	PE-IV	CT	22CT742	PE IV: Lab: Cyber Forensic
3	7	PE-IV	CT	22CT743	PE IV: Machine Learning
4	7	PE-IV	CT	22CT744	PE IV: Lab: Machine Learning
5	7	PE-IV	CT	22CT745	PE IV: Design Patterns
6	7	PE-IV	CT	22CT746	PE IV: Lab: Design Patterns
7	7	PE-IV	CT	22CT747	PE IV: Customer Relationship Management
8	7	PE-IV	CT	22CT748	PE IV: Lab: Customer Relationship Management

Professional Electives -V

1	7	PE-V	CT	22CT761	PE V: Introduction to Natural Language Processing
2	7	PE-V	CT	22CT762	PE V: Embedded Systems
3	7	PE-V	CT	22CT763	PE V: Computer Vision
4	7	PE-V	CT	22CT764	PE V: Bioinformatics
5	7	PE-V	CT	22CT765	PE V: Cyber Physical Systems

Eighth Semester															
1	**8**	**STR**		22CT801	Internship - training / Seminar & Report	P	0	0	12	12	3		60	40	
2	**8**	**STR**		22CT802	Extra Curricular Activity Evaluation	P	0	0	0	0	2		100		
					TOTAL EIGHTH SEM		**0**	**0**	**12**	**12**	**5**				
					GRAND TOTAL		**116**	**5**	**84**	**202**	**163**				

MSEs* = Two MSEs of 15 Marks each will conducted and marks of of these 2 MSEs will be considered for Continuous Assessment

TA ** = for Theory : 12 marks on lecture quizzes, 12 marks on two TA2 activitied decided by course teacher, 2 marks on class attendance and 4 marks on TA4 activities

TA = for Practical : MSPA will be 15 marks each**

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Applicable for AY 2022-23 Onwards

VII SEMESTER
22CT701 : Operation Research and Optimization Techniques

Course Outcomes :

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

1. Understand the fundamental concepts of operational research and its role in decision-making processes.
2. Formulate and solve linear programming problems using graphical and simplex methods.
3. Apply classical and constrained optimization methods including Newton-Raphson and KKT conditions to solve real-world problems.
4. Analyze various optimization techniques such as transportation, assignment, and machine sequencing

Unit I:	**(6 Hrs.)**
Modeling Approach : Definitions, Characteristics, Scope and Limitations of Operation R, phases of OR modeling OR tools and techniques of OR	
Unit II:	**(6 Hrs.)**
Linear Programming: Linear Programming, assumptions and formulation of LP model, solution of LPP by graphical method, simplex method, Dual Simplex Method, Two Phase Simplex Method, Big M Method, Duality in LP.	
Unit III:	**(6 Hrs.)**
Assignment Models: Definition and assumptions, formulation and solution, multiple optimum solutions, prohibited assignment	
Unit IV:	**(7 Hrs.)**
Transportation Model: Definition, Solution of Transportation Model, prohibited and preferred routes, and degeneracy in transportation problem	
Unit V:	**(6 Hrs.)**
Machine Sequencing: Introduction, Notation, terminology and assumptions, processing n jobs through two machines, processing n jobs through three machines.	
Unit VI:	**(8 Hrs.)**
Classical Optimization: Unconstrained problems, Necessary and sufficient conditions, Newton Raphson method **Constrained Optimization:** Karush-Kuhn-Tucker Conditions for Constrained Optimization	
Total Lecture	**39 Hours**

Textbooks:	
1	Optimization technique by Radrin pearson ,Ed. Publication.
2	Problems in Operation Research by P.K.Gupta & Man Mohan ,Khanna Pub.
3	Mathematical Models in Operation Research by J. K. Sharma, Mac millan Pub.
Reference Books:	
1	Introduction to Operation research by Hiller & Liberman (Holden Day Inc. San Francisco)
2	Operation Research by Kantiswaroop & Gupta, S.Chand Pub.
3	Principles of Operation Research by Wagner ,PHI Pub.
4	Operation Research by Dr. B. S. Goel & S. K. Mittal , Pragati Prakashan
5	Optimization Technique by S. S. Rao.

