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 Information Technology

B. Tech in Computer Science and Design

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 Information Technology)

Computer Science and Design

SoE No. 22CSD-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	22CSD101	Probability and Statistics	T	3	1	0	3	4	30	20	50	3 Hours
2	1	BS	GE/PHY	22CSD102	Engineering Physics	T	3	0	0	3	3	30	20	50	3 Hours
3	1	BS	GE/PHY	22CSD103	Lab.: Engineering Physics	P	0	0	2	2	1		60	40	
4	1	HS	GE/HUM	22CSD104	Social Science	T	3	0	0	3	3	30	20	50	3 Hours
5	1	BES	CV/CV	22CSD105	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3 Hours
6	1	BES	CV/CV	22CSD106	Lab.:Engineering Mechanics	P	0	0	2	2	1		60	40	
7	1	BES	IT/IT	22CSD107	Introduction to Computer Programming	T	3	0	0	3	3	30	20	50	3 Hours
8	1	BES	IT/IT	22CSD108	Lab.: Introduction to Computer Programming	P	0	0	2	2	1		60	40	
					TOTAL FIRST SEM		**15**	**1**	**6**	**21**	**19**				
List of Mandatory Learning Course (MLC)															
1	1	BES	GE/CHE	GE2132	Environmental Science	**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	22CSD201	Calculus, Sequences and Series	T	3	1	0	3	4	30	20	50	3 Hours
2	2	BS	GE/CHE	22CSD202	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3 Hours
3	2	BS	GE/CHE	22CSD203	Lab: Engineering Chemistry	p	0	0	2	2	1		60	40	
4	2	HS	GE/HUM	22CSD204	Technical Communication	T	3	0	0	3	3	30	20	50	3 Hours
5	2	HS	GE/HUM	22CSD205	Lab:Technical Communication	P	0	0	2	2	1		60	40	
6	2	BES	EE/EE	22CSD206	Digital Circuit Design	T	3	0	0	3	3	30	20	50	3 Hours
7	2	BES	EE/EE	22CSD207	Lab.:Digital Circuit Design	P	0	0	2	2	1		60	40	
8	2	BES	EL/EL	22CSD208	Basic Electrical Machines	T	3	0	0	3	3	30	20	50	3 Hours
9	2	BES	EL/EL	22CSD209	Lab:Basic Electrical Machines	P	0	0	2	2	1		60	40	
10	2	BES	ME/ME	22CSD210	Lab.: Engineering Design	P	0	0	4	4	2		60	40	
					TOTAL SECOND SEM		**15**	**1**	**12**	**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	HS	GE/HUM	GE2131	Universal Human Value	**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

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B.TECH SCHEME OF EXAMINATION 2022

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

(Department of Information Technology)

Computer Science and Design

SoE No. 22CSD-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
THIRD SEMESTER															
1	3	BS	GE/GE	22CSD301	Linear Algebra	T	3	1	0	4	4	30	30	40	3
2	3	PC	CSD	22CSD302	Microprocessors and Microcontrollers	T	3	0	0	3	3	30	30	40	3
3	3	PC	CSD	22CSD303	Lab:Microprocessors and Microcontrollers	P	0	0	2	2	1		60	40	
4	3	PC	CSD	22CSD304	Data Structures	T	4	0	0	4	4	30	30	40	3
5	3	PC	CSD	22CSD305	Lab:Data Structures	P	0	0	2	2	1		60	40	
6	3	PC	CSD	22CSD306	Computer System Organization	T	3	0	0	3	3	30	30	40	3
7	3	PC	CSD	22CSD307	Theoretical Foundation of Computer Sciences	T	3	0	0	3	3	30	30	40	3
8	3	PC	CSD	22CSD308	Software Lab-I	P	0	0	4	4	2		60	40	
9	3	PC	CV/CSD	22CSD309	Environmental Sustainability, Pollution and Management	**T**	3	0	0	3	3	30	20	50	3 Hrs
						TOTAL	**19**	**1**	**8**	**28**	**24**				
List of Mandatory Learning Course (MLC)															
1	3	HS	GE/T&P	MLC2123	YCAP3 -	**A**	2	0	0	2	0				
2	3	BES	CSD	MLC119	Technical Documentation	**A**	2	0	0	2	0				

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
FOURTH SEMESTER															
1	4	BS	GE	22CSD401	Discrete Mathematics and Graph Theory	T	3	1	0	4	4	30	30	40	3
2	4	PC	CSD	22CSD402	Operating Systems	T	3	0	0	3	3	30	30	40	3
3	4	PC	CSD	22CSD403	Lab : Operating Systems	P	0	0	2	2	1		60	40	
4	4	PC	CSD	22CSD404	Computer Networks	T	3	0	0	3	3	30	30	40	3
5	4	PC	CSD	22CSD405	Object Oriented Programming	T	3	0	0	3	3	30	30	40	3
6	4	PC	CSD	22CSD406	Lab:Object Oriented Programming	P	0	0	2	2	1		60	40	
7	4	PC	CSD	22CSD407	Design and Analysis of Algorithms	T	3	0	0	3	3	30	10	60	3
8	5	PC	CSD	22CSD409	Lab.:Design and Analysis of Algorithms	P	0	0	2	2	1		60	40	
9	4	PC	CSD	22CSD410	Software Lab-II	P	0	0	4	4	2		60	40	
						TOTAL	**15**	**1**	**10**	**26**	**21**				
List of Mandatory Learning Course (MLC)															
1	4	HS	GE/T&P	MLC2124	YCAP4 -	**A**	2	0	0	2	0				
2	4	BES	CSD	MLC120	Open Source Tool for Graphics	**A**	2	0	0	2	0				

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(Department of Information Technology)

Computer Science and Design

SoE No. 22CSD-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
THIRD SEMESTER															
1	3	BS	GE/GE	22CSD301	Linear Algebra	T	3	1	0	4	4	30	30	40	3
2	3	PC	CSD	22CSD302	Microprocessors and Microcontrollers	T	3	0	0	3	3	30	30	40	3
3	3	PC	CSD	22CSD303	Lab:Microprocessors and Microcontrollers	P	0	0	2	2	1		60	40	
4	3	PC	CSD	22CSD304	Data Structures	T	4	0	0	4	4	30	30	40	3
5	3	PC	CSD	22CSD305	Lab:Data Structures	P	0	0	2	2	1		60	40	
6	3	PC	CSD	22CSD306	Computer System Organization	T	3	0	0	3	3	30	30	40	3
7	3	PC	CSD	22CSD307	Theoretical Foundation of Computer Sciences	T	3	0	0	3	3	30	30	40	3
8	3	PC	CSD	22CSD308	Software Lab-I	P	0	0	4	4	2		60	40	
						TOTAL	**16**	**1**	**8**	**25**	**21**				
List of Mandatory Learning Course (MLC)															
1	3	HS	GE/T&P	MLC2123	YCAP3 -	**A**	2	0	0	2	0				
2	3	BES	CSD	MLC119	Technical Documentation	**A**	2	0	0	2	0				

FOURTH SEMESTER															
1	4	BS	GE	22CSD401	Discrete Mathematics and Graph Theory	T	3	1	0	4	4	30	30	40	3
2	4	PC	CSD	22CSD402	Operating Systems	T	3	0	0	3	3	30	30	40	3
3	4	PC	CSD	22CSD403	Lab : Operating Systems	P	0	0	2	2	1		60	40	
4	4	PC	CSD	22CSD404	Computer Networks	T	3	0	0	3	3	30	30	40	3
5	4	PC	CSD	22CSD405	Object Oriented Programming	T	3	0	0	3	3	30	30	40	3
6	4	PC	CSD	22CSD406	Lab:Object Oriented Programming	P	0	0	2	2	1		60	40	
7	4	PC	CSD	22CSD407	Design and Analysis of Algorithms	T	3	0	0	3	3	30	10	60	3
8	5	PC	CSD	22CSD409	Lab.:Design and Analysis of Algorithms	P	0	0	2	2	1		60	40	
9	4	PC	CSD	22CSD409	Software Lab-II	P	0	0	4	4	2		60	40	
						TOTAL	**15**	**1**	**10**	**26**	**21**				
List of Mandatory Learning Course (MLC)															
1	4	HS	GE/T&P	MLC2124	YCAP4 -	**A**	2	0	0	2	0				
2	4	BES	CSD	MLC120	Open Source Tool for Graphics	**A**	2	0	0	2	0				

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Computer Science and Design

SoE No. 22CSD-101

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							L	T	P	Hrs		MSEs*	TA**	ESE	
FIFTH SEMESTER															
1	5	HS	CSD	22CSD501	Cyber Laws & Professional Ethics	T	3	0	0	3	3	30	20	50	3 Hours
2	5	PC	CSD	22CSD502	Database Management Systems	T	3	0	0	3	3	30	20	50	3 Hours
3	5	PC	CSD	22CSD503	Lab: Database Management Systems	P	0	0	2	2	1		60	40	
4	5	PC	CSD	22CSD504	Principles of Compiler Design	T	3	0	0	3	3	30	20	50	3 Hours
5	5	PC	CSD	22CSD505	Lab.:Principles of Compiler Design	P	0	0	2	2	1		60	40	
6	5	PE	CSD		**Professional Elective-I**	T	3	0	0	3	3	30	20	50	3 Hours
7	5	PE	CSD		**Lab. Professional Elective-I**	P	0	0	2	2	1		60	40	
8	5	OE	CSD		**Open Elective -I**	T	3	0	0	3	3	30	20	50	3 Hours
9	5	OE	CSD		**Open Elective -II**	T	3	0	0	3	3	30	20	50	3 Hours
10	5	STR	CSD	22CSD506	Industrial training, Seminar & Report	P					1		60	40	
						TOTAL	**18**	**0**	**6**	**24**	**22**				

Professional Electives-I

1	5	PE-I	CSD	22CSD511	PE-I: Digital Image Processing
2	5	PE-I	CSD	22CSD512	PE-I: **Lab:** Digital Image Processing
3	5	PE-I	CSD	22CSD513	PE-I: Machine Learning
4	5	PE-I	CSD	22CSD514	PE-I: **Lab:** Machine Learning
5	5	PE-I	CSD	22CSD515	PE-I: Data Visualization
6	5	PE-I	CSD	22CSD516	PE-I: **Lab:** Data Visualization
7	5	PE-I	CSD	22CSD517	PE-I: Computer Graphics
8	5	PE-I	CSD	22CSD518	PE-I: **Lab:** Computer Graphics
9	5	PE-I	CSD	22CSD519	PE-I: Internet of Things
10	5	PE-I	CSD	22CSD520	PE-I: **Lab:**Internet of Things

Open Electives-I

1	5	OE-I	CSD	22CSD531	OE I : Computer Graphics
2	5	OE-I	CSD	22CSD532	OE I : Multimedia Design

Open Electives-II

1	5	OE-II	CSD	22CSD551	OE II : Advanced Web Designing
2	5	OE-II	CSD	22CSD552	OE II : Virtual Reality

List of Mandatory Learning Course (MLC)												
1	5	HS	T&P	MLC2125	YCAP5: YCCE Communication Aptitude Preparation	**A**	2	0	0	2	0	
2			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	HS	GE/HUM	22CSD601	Fundamentals of Management and Economics	T	3	0	0	3	3	30	20	50	3 Hours
2	6	PC	CSD	22CSD602	Software Architecture & Design	T	3	0	0	3	3	30	20	50	3 Hours
3	6	PC	CSD	22CSD603	Computer Game Design and Programming	T	3	0	0	3	3	30	20	50	3 Hours
4	6	PC	CSD	22CSD604	Lab: Computer Game Design and Programming	P	0	0	2	2	1		60	40	
5	6	PE2	CSD		**Professional Elective-II**	T	3	0	0	3	3	30	20	50	3 Hours
6	6	PE2	CSD		**Lab. Professional Elective-II**	P	0	0	2	2	1		60	40	
7	6	STR	CSD	22CSD605	Design Workshop	P	0	0	4	4	2		60	40	
8	6	OE3	CSD		**Open Elective -III**	T	3	0	0	3	3	30	20	50	3 Hours
9	6	OE4	CSD		**Open Elective -IV**	T	3	0	0	3	3	30	20	50	3 Hours
10	6	PR	CSD	22CSE606	PROJECT PHASE 1	**P**	0	0	4	4	2		60	40	
						TOTAL	**18**	**0**	**12**	**30**	**24**				

Professional Electives-II

1	6	PE-II	CSD	22CSD611	PE-II: Multimedia Design & Processing
2	6	PE-II	CSD	22CSD612	PE-II: **Lab:** Multimedia Design & Processing
3	6	PE-II	CSD	22CSD613	PE-II: Advanced Web Designing
4	6	PE-II	CSD	22CSD614	PE-II: **Lab:** Advanced Web Designing
5	6	PE-II	ME	22CSD615	PE-II: Design Manufacturing and Assembly
6	6	PE-II	ME	22CSD616	PE-II: **Lab:** Design Manufacturing and Assembly
7	6	PE-II	CSD	22CSD617	PE-II: UX &UI Design
8	6	PE-II	CSD	22CSD618	PE-II: **Lab:** UX & UI Design
9	6	PE-II	CSD	22CSD619	PE-II: Introduction to Deep Learning
10	6	PE-II	CSD	22CSD620	PE-II: **Lab:** Introduction to Deep Learning

Open Electives-III

1	6	OE-III	CSD	22CSD631	OE III : Computer Graphics
2	6	OE-III	CSD	22CSD632	OE III : Multimedia Design

Open Electives-IV					
1	6	OE-IV	CSD	22CSD651	OE IV : Advanced Web Designing
2	6	OE-IV	CSD	22CSD652	OE IV : Virtual Reality

List of Mandatory Learning Course (MLC)												
1	6	HS	T&P	MLC2126	YCAP6 : YCCE Communication Aptitude Preparation	**A**	2	0	0	2	0	