VII SEMESTER
22CT721 : Neural Network & Fuzzy Logic

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand the fundamentals of Artificial Neural Network and Fuzzy Logic 2. Apply the concepts of Artificial Neural Network and Fuzzy Logic for the given scenario 3. Design single layer and multilayer neural networks for the given problem definition

Unit I:	**(6 Hrs.)**
Fundamentals concepts and models of artificial neural systems: Biological neurons and their artificial models, models of artificial neural networks, learning and adaptation, neural network learning rules, overview of neural networks	
Unit II:	**(6 Hrs.)**
Single-layer perceptron classifiers: Discriminant functions, linear machine and minimum distance classification, training and classification using the discrete perceptron: algorithm and example, single layer	
Unit III:	**(6 Hrs.)**
Multi-layer feedback networks: linearly non-separable pattern classification, delta learning rule. Feed forward recall and error back-propagation training, learning factors, Hopfield networks, Applications of Neural Networks	
Unit IV:	**(7 Hrs.)**
Introduction crisp sets: an overview, fuzzy sets: basic types, fuzzy sets: basic concepts, characteristics and significant of the paradigm shift. Fuzzy sets versus crisp sets, representation of fuzzy sets, alpha cuts, cardinality, Operations on fuzzy sets: types of operations, fuzzy complements, fuzzy intersection : T-norms, fuzzy unions: T-Conorms, Distinction between Probability, Fuzzy and Random System.	
Unit V:	**(7 Hrs.)**
Linguistics variables, linguistic edges, Fuzzy relations, Binary Operation on a single set, projection and cylindrical extension, Extension principles for fuzzy sets, Fuzzy Arithmetic: fuzzy numbers, arithmetic operations on fuzzy numbers, Fuzzy Equations.	
Unit VI:	**(7 Hrs.)**
Defuzzification methods, design fuzzy rule base, Fuzzy Inference Systems: Mamdani Vs Sugeno, Steps in design of a fuzzy controller, applications of fuzzy logic	
Total Lecture	**39 Hours**

Textbooks:	
1.	Principal of Soft Computing, S. N. Sivanandam & S. N. Deepa, Wiley India Pvt. Limited
2.	Fuzzy logic & Neural Network, T. J. Ross, Tata McGraw hill

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VII SEMESTER
22CT722 : PE III: Adhoc Wireless Network

Course Outcomes :

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

1. Identify the need of Adhoc network compare infrastructure base and infrastructure less wireless network
2. Identify the design issues involved in the design of protocols at each layer, Compare and classify different protocols
3. Classify QoS approaches and Identify the need of energy management in ad hoc network.

Unit I:	**(6 Hrs.)**
Adhoc Wireless Networks: Introduction, Issues in Ad hoc wireless Networks, Ad hoc Wireless Internet.	
Unit II:	**(6 Hrs.)**
MAC Protocols for Ad hoc Wireless Networks: Introduction, issues in designing MAC protocol, Design goals of MAC protocols, classification, Contention based protocols: MACAW. Floor acquisition multiple access Protocols. Contention based protocols with reservation mechanism: Distributed Packet reservation multiple access protocol, Collision avoidance Time allocation protocol. Contention based MAC protocols with scheduling mechanism: Distributed priority scheduling and medium access in ad hoc networks.	
Unit III:	**(6 Hrs.)**
Routing Protocols for Ad hoc Wireless Networks: Introduction, Issues in designing routing protocol, classification, table driven routing protocols: DSDV, cluster head gateway switch routing protocol. On demand routing protocols: DSR, AODV. Hybrid routing protocols: core extraction distributed routing protocol, Zone routing protocol. Routing protocols with efficient flooding mechanisms, hierarchical routing protocols, Power aware routing protocols.	
Unit IV:	**(7 Hrs.)**
Multicast routing in adhoc wireless networks: Introduction, Issues in designing multicast routing protocol, operation of multicast routing protocols, An architecture reference model, classification, Tree based multicast routing protocol: Bandwidth efficient multicast routing protocol, Multicast routing protocol based on zone routing, Multicast core extraction distributed Ad hoc routing, MAODV. Mesh based multicast routing protocols: on demand multicast routing protocol, Dynamic core based multicast routing protocol. Energy efficient Multicasting: Energy efficient reliable broadcast and multicast protocols, A distributed power aware multicast routing protocol. Multicasting with Quality of Service guarantees, Application dependent multicast routing.	
Unit V:	**(7 Hrs.)**
Transport layer and security protocols: Introduction, Issues in designing transport layer protocol, design goals of transport layer protocol, Classification of transport layer solutions, TCP over ad hoc wireless networks, Other transport layer protocols for ad hoc wireless network, security in ad hoc wireless network, network security requirements, Issues and challenges in security provisioning,	