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							L	T	P	Hrs		MSEs*	TA**	ESE	
SEVENTH SEMESTER															
1	7	PC	CSD	22CSD701	Virtual and Augmented Reality	T	3	0	0	3	3	30	20	50	3 Hours
2	7	PC	CSD	22CSD702	Lab: Virtual & Augmented Reality	P	0	0	2	2	1		60	40	
3	7	PC	ME	22CSD703	Computer Aided Design	T	3	0	0	3	3	30	20	50	3 Hours
4	7	PC	ME	22CSD704	Lab: Computer Aided Design	P	0	0	2	2	1		60	40	
5	7	PE	CSD		**Professional Elective-III**	T	3	0	0	3	3	30	20	50	3 Hours
6	7	PE	CSD		**Lab.: Professional Elective-III**	P	0	0	2	2	1		60	40	
7	7	PE	CSD		**Professional Elective-IV**	T	3	0	0	3	3	30	20	50	3 Hours
8	7	PE	CSD		**Professional Elective-V**	T	3	0	0	3	3	30	20	50	3 Hours
9	7	STR	CSD	22CSD705	Project Phase-II	**P**	0	0	10	10	5		60	40	
10	7	STR	CSD	22CSD706	Campus Recruitment Training (CRT)	**P**	0	0	0	0	2		100		
					TOTAL SEVENTH SEM		**15**	**0**	**16**	**31**	**25**				

Professional Electives -III

1	7	PE-III	CSD	22CSD711	PE-III: GPU Computing
2	7	PE-III	CSD	22CSD712	PE-III: **Lab. :** GPU Computing
3	7	PE-III	CSD	22CSD713	PE-III: Digital Audio Design and Synthesis
4	7	PE-III	CSD	22CSD714	PE-III: **Lab. :** Digital Audio Design and Synthesis
5	7	PE-III	CSD	22CSD715	PE-III: Special Effects Techniques
6	7	PE-III	CSD	22CSD716	PE-III: **Lab. :** Special Effects Techniques
7	7	PE-III	CSD	22CSD717	PE-III: Animation Principles & Design
8	7	PE-III	CSD	22CSD718	PE-III: **Lab. :** Animation Principles & Design
9	7	PE-III	CSD	22CSD719	PE-III: Product Design and Development
10	7	PE-III	CSD	22CSD720	PE-III: **Lab. :** Product Design and Development
11	7	PE-III	CSD	22CSD721	Java Fullstack Development
12	7	PE-III	CSD	22CSD722	**Lab**:Java Fullstack Development
13	7	PE-III	CSD	22CSD723	Dot Net Fullstack Development
14	7	PE-III	CSD	22CSD724	**Lab.:** Dot Net Fullstack Development

Professional Electives -IV

1	7	PE IV	CSD	22CSD731	PE-IV: Mobile Computing
2	7	PE IV	CSD	22CSD732	PE-IV: Information Retrival
3	7	PE IV	CSD	22CSD733	PE-IV: Image & Video Processing
4	7	PE IV	CSD	22CSD734	PE-IV: Computer Vision
5	7	PE IV	CSD	22CSD735	PE-IV: Sensors & Actuators
6	7	PE IV	CSD	22CSD736	Generative AI

Professional Electives -V

1	7	PE V	CSD	22CSD751	PE-V: Spatial Computing
2	7	PE V	CSD	22CSD752	PE-V: Artificial Intelligence
3	7	PE V	CSD	22CSD753	PE-V: Cloud Computing
4	7	PE V	CSD	22CSD754	PE-V: Industry 4.o
5	7	PE V	ME	22CSD755	PE-V: Additive Manufacturing

EIGHT SEMESTER															
1	8	STR	CSD	22CSD801	Major Project/Internship	**P**	0	0	12	12	3		60	40	
2	8	ER	CSD	22CSD802	Extra curricular Activity Evaluation	**P**	0	0	0	0	2		100		
					TOTAL EIGHTH SEM		**0**	**0**	**12**	**12**	**5**				
					GRAND TOTAL		**115**	**4**	**82**	**199**	**162**				

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Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2022

1st Semester

(Department of Information Technology

B. Tech in Computer Science and Design

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 Information Technology)

Computer Science and Design

SoE No. 22CSD-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	22CSD101	Probability and Statistics	T	3	1	0	3	4	30	20	50	3 Hours
2	1	BS	GE/PHY	22CSD102	Engineering Physics	T	3	0	0	3	3	30	20	50	3 Hours
3	1	BS	GE/PHY	22CSD103	Lab.: Engineering Physics	P	0	0	2	2	1		60	40	
4	1	HS	GE/HUM	22CSD104	Social Science	T	3	0	0	3	3	30	20	50	3 Hours
5	1	BES	CV/CV	22CSD105	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3 Hours
6	1	BES	CV/CV	22CSD106	Lab.:Engineering Mechanics	P	0	0	2	2	1		60	40	
7	1	BES	IT/IT	22CSD107	Introduction to Computer Programming	T	3	0	0	3	3	30	20	50	3 Hours
8	1	BES	IT/IT	22CSD108	Lab.: Introduction to Computer Programming	P	0	0	2	2	1		60	40	
					TOTAL FIRST SEM		**15**	**1**	**6**	**21**	**19**				
List of Mandetory Learning Course (MLC)															
1	1	BES	GE/CHE	GE2132	Environmental Science	**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	22CSD201	Calculus, Sequences and Series	T	3	1	0	3	4	30	20	50	3 Hours
2	2	BS	GE/CHE	22CSD202	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3 Hours
3	2	BS	GE/CHE	22CSD203	Lab: Engineering Chemistry	p	0	0	2	2	1		60	40	
4	2	HS	GE/HUM	22CSD204	Technical Communication	T	3	0	0	3	3	30	20	50	3 Hours
5	2	HS	GE/HUM	22CSD205	Lab:Technical Communication	P	0	0	2	2	1		60	40	
6	2	BES	EE/EE	22CSD206	Digital Circuit Design	T	3	0	0	3	3	30	20	50	3 Hours
7	2	BES	EE/EE	22CSD207	Lab.:Digital Circuit Design	P	0	0	2	2	1		60	40	
8	2	BES	EL/EL	22CSD208	Basic Electrical Machines	T	3	0	0	3	3	30	20	50	3 Hours
9	2	BES	EL/EL	22CSD209	Lab:Basic Electrical Machines	P	0	0	2	2	1		60	40	
10	2	BES	ME/ME	22CSD210	Lab.: Engineering Design	P	0	0	4	4	2		60	40	
					TOTAL SECOND SEM		**15**	**1**	**12**	**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	HS	GE/HUM	GE2131	Universal Human Value	**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

I SEMESTER

22CSD101: Probability and Statistics

Course Outcomes
Upon successful completion of the course the students will be able to 1. Identify an appropriate probability distribution for a given discrete or continuous random variable and compute probabilities. 2. Make use of probability distributions to solve real life problems. 3. Apply concepts of sampling theory to find probabilities and estimate parameters of various problems. 4. Inspect scientific data, use proper curve fitting and find correlation, regression of variables.

Unit I:Random Variables & Probability Distributions	**(7 Hrs.)**
Conditional probability, Baye's theorem. Random variables: Discrete and Continuous random variables, Probability function and Distribution function, Joint distributions. Independent Random variables, Conditional Distribution. **(Contemporary Issues related to Topic)**	
Unit II: Mathematical Expectation	**(7 Hrs.)**
Mathematical Expectation, Variance & Standard Deviation, Moments, Moment generating function, Skewness and Kurtosis. **(Contemporary Issues related to Topic)**	
Unit III: Special Probability Distributions	**(6 Hrs.)**
Binomial, Geometric, Poisson, Exponential, Normal distributions, Central Limit theorem. **(Contemporary Issues related to Topic)**	
Unit IV: Sampling Theory	**(6 Hrs.)**
Population and sample. Statistical inference. Sampling with and without replacement. Population parameters, sample statistics. Sampling distribution of means. Sampling distribution of proportions. **(Contemporary Issues related to Topic)**	
Unit V: Estimation	**(7 Hrs.)**
Unbiased and efficient estimates. Point estimates and interval estimates. Confidence interval for means, Confidence interval for proportions, Confidence interval for differences and sums of mean and proportions. **(Contemporary Issues related to Topic)**	
Unit VI: Curve Fitting	**(6 Hrs.)**
Fitting of straight line, $y = a + bx$, a parabola $y = a + bx + cx^2$, exponential curves and power curves by method of least squares; Lines of regression and correlation; Rank correlation. **(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.	The theory and problems of probability and Statistics, 5rd edition, M. R. Spiegel, Schaum series,McGraw Hill
2.	Basic Statistics for Business and economics , 3rd edition,E. K.Bowen, M.K Star,McGraw Hill
3.	Engineering Mathematics, 43rd edition, Dr. B. S. Grewal, Khanna Publisher
4.	Probability and Statistics, 2nd edition, Michael J. Evans and Jeffrey S.

Reference Books:	
1.	A First course in probability,Sixth Edition, Sheldon Ross, Pearson Education
2.	Fundamentals of Mathematical statistics ,3rd Edition, S. C.Gupta and V.K.Kapoor,Sultan Chand and sons
3.	Probability and Statistics for Engineering, 6th edition, Miller Freund and Johnson, Richard A. Johnson

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://youtu.be/UftY0e2ilM4
2.	https://youtu.be/bwga7Pnv30c
3.	https://youtu.be/WUCMavXbJo4

I SEMESTER

22CSD102: Engineering Physics

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Co-relate fundamentals of quantum mechanics to solve problems dealing with quantum particle. 2. Analyze crystal structures in terms of lattice parameters with identification of crystal planes. 3. Assess the characteristics of semiconductor materials in terms of crystal structures, charge Carriers and energy bands. 4. Illustrate working principle of lasers and optical fibres for their use in the field of industry. 5. Analyze the motion in electric and magnetic field and its applications to electron optic devices.

Unit:1 Quantum Physics	**(7 Hrs.)**
Wave-particle duality, Wave packet, Heisenberg uncertainty principle, Interpretation of wavefunction, Schrodinger's Equations, Particle in infinite and finite potential well, quantum tunneling, Introduction to Bits and Qubits. **(Contemporary Issues related to Topic)**	
Unit II: Crystallography	**(6Hrs.)**
Introduction, Unit cell characteristics: SC, BCC and FCC unit cells, Crystal planes and Miller indices, Bragg's law, Voids: Tetrahedral and octahedral. **(Contemporary Issues related to Topic)**	
Unit III: Band Theory of Solids	**(7 Hrs.)**
Formation of energy bands in solids, Classification and energy band diagrams, Structure of semiconductor with band diagram, Intrinsic and extrinsic semiconductors, Law of mass action, Carrier transport, conductivity, Hall Effect. **(Contemporary Issues related to Topic)**	
Unit IV: Lasers	**(7 Hrs.)**
Interaction of radiation with matter, Population Inversion and Optical resonance cavity, Three and four level laser, Ruby laser, He-Ne laser, diode laser, Properties and engineering applications of laser. **(Contemporary Issues related to Topic)**	
Unit V: Fundamentals of Fibre Optics	**(6 Hrs.)**
Principle, structure and classification, Acceptance angle, Numerical aperture, Losses in optical fibres, Applications as sensor. **(Contemporary Issues related to Topic)**	
Unit VI: Electron Ballistics and Optics	**(7 Hrs.)**
Motion of a charged particle in uniform electric and magnetic field, Cross field configuration; Electron refraction, Electron lens, CRO. **(Contemporary Issues related to Topic)**	
Total Lecture	**40 Hours**

			July 2022	1.00	Applicable for AY 2022-23 Onwards
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Textbooks:	
1.	M. N. Avadhanulu, P. G. Kshirsagar, A Textbook of Engineering Physics, Revised 14th Edition, S. Chand & Company, 2014.
2.	John Allision, Electronic Engineering Materials and Devices, TMH edition, 10th reprint, Tata McGraw Hill.

Reference Books:	
1.	John Wiley &Sons Inc, Fundamentals of Physics, 10th Edition, David Halliday, Robert Resnick and Jeryle Walker, John-Wiley India.
2.	Subramanyam, Brijlal, M N Avadhanulu, Text Book of Optics, S. Chand & Company, 2006.
3.	M N Avadhanulu, An Introduction to Lasers: Theory & Applications, First Edition 2001, S. Chand & Company Pvt. Ltd, 2017.
4.	Arthur Beiser, Concept of Modern Physics, 6th edition, Tata McGraw - Hill Education, 2002.
5.	Thyagarajan K and Ghatak A. K, LASERS: Theory and Applications, 2nd edition, Macmillan Publication.
6.	S O Pillai, Solid State Physics, 9th edition, New Edge International Publishers, 2021.
7.	P K Palanisamy, Solid state Physics, 8th Edition, SCITECH publications, 2015.
8.	C. Kittel, Solid State Physics, 8th Edition, Willey Publication.
9.	B. K. Pandey, S.Chaturvedi, Engineering Physics, 1st Edition, Cengage Learning Publications.
10.	Hitendra K Malik, A K Singh , Engineering Physics, 2nd Edition, Tata McGraw Hill Education Private Limited, 2015.

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

MOOCs Links and additional reading, learning, video material	
1.	http://nptel.iitm.ac.in- Quantum Physics
2.	http://nptel.ac.in- CRO
3.	www.digimat.in/nptel/courses/video/115102124/L36.html - LASER

I SEMESTER

22CSD103: Lab: Engineering Physics

Course Outcomes
Upon successful completion of the course the students will be able to
1. Co-relate fundamentals of quantum mechanics to solve problems dealing with quantum particle. 2. Analyze crystal structures in terms of lattice parameters with identification of crystal planes. 3. Assess the characteristics of semiconductor materials in terms of crystal structures, charge Carriers and energy bands. 4. Illustrate working principle of lasers and optical fibres for their use in the field of industry. 5. Analyze the motion in electric and magnetic field and its applications to electron optic devices.