Network security attacks, Key management, Secure routing in AD hoc Wireless networks: Requirements of secure routing protocol, security aware ad hoc routing protocol.Transaction Management: ACID Properties, Implementation of ACID Properties, Database processes to support ACID Properties, Schedules, and Testing of Serializability.	
Unit VI:	**(7 Hrs.)**
Quality of service and energy management in Ad hoc Wireless networks: Introduction, Issues and challenges in providing Quality of service, classification of Quality of service solutions. Introduction to energy management, Need for energy management, classification, Battery management schemes, transmission power management schemes, system power management schemes.	
Total Lecture	**39 Hours**

Textbooks:	
1.	Ad Hoc Wireless Networks Architecture and protocols by C. Siva Ram Murthy, B. S. Manoj, Pearson Publication.

Reference Books:	
1.	Ad hoc Networking by Charles E. Perkins, Addison Wesley.
2.	The hand book of ad hoc wireless networks by Mohammad Ilyas, CRC press.

VII SEMESTER
22CT724 : 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:	**(7 Hrs.)**
Data Modelling to perform Data Mining: Data warehouse concepts, Data warehouse modelling, Data warehouse implementation, Data generalization by Attribute – Oriented Induction.	
Unit III:	**(6 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:	**(6 Hrs.)**
Data mining using Prediction methods: Linear and nonlinear regression, Multiple regression, Logistic Regression	
Unit V:	**(6 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	**39 Hours**

Textbooks:	
1.	Data Mining: Concepts and Techniques, J. Han, M. Kamber, Morgan Kaufman 3rd Edition, 2012
2.	Statistics for Management, Richard I. Levin Davis S. Rubin, Pearson 7th Edition

Reference Books:	
1.	Data Mining Techniques, Arun Pujari, 3rd Edition, Universities Press.
2.	Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University Press

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VII SEMESTER
22CT741 : PE IV: Cyber Forensic

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Describe the types of cybercrimes, forensic investigation processes, and foundational concepts of digital forensics. 2. Analyze techniques used in digital evidence collection and digital forensics across various platforms. 3. Evaluate forensic reports and case studies to assess the effectiveness of investigation strategies and legal implications.

Unit I:	**(7 Hrs.)**
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:	**(7 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:	**(6 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:	**(7 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:	**(6 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:	**(6 Hrs.)**
Forensics report writing and presentation, Case studies	
Total Lecture	**39 Hours**

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Textbooks:	
1.	Incident Response & Computer Forensics, Mandia, K., Prosise, C., Pepe, M., McGraw-Hill
2.	Guide to Computer Forensics and Investigations, Bill Nelson, Amelia Phillips, Frank Enfinger, and Chris Steuart, Cengage Learning

Reference Books:	
1.	File System Forensic Analysis, Brian Carrier, Wesley
2.	Digital Evidence and Computer Crime, Eoghan Casey, Academic Press
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

VII SEMESTER
22CT743 : PE IV: Machine Learning

Course Outcomes :
Upon successful completion of the course the students will be able to
1. Interpret machine learning techniques suitable for a given problem 2. Apply machine learning techniques to solve the problems 3. Compare machine learning techniques 4. Evaluate different machine learning techniques