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

SN	**Experiments based on**
1	A study of cubic space lattices and atomic packing in solids.
2	Determination of Hall coefficient and density of charge carriers using Hall effect.
3	Dependence of Hall coefficient on temperature.
4	The study of V-I characteristics of a semiconductor diode (germanium and silicon) in forward and reverse bias mode.
5	Determination of Band gap in a semiconductor by four probe method.
6	Determination of Band gap in a semiconductor using reverse biased p-n diode.
7	Determination of divergence of laser beam.
8	Determination of wavelength of laser using diffraction grating.
9	Determination of Acceptance angle and numerical aperture of a given optical fiber.
10	Determination of attenuation of a given optical fibre.
11	Determination of amplitude and frequency of sinusoidal signal using C.R.O.
12	To measure the phase shift introduced by a phase shift network using Dual beam CRO.

I SEMESTER

22CSD104: Social Science

Course Outcomes:
Upon successful completion of the course the students will be able to 1. Explain the basic concepts of Constitution of India 2. Describe the various Fundamental rights 3. Analyze the Impact of federalism on the State 4. Explain Industrial Law and Judiciary

Unit:1	**Origin and meaning**	**7 Hours**
Origin of history of Constitution, Meaning of the constitution law and constitutionalism, Kingship and Republic States in Ancient India **(Contemporary Issues related to Topic)**		
Unit:2	**Concept of the Constitution of India**	**6 Hours**
Preamble, The union and its territory, Citizenship **(Contemporary Issues related to Topic)**		
Unit:3	**Federalism**	**7 Hours**
Salient features of Federalism, Structures and features of Indian Federalism, Panchayat Raj System **(Contemporary Issues related to Topic)**		
Unit:4	**Fundamental Rights**	**6 Hours**
Scheme of the Fundamental rights, duties, Scheme of the Fundamental Right to Equality, The scheme of the Fundamental Duties and its legal status **(Contemporary Issues related to Topic)**		
Unit:5	**Legislative Power**	**7 Hours**
Federal structure and distribution of legislative, Financial power between the Union and the States, Parliamentary Form of Government in India – The constitution power and status of the President of India **(Contemporary Issues related to Topic)**		
Unit :6	**Challenges to Indian Political Systems**	**6 Hours**
The Executive, Directive principles of State Policy, The Union Judiciary **(Contemporary Issues related to Topic)**		
Total Lecture Hours		**39 Hours**

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Textbooks	
1	"Social Science" 1st edition Dr G.N. Nimbarte Sankalp Publication, Vidhya Nagar, Nagpur

Reference Books	
1	Constitution of India,1st edition, Dr. B. R. Ambedkar Government of India, Ministry of Law and Justice
2	An Introduction to the Constitution of India, 24th edition Basu, D.D (2005) New Delhi, Prentice Hall
3	Working of a Democratic Constitution of India2nd edition G. Austin (2004) New Delhi: Oxford University Press.

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

I SEMESTER

22CSD105: 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. Evaluate the dynamic variables of kinetics of particles and simple lifting machine

Unit I: Resultant of Plane Force System	**(7 Hrs.)**
Fundamental concepts, system of forces, laws of mechanics, principle of transmissibility of forces, Resolution and Resultant of a 2-Dimensional force system, Moment of force, Principle of moment, Couple, Equivalent force couple system. **(Contemporary Issues related to Topic)**	
Unit II: Equilibrium of Plane Force System and Friction	**(6 Hrs.)**
Equilibrium: Free body diagrams, Conditions of equilibrium, types of supports, types of beams, types of loads, Application to 2D force system. Friction: Plane friction, belt friction **(Contemporary Issues related to Topic)**	
Unit III: Spatial Force System (3D Force system)	**(7 Hrs.)**
Resultant: Resultant of a 3-Dimensional force system, Moment of force, Principle of moment. Equilibrium: Conditions of equilibrium, Application of equilibrium to 3D force system. **(Contemporary Issues related to Topic)**	
Unit IV: Properties of Surfaces	**(6 Hrs.)**
Centroid: Introduction, First Moment of Area, Problem on Centroid of composite sections. Area Moment of Inertia: Introduction, Second Moment of Area, Radius of Gyration, Transfer Theorem, Product of Inertia, 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. Kinetics of Particle: D' Alembert's principle, Translation of bodies and interconnected particles. **(Contemporary Issues related to Topic)**	
Unit VI: Work Energy and Impulse Momentum Method	**(6 Hrs.)**
Work Energy Method: Introduction, Conservation of energy and problems on connected bodies. Impulse Momentum Method: Definitions, Principle of conservation of momentum, elastic impact of two bodies, coefficient of restitution, application of impulse momentum method. **(Contemporary Issues related to Topic)**	
Total Lecture	**39 Hours**

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

I SEMESTER

22CSD106: 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. 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 determine 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 find the resultant of concurrent force system using graphical method and hand calculation.
11	To find support reactions of a simply supported beam using graphical method and hand calculation.
12.	To find for a composite figure by using Mohr's circle and hand calculation, (1) Principle moment of inertia (2) Moment of inertia and product of inertia about any inclined axis.

I SEMESTER

22CSD107: Introduction to Computer Programming

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand computer system, basics of algorithm & flowchart, and demonstrate straight line program using basic 'C' programming language constructs. 2. Implement basic Linux commands and simple programs using different constructs in C. 3. Design & Develop programs using different loop control structures, user defined functions, and Pointers. 4. Analyze and apply concepts of different dimensional Arrays as a data structure & development of programs using the same. 5. Design and develop programs using basics of Strings, Structures, union and Files in 'C' language.

Unit I: Components of Computer System	**(6 Hrs.)**
Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.). Algorithms & Conventions used in writing algorithms, Flowcharts. Overview of Programming Language, sample 'C' code, compiler, operating system, running 'C' programs, Types of programming errors. **(Contemporary Issues related to Topic)**	
Unit II: Basics of C Programming	**(8 Hrs.)**
Character set, variables, identifiers & keywords, Data types, Operators, Types of operators and expressions, sizeof() operator, constants and its types, Symbolic constant, typedef statement, Introduction to library functions, basic input/output statements, precedence of operators, write straight line programs, Decision control statements: if, if - else and nested if-else statements, else-if ladder statement, switch-case control statement, Programming Examples. **(Contemporary Issues related to Topic)**	
Unit III: Loop Structure	**(7 Hrs.)**
Loop Structures: While, do while and for loops, break and continue statement, 'goto' statement, C programs based on these loop structures. **(Contemporary Issues related to Topic)**	
Unit IV: Modular Programming	**(8 Hrs.)**
Concept of functions, Modular programming, user defined and library functions, function prototypes, formal parameters, actual parameters, return types, function call- call by value, C programs using functions, Recursive functions, comparing recursion against iteration, C programs using recursive functions, Concepts of pointer. **(Contemporary Issues related to Topic)**	
Unit V: Array	**(9 Hrs.)**
Introduction to Arrays, One dimensional array, array manipulation, insertion, deletion of an element, searching techniques- Linear and binary search, sorting techniques - Bubble, insertion and selection sort.Two dimensional array: programs for basic matrix operations-addition, multiplication and transpose, converting a matrix in upper or lower triangular matrix, Array as function arguments. **(Contemporary Issues related to Topic)**	
Unit VI: String and files	**(6 Hrs.)**
Introduction to strings, string handling functions. Introduction to structures and Union. Concepts of files, Types of files, file opening in various modes, file closing, reading and writing text files, concept of pre-processor directives and macros, Command line Argument. **(Contemporary Issues related to Topic)**	
Total Lecture	**44 Hours**

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Textbooks:	
1.	The C Programming Language. J.B.W.Kernighan & D.M.Ritchie, Prentice Hall
2.	Mastering C, K.R.Venugopal & S.R. Prasad, TMH,2007.

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 computer, 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

22CSD108: Lab.: Introduction to Computer Programming

SN	Unit	Name of the Practical
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.
1(C)		Introduction to Turbo C, Compilation and Execution of a program on Turbo C.
2	**II**	A) Write a program in c accept radius us input from keyboard and display the area and circumference of circle
	II	B) Write C program using conditional operators to display maximum number if any three number are inputted
3	**II**	A) Write a program which accept any character as input and check whether entered character is vowel or not.
	II	B) Write a program which accepts any year as input and check whether entered year is leap year or not and display the appropriate message.
	II	c) Write a C program to input electricity unit charge and calculate the total electricity bill according to the given condition: For first 50 units Rs. 3.50/unit For next 100 units Rs. 4.00/unit For next 100 units Rs. 5.20/unit For unit above 250 Rs. 6.50/unit An additional surcharge of 20% is added to the bill.
4	**II**	Write a Menu Driven C program using Switch Case to perform the following operations on a four digit positive integer number entered by the user. 1. To display the number in reverse order. 2. To display sum of the digits of the number. 3. To display a number by adding one in each digit. 4. Exit.
5	**III**	Write a C program to input any number and find the how many digits and also find the factorial of highest digit.
6	**III**	Write a C program to display sum of the following series. Sum =1 + $\frac{x^1}{1!}+\frac{x^2}{2!}+\frac{x^3}{3!}+\ldots\ldots\ldots+\frac{x^n}{n!}$

7	**III**	Write a C program to print following pyramid. * * * * * * * * * *
8	**IV**	A) Write a function which accepts a number a Check Whether a Number is Prime or not, your function returns 1 if a number is a prime number, otherwise 0.
	IV	B) C Program to Find Factorial of a Number Using Recursion.
9	**V**	Write a C program to sort an array of integers using Bubble Sort.
10	**V**	Write a C program to print the transpose of matrix.
11	**V**	A) Write a program in C to find the length of a string without using library function
12	**VI**	Define a structure called cricket that will describe the following information: player name,team name, batting average. Using cricket,declare an array player with 5 elements and write a program to read the information about all the 5 players and print a team-wise list containing names of player with their batting average.
13	**VI**	Write a C program to Copy one file to another file in C

I 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

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 Information Technology

B. Tech in Computer Science and Design

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 Information Technology)

Computer Science and Design

SoE No. 22CSD-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	22CSD101	Probability and Statistics	T	3	1	0	3	4	30	20	50	3 Hours
2	1	BS	GE/PHY	22CSD102	Engineering Physics	T	3	0	0	3	3	30	20	50	3 Hours
3	1	BS	GE/PHY	22CSD103	Lab.: Engineering Physics	P	0	0	2	2	1		60	40	
4	1	HS	GE/HUM	22CSD104	Social Science	T	3	0	0	3	3	30	20	50	3 Hours
5	1	BES	CV/CV	22CSD105	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3 Hours
6	1	BES	CV/CV	22CSD106	Lab.:Engineering Mechanics	P	0	0	2	2	1		60	40	
7	1	BES	IT/IT	22CSD107	Introduction to Computer Programming	T	3	0	0	3	3	30	20	50	3 Hours
8	1	BES	IT/IT	22CSD108	Lab.: Introduction to Computer Programming	P	0	0	2	2	1		60	40	
					TOTAL FIRST SEM		**15**	**1**	**6**	**21**	**19**				
List of Mandetory Learning Course (MLC)															
1	1	BES	GE/CHE	GE2132	Environmental Science	**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	22CSD201	Calculus, Sequences and Series	T	3	1	0	3	4	30	20	50	3 Hours
2	2	BS	GE/CHE	22CSD202	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3 Hours
3	2	BS	GE/CHE	22CSD203	Lab: Engineering Chemistry	p	0	0	2	2	1		60	40	
4	2	HS	GE/HUM	22CSD204	Technical Communication	T	3	0	0	3	3	30	20	50	3 Hours
5	2	HS	GE/HUM	22CSD205	Lab:Technical Communication	P	0	0	2	2	1		60	40	
6	2	BES	EE/EE	22CSD206	Digital Circuit Design	T	3	0	0	3	3	30	20	50	3 Hours
7	2	BES	EE/EE	22CSD207	Lab.:Digital Circuit Design	P	0	0	2	2	1		60	40	
8	2	BES	EL/EL	22CSD208	Basic Electrical Machines	T	3	0	0	3	3	30	20	50	3 Hours
9	2	BES	EL/EL	22CSD209	Lab:Basic Electrical Machines	P	0	0	2	2	1		60	40	
10	2	BES	ME/ME	22CSD210	Lab.: Engineering Design	P	0	0	4	4	2		60	40	
					TOTAL SECOND SEM		**15**	**1**	**12**	**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	HS	GE/HUM	GE2131	Universal Human Value	**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

22CSD201: 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 expansion and derivatives of functions of several variables and use it to find extreme values of functions. 3. Evaluate the improper integrals, multiple integrals and apply it to compute the area and volume of various structures. 4. Solve higher order differential equations and its applications.

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, Change of variables (simple transformations), Coordinate Transformation, Change of order of integration (Cartesian and polar), Elementary triple integrals and Applications to find area, volume. **(Contemporary Issues related to Topic)**	
Unit VI: Differential Equations	**(7 Hrs.)**
Higher order differential equations with constant coefficients. Cauchy's and Legendre's homogeneous differential equations, Applications of differential equations. **(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.	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.	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