Unit I:	**(6 Hrs.)**
Introduction, machine learning classes (i.e., supervised, unsupervised and reinforced), well posed and ill posed learning problems, designing a learning system, perspective and issues in machine learning, applications.	
Unit II:	**(6 Hrs.)**
Learning a class from Bayesian learning, learning theory (bias/variance tradeoffs; VC theory; large margins), Generative/discriminative learning, parametric / non-parametric learning linear and logistic regression, SVM.	
Unit III:	**(6 Hrs.)**
Introduction, Density Estimation, Clustering Dimensionality reduction, PCA, kernel methods	
Unit IV:	**(7 Hrs.)**
Introduction, decision tree representation, appropriate problems for Decision Tree learning, the basics decision tree learning algorithm, hypothesis space search, inductive bias in decision tree learning, issues in decision tree learning	
Unit V:	**(7 Hrs.)**
Introduction, Factors, Response, and Strategy of Experimentation, Guidelines for Machine Learning Experiments, Cross-Validation and Resampling Method, Measuring Classifier Performance, Interval Estimation, Hypothesis Testing, Assessing a Classification Algorithm‟ Performance, Comparing Two Classification Algorithms, Comparing Multiple Algorithms: Analysis of Variance, Comparison over Multiple Datasets.	
Unit VI:	**(7 Hrs.)**
Ensemble methods, Introduce the concepts behind deep learning and benefits of deep over shallow networks, introduce the concepts of reinforcement learning.	
Total Lecture	**39 Hours**

Textbooks:	
1.	"Introduction to Machine Learning" by Ethem Alpaydin, The MIT Press Publication
2.	"Machine Learning" by Tom Mitchell, McGraw-Hill Publication

Reference Books:	
1.	"Pattern Recognition and Machine Learning" by Christopher M. Bishop,
2.	"An Introduction to Reinforcement Learning" by R. Sutton and A. Barto,
3.	"Reinforcement Learning" by C. Szepesvari, Algorithms
4.	"Deep Learning" by Ian Goodfellow, Yoshua Bengio, and Aaron Courville,

II SEMESTER
22CT744 : Lab: Machine Learning

Course Outcomes

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

1. Understand the fundamental principles behind deep learning and machine learning techniques.
2. Apply various algorithms on a given problem and interpret the results.
3. Evaluate the performance of various learning algorithms on different datasets of a domain.
4. Formulating the problems through investigation and analysis of data, and implementing the desired solution to the problem.

Sr. No	Aim of Practical
1	Introduction to Google Collab, Selecting proper Datasets, Tools, Data Interpretation, Exploratory Data Analysis.
2	Demonstrate various data pre-processing techniques for a given dataset: a. Handling missing values • isnull() • notnull() • dropna() • fillna() • replace(): replace blank textual data with string 'zzz' • interpolate() b. Demonstrate various data visualization techniques in Python • Bar graph • Scatterplot • Line plot
3	Classify the data into training, testing and validation using random sampling. Also plot Normal distribution for Duration parameter with mean 0 and sigma 1.
4	Program based on Linear Regression.
5	Implementation of Unsupervised Learning Algorithms.
6	Selection of a dataset of people with parameters- Age, BMI, Weight, BP, Height, etc. Implementation of Clustering Algorithm (Grouping of People) based on coefficient of correlation.
7	Implementation of Decision Trees
8	Implementation of SVM Algorithm.
9	Implement basic version of Chess Game using Reinforcement Learning.

VII SEMESTER
22CT747 : PE IV: Customer Relationship Management

Course Outcomes :
Upon successful completion of the course the students will be able to
4. **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.
5. **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.
6. **Design** and customize a CRM application for organization to suit their business needs

Unit I:	**(7 Hrs.)**
Introduction to Cloud: Definition of Cloud Computing, Cloud Architecture, Cloud Types, Service models, Deployment models, Examining the Characteristics of Cloud Computing, Benefits of cloud computing, Disadvantages of cloud computing. **CRM Concepts and its tools:** Definition, History, Key Benefits, Service Level Agreements (SLAs), creating and managing effective SLAs. Architecture, Service Nature of Salesforce, Features, Products and its overviews, Traditional CRM vs. Salesforce CRM.	
Unit II:	**(7 Hrs.)**
CRM Administration and Data Model Design: Lightning and classic UI and differences, Creation of org, 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 III:	**(7 Hrs.)**
Data Management with CRM Tool: Record details, List Views, Filters, Actions Page layouts, Compact Layouts, Introduction to Workflows, email templates, Limitation of workflows, approval processes, Process Builder, Lightning Flow, Community Creation, Reports and Dashboards.	
Unit IV:	**(7Hrs.)**
Security Model: Introduction to Profiles and Permission Set, Overview of Data Security, Control access to org, object, field, record, OWD, Role and Roles Hierarchy, Sharing Rule, Sharing sObjects, Apex Sharing.	