II SEMESTER

22CSD202: 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 : Energetics	**(7 Hrs.)**
Introduction, Internal energy, enthalpy, Gibb's free energy, Free energy change and chemical equilibrium. Spontaneous and non-spontaneous processes. I and II law of thermodynamics. Entropy and its significance. Numerical on Internal energy and enthalpy change. Thermodynamic applications to physical and chemical equilibrium. **(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: Industrial pollution, its impacts on environment and control.	**(6 Hrs.)**
Introduction: Industrial pollution and its types. Sources of pollution in electronic industries. Hazardous waste management. Battery waste management. e-waste pollution, its impact on environment , rules of regeneration of e-waste recycling and its managements as per government norms. **(Contemporary Issues related to Topic)**	
Unit VI: Advanced Materials	**(7 Hrs.)**
Nanomaterials: Definition of nanomaterials, nano scale. Carbon Nanotubes and types. Application of Nanomaterials: Applications of nanomaterials in medicine, environment, and electronics. Nanotechnology for waste reduction and improved energy efficiency. Threats of Nanomaterials. **Silicon Chips:** Introduction. Physical, chemical, electrical & mechanical properties and applications. **Polymers in electronic industries:** Piezo, pyroelectric, Ferroelectric polymers. **Smart materials:** Properties and applications of shape memory alloys, chromoactive, photoactive and magnetorheological materials. **(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 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.	William C. O'Mara, Robert B. Herring ,Handbook of Semiconductor Silicon Technology ,Noyes Publications Park Ridge, NJ, USA.1st Edition.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/SERIES%20WISE%20BOOKS/CHEMISTRY/

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=XTt3gXB0a84
2.	https://www.youtube.com/watch?v=iihYXx79QiE
3.	https://www.youtube.com/watch?v=JfJ7MlP9Dco
4.	https://www.youtube.com/watch?v=L2VSOccUrSk

II SEMESTER

22CSD203: Lab.: Engineering Chemistry

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.

II SEMESTER

22CSD204: Technical Communication

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

Unit I: Basics of Communication	**(6Hrs.)**
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: Interview Skills	**(5 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 IV: Oral Skills	**(6 Hrs.)**
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), Listening Skills -definition types and traits **(Contemporary Issues related to Topic)**	
Unit V: Presentation & Visual Communication	**(6 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 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	**35 Hours**

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

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

II SEMESTER

22CSD205: Lab.: Technical Communication

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

Lab I	**(2 Hrs.)**
Handson for Consonants and vowel sounds **(Contemporary Issues related to Topic)**	
Lab II	**(2 Hrs.)**
Identifying the pragmatic meaning of the text **(Contemporary Issues related to Topic)**	
Lab III	**(2 Hrs.)**
Sessions for Interview **(Contemporary Issues related to Topic)**	
Lab IV	**(2 Hrs.)**
Grooming session for effective use of body language **(Contemporary Issues related to Topic)**	
Lab V	**(2 Hrs.)**
Visual Media – preparing poster boards, advertising product **(Contemporary Issues related to Topic)**	
Lab VI	**(2 Hrs.)**
Group Discussion **(Contemporary Issues related to Topic)**	
Total Lecture	**12 Hours**

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

Reference Books:	
1.	How to Develop Self – Confidence & Influence People by Public Speaking,1st Edition,Dale Carnegie
2.	Communication Skills, 2nd Edition, Asha Kaul
3.	Body Language,1st Edition, Allen Peas
4.	Technical Communication, January 2003, Gerson'sGerson

MOOCs Links and additional reading, learning, video material	
1.	https://youtu.be/XoVLa6Dqd5I
2.	https://youtu.be/45uNWLmAZR8

II SEMESTER

22CSD206: Digital Circuit Design

Course Outcomes:
Students will be able to: 1. Simplify combination logic circuits using Boolean algebra. 2. Understand and demonstrate the various codes and illustrate their addition substraction. 3. Simply and exhibit the methods to solve logical functions using K- map and Quine Mc-Cluskey methods and apply it to implement combinational logic circuits. 4. Design and analyze Synchronous and Asynchronous sequential Circuits.

Unit:1	**Number system and codes**	**6 Hours**
Binary: octal, hexadecimal and decimal Number systems and their inter conversion, BCD numbers (8421-2421), gray code, excess–3 code, ASCII codes. Binary addition and subtraction, signed and unsigned binary numbers, 1's and 2's complement representation **(Contemporary Issues related to Topic)**		
Unit:2	**Boolean Algebra**	**6 Hours**
Basic logic circuits: Logic gates (AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR and their truth tables,), Universal Gates, Laws of Boolean algebra, De- Morgan's theorem. **(Contemporary Issues related to Topic)**		
Unit:3	**Minimization Techniques**	**6 Hours**
Min term, Max term, POS, SOP, K-Map, Simplification by Boolean theorems, don't care condition. Quine Mc-Cluskey method. **(Contemporary Issues related to Topic)**		
Unit:4	**Combinational Logic**	**6 Hours**
The Half adder, the full adder, subtractor circuit. Multiplxer de-multiplexer, decorder, BCD to seven segment Decorder, encoders **(Contemporary Issues related to Topic)**		
Unit:5	**Sequential Circuits**	**7 Hours**
Flip flop, set-reset laches, R-S flip-flop, D-flip flop, J-K Flip-flop, Master slave Flip flop, T flip-flop, excitation table of flip-flops. **(Contemporary Issues related to Topic)**		
Unit :6	**Registers&Counters**	**7 Hours**
Synchronous/Asynchronous counter operation, Up/down synchronous counter, application of counter, Serial in/Serial out shift register, Serial in/Serial out shift register, Serial in/parallel out shift register, parallel in/ parallel out shift register, parallel in/Serial out shift register, Bi-directional register. **(Contemporary Issues related to Topic)**		
Total Lecture Hours		**38 Hours**

Textbooks	
1	Modern Digital Electronics , RP Jain, Tata McGraw Hill, 3rd Edition
2	M. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd., 2003 Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
3	Donald P.Leach and Albert Paul Malvino, Digital Principles and Applications, 6thEdition, TMH, 2003.
4	Anandkumar- fundamental of digital circuit. 3rd edition. PHI

Reference Books	
1	Fundamentals of Logic Design, C.H.Roth, Public Work & Services, 3rd edition 2007.
2	Engg Approach to Digital Design, Fletcher, Prentice Hall of India 1993.
3	Digital Circuits & Microprocessors, Hebert Taub, Mc Graw Hill, 1988.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html

MOOCs Links and additional reading, learning, video material	
1	https://www.digimat.in/nptel/courses/video/108105132/L01.html
2	https://www.digimat.in/nptel/courses/video/108105113/L01.html
3	https://www.coursera.org/learn/digital-systems

II SEMESTER
22CSD207: Lab.: Digital Circuit Design

Students will be able to:

1. Simplify combination logic circuits using Boolean algebra.
2. Understand and demonstrate the various codes and illustrate their addition substraction.
3. Simply and exhibit the methods to solve logical functions using K- map and Quine Mc-Cluskey methods and apply it to implement combinational logic circuits.
4. Design and analyze Synchronous and Asynchronous sequential Circuits.