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Unit V:	**(6 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.	
Unit VI:	**(6 Hrs.)**
Lightning Aura Component: Introduction to Aura component attributes handling in aura component, handle action in controller, Parent and child component, Events handling in aura component, Server-side controller.	
Total Lecture	**39 Hours**

Textbooks:	
1.	Salesforce CRM: The Definitive Admin Handbook Paperback – Import, 24 Jul 2013 by Paul Goodey, Publisher: Packt Publishing Limited; 2nd edition edition
2.	Alok Kumar Rai, CUSTOMER RELATIONSHIP MANAGEMENT CONCEPT & CASES, Prentice Hall of India Private Limted,New Delhi. 20112
3	S. Shanmugasundaram, CUSTOMER RELA TIONSHIP MANAGEMENT, Prentice Hall of India Private Limted,New Delhi, 20083.
4	V. Kumar & Werner J., CUSTOMER RELA TIONSHIP MANAGEMENT, Willey India, 2008

Reference Books:	
1.	"Salesforce for Beginners" by Liz Kao, Packt Publishing
2.	Advanced Apex Programming in Salesforce" by Dan Appleman, Desaware Publishing
3	The Salesforce Career Playbook" by Martin Gessner, Independently Published (29 October 2020)
4	Mastering Salesforce Reports and Dashboards" and "Automating Salesforce Marketing Cloud".

VII SEMESTER

22CT748 : PE IV: LAB-Customer Relationship Management

Course Outcomes
Upon successful completion of the course the students will be able to 1. Explain the value of relationship management strategy. (CO1) 2. Implement cloud-based solutions for customers using Salesforce CRM tool (CO1, CO2) 3. Help teams articulate their CRM goals and identify key milestone in the relationship management process. (CO2, CO3) 4. Demonstrate the use of Aura Lightning Framework. (CO3)

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

SN	Program 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	A] To study different layouts. B] To implement a workflow.
5	Customize process flow using process builder.
6	To create a domain specific schema builder.
7	A] To create clone user and assigned permissions B] To perform OWD operations.
8	To create Email templates in salesforce Lightning.
9	A] Write an Apex code to perform the DML Operations on Standard or the Custom objects created by the user.
10	A] To Create a Hello World Aura Component. B] To Create and Edit Aura Component.
11	Group Mini Project

VII SEMESTER
22CT761 : Introduction to Natural Language Processing

Course Outcomes :

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

1. Understand basic NLP concepts like morphology, syntax, semantics, and speech.
2. Apply parsing and ML techniques in NLP tasks.
3. Analyze challenges in multilingual and Indian language processing.
4. Design and assess simple NLP applications using rule-based or statistical methods.

Unit I:	**(5 Hrs.)**
Introduction: Biology of Speech Processing; Place and Manner of Articulation; Word Boundary Detection; Argmax based computations; HMM and Speech Recognition.	
Unit II:	**(6 Hrs.)**
Word level Analysis: Morphology fundamentals; Morphological Diversity o f Indian Languages; Morphology Paradigms; Finite State Machine Based Morphology; Automatic Morphology Learning; Shallow Parsing; Named Entities; Maximum Entropy Models; Random Fields.	
Unit III:	**(6 Hrs.)**
Syntax Analysis: 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:	**(7 Hrs.)**
Semantic Analysis: Lexical Knowledge Networks, Wordnet Theory; Indian Language Wordnets and Multilingual Dictionaries; Semantic Roles; Word Sense Disambiguation; WSD and Multilinguality; Metaphors; Coreferences.	
Unit V:	**(6 Hrs.)**
Applications: Sentiment Analysis; Text Entailment; Robust and Scalable Machine Translation; Question Answering in Multilingual Setting; Cross Lingual Information Retrieval (CLIR).	
Unit VI:	**(6 Hrs.)**
Introduction to Speech Processing: Word level Morphology and Computational Phonology; Basic Text to Speech; Introduction to HMMs and Speech Recognition, Part of Speech Tagging; Parsing with CFGs; Probabilistic Parsing. Representation of Meaning; Semantic Analysis; Lexical Semantics; Word Sense; Disambiguation; Discourse understanding; Indian language case studies	
Total Lecture	**36 Hours**

			July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

Textbooks:	
1.	Allen, James, Natural Language Understanding, 2nd Edition, Benjamin / Cumming, 1995.
2.	Charniack, Eugene, Statistical Language Learning, MIT Press, 1993.

Reference Books:	
1.	Jurafsky, Dan and Martin, James, Speech and Language Processing, Second Edition, Prentice Hall, 2008.
2.	Manning, Christopher and Heinrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999.

VII SEMESTER
22CT762 : PE V: 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	**(5 Hrs.)**
Definition, Design challenges, Design metrics (NRE, unit cost), Applications, Trends in embedded systems, Embedded system design cycle	
Unit II: Embedded System Architecture & Development Tool	**(6 Hrs.)**
Hardware/software co-design, Processor selection, Memory types, IO devices, Interrupts, Context switching, Device drivers, Software development tools: compiler, linker, simulator, emulator.	
Unit III: Architecture and Programming	**(6 Hrs.)**
RISC and CISC, ARM organization, ARM Programmers model, operating modes, Exception Handling, ARM instruction set (Thumb), Assembly language basics	
Unit IV: 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 V: Communication Protocols in Embedded Systems	**(6 Hrs.)**
Bluetooth, IEEE 802.11, 802.16, GPRS, MODBUS, CAN, I2C, USB: operation, architecture and implementation	
Unit VI: Case Studies in Embedded Systems	**(6 Hrs.)**
Case studies from automation, communication, automobile, and security systems; Embedded OS examples (RTOS, handheld OS)	
Total Lecture	**36 Hours**

Textbooks:

			July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

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

VII SEMESTER
22CT762 PE-V: 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	Studythearchitecturediagramof theATmega328micro-controller
2	Writeaprogramtoalternateblink4LEDlightsonArduinoNan
3	Writeaprogramtoreadthestatusof thePushbuttonandcontrol theLEDlight usingtheButton
4	Studyof OneWireProtocol.Write a program to read the DHT22 sensor data and display it on an LCD
5	Studyof I2Cprotocol.WriteaprogramtodisplaymessagesonLCDI2C
6	Develop an RTOS-based application using FreeRTOS (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 SerialmonitortoArduinoNano(controlLED)andreadtheanalogsignalvalue on the Serial Monitor
10	Case study: Develop a mini project based on embedded systems in domains like communication, automation, or automobile

VII SEMESTER
22CT763 : PE V- Computer Vision

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Learn fundamentals of computer vision and its applications. 2. Understand the basic image processing operations to enhance and segment the images 3. Analyze 3D vision concepts such as stereo vision, epipolar geometry, and optical flow. 4. Implement motion analysis and object detection/recognition techniques using classical vision algorithms. 5. Evaluate machine learning-based approaches for visual recognition tasks.

Unit I:	**(6 Hrs.)**
Overview of computer vision and its applications: Image formation, Imaging geometry, radiometry, digitization, Image transformations, Homogenous coordinates Projective geometry, Camera calibration, Camera geometry, vanishing points.	
Unit II:	**(6 Hrs.)**
Feature detection: Image filters, Edge detection, Corner detection, Fitting, Feature Detection and Matching, Homographies, Image Stitching/Mosaicing.	
Unit III:	**(8 Hrs.)**
3D Vision, Segmentation and Recognition Techniques: Epipolar Geometry, Stereo Vision, Segmentation, Recognition and Classification.	
Unit IV:	**(7 Hrs.)**
Motion and Object Analysis in Computer Vision: Optical flow 3D reconstruction, Object detection, Object recognition Object tracking, **Segmentation:** Active contours, split & merge, watershed, region splitting, region merging, graph-based segmentation, mean shift and model finding, Normalized cut	
Unit V:	**(7 Hrs.)**
Computational tools for creating Image Panoramas: Homographies, RANSAC for point matching, SIFT (scale invariant feature transform) for detection of salient feature points, **Algorithms for :** shape from shading, depth from needle map, optical flow, Kanade-LucasTomasi algorithm, applications of optical flow in underwater imagery, shape from stereo, epipolar geometry, structure from motion	
Unit VI:	**(6 Hrs.)**
Photometric stereo: deriving shape from multiple images of an object taken under different lighting conditions; applications to illumination invariant face recognition, face relighting, **Machine Learning in computer vision**: Face detection using Adaboost, Object detection using parts, **Classifiers:** SVMs, Neural Nets, Deep Learning	
Total Lecture	**40 Hours**

			July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

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

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