Expt. No.	Name of Experiments
1.	Introduction to LogicAid software and commands. Verifications of functions using Logic Aid and comparing the results with manual results.
2.	Introduction to Bread Board and Verify Truth Tables of basic Logic gates using Bread Board.
	Virtual Lab: **An Initiative of Ministry of Human Resource Development Under the National Mission onEducation through ICT**
3.	Construction of half/ full adder using XOR and NAND gates and verification of its operation.
4.	Verify Binary to Gray and Gray to Binary conversion using NAND gates only.
5.	Implementation of 4x1 multiplexer and 1x4 demultiplexer using logic gates.
6.	Verify the truth table of RS, JK, T and D flip-flops using NAND & NOR gates.
7.	Design and verify the 4- Bit Synchronous/ Asynchronous Counter using JK Flip Flop.
	Using SPICE
8.	Introduction to SPICE Digital model and commands. Verify Truth Tables of basic Logic gates &Universal Gates **using SPICE.**
9.	Design & verify Truth Table of Half adder & Full adder circuits **using SPICE.**
10.	Design & verify Truth Table of 4:1 Multiplexer & 1: 4 Demultiplexer circuits **using SPICE.**

II SEMESTER

22CSD208: Basic Electrical Machines

Course Outcomes:

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

1. Reproduce fundamentals of dc circuits.
2. Explain, construction, working and applications of various electrical machines.
3. Analyze performance of various electrical machines.

Unit:1	**D.C. Circuits**	**7 Hours**

D.C. Circuits: Basics of electrical circuits. Equivalent resistance, Kirchhoff's Laws. Current and Voltage division rule. Mesh and Nodal analysis of dc circuits. Superposition Theorem.
A.C. Fundamentals: Values of alternating quantity. Concept of power factor, reactive power and apparent power with power triangle.
(Contemporary Issues related to Topic)

Unit:2	**Single Phase Transformer**	**7 Hours**

Working principle. EMF equation. Voltage ratio and turns ratio. Step up and step down transformers. Construction of single phase transformer. Ideal transformer. Transformer on no load with phasor diagram and equivalent circuit. Practical transformer and its equivalent circuit. Referred values. Voltage Regulation. Losses in transformer. Open circuit and Short circuit tests on transformer. Efficiency and condition for maximum efficiency. Types of transformers and their applications.
(Contemporary Issues related to Topic)

Unit:3	**DC Motor**	**7 Hours**

Principle, Torque Equation, Characteristics and applications of various types of D.C. Motors, Starting of D.C. Motors, Speed control of Series and Shunt motors, Power flow in DC machines, Losses and Efficiency in D.C. machines.
(Contemporary Issues related to Topic)

Unit:4	**Three Phase Induction Motor**	**6 Hours**

Construction. Production of rotating magnetic field. Principle of operation. Speed and slip. Frequency of rotor voltage and current.. Applications of three phase induction motor.
(Contemporary Issues related to Topic)

Unit:5	**Stepper Motors**	**7 Hours**

Principle of operation, Constructional features, Types of stepper Motors, Various modes of operation of Variable reluctance (VR) stepper motors, torque production in Variable Reluctance (VR) stepping motor, Multi stack VR stepper motor, Construction and working of Permanent Magnet (PM) stepper motor, Construction and working of Hybrid stepper motor, Torque angle characteristics of the stepper motor.
(Contemporary Issues related to Topic)

Unit:6	Permanent Magnet Brushless DC Motors	7 Hours
Permanent Magnet Brushless DC Motors: Fundamentals of Permanent Magnets, Principle of operation, Magnetic circuit analysis, EMF and Torque equations, Characteristics and control. **Servomotors:** AC Servomotors & DC Servomotors. **(Contemporary Issues related to Topic)**		
	Total Lecture Hours	**41 Hours**

Textbooks	
1	T. K. Nagsarkar and M. S. Sukhija, Basic Electrical Engineering, 1st Edition, Oxford Higher Education, 2005
2	V. N. Mittle and A. K. Mittal, Basic Electrical Engineering, 2nd Edition,2006, The McGraw Hill Companies, New Delhi
3	B.L.Theraja, Electrical Technology, S.Chand, 2005
4	T. Kenjo and S. Nugatory, Permanent Magnet and Brushless DC motors, England, Clarendon Oxford Press, 1989

Reference Books	
1	I J Nagrath and D. P.Kothari, Basic Electrical Engineering, 2nd Edition,2002, McGraw Hill, New Delhi
2	Vincent Del Toro, Electrical Engineering Fundamentals, 2nd Edition,2002, Prentice Hall India, New Delhi

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://link.springer.com/openurl?genre=book&isbn=978-3-642-25904-3
2	http://link.springer.com/openurl?genre=book&isbn=978-1-4614-0399-9

MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/108105155
2	https://nptel.ac.in/courses/108105155
3	https://nptel.ac.in/courses/108105155

II SEMESTER

22CSD209: Lab.: Basic Electrical Machines

After completion of the laboratory work, student will demonstrate the ability to

1. Perform laboratory experiments and demonstrate competency in collecting, interpreting, analyzing data, communicate and present effectively through laboratory journals

Expt. No.	Name of Experiments
1.	To verify Kirchhoff's voltage law and Kirchhoff's current law.
2.	To study R —L— C series circuit
3.	To verify Superposition theorem.
4.	To study R —L— C parallel circuit.
5.	To study balanced three phase star (Y} connected load.
6.	To perform O.C. and S.C. tests on a single phase transformer
7.	To study balanced three phase delta connected load
8.	To find transformation ratio, regulation and efficiency of a single phase transformer
9.	To study speed control of dc motor.
10.	To study speed control of three phase induction motor.

II SEMESTER

22CSD210: Lab.: Engineering Design

Course Outcomes
Upon successful completion of the course the students will be able to
1. Identify different orthographic views using knowledge of geometrical entities.
2. Translating the geometries from 2D to 3D and vice versa.
3. Visualization of models using different rendering effects.
4. Record and Transform part and assembly motion into animation.

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

Expt. No	Name of Experiment
1	**Basic introduction to geometrical entities**
2	**Visualizing different orthographic views for the given 3-D object**
3	**Creation of 3-D to 2-D views using any CAD software**
4	**Creation of 2-D to 3-D objects using any CAD software**
5	**Modification of 3-D objects using special geometrical features**
6	**Creation of realistic representation of models using any CAD software**
7	**Evaluating true-to-life models using textures and appearance effects**
8	**Rendering of models using different environments, lighting conditions, shading effects**
9	**Capturing the motion of parts and assemblies using any CAD software**
10	**Creation of animation and exporting the file to any windows based media software**

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

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
2.	

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
2.	

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 Information Technology

B. Tech in Computer Science and Design

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 Information Technology)

Computer Science and Design

SoE No. 22CSD-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
THIRD SEMESTER															
1	3	BS	GE/GE	22CSD301	Linear Algebra	T	3	1	0	4	4	30	30	40	3
2	3	PC	CSD	22CSD302	Microprocessors and Microcontrollers	T	3	0	0	3	3	30	30	40	3
3	3	PC	CSD	22CSD303	Lab:Microprocessors and Microcontrollers	P	0	0	2	2	1		60	40	
4	3	PC	CSD	22CSD304	Data Structures	T	4	0	0	4	4	30	30	40	3
5	3	PC	CSD	22CSD305	Lab:Data Structures	P	0	0	2	2	1		60	40	
6	3	PC	CSD	22CSD306	Computer System Organization	T	3	0	0	3	3	30	30	40	3
7	3	PC	CSD	22CSD307	Theoretical Foundation of Computer Sciences	T	3	0	0	3	3	30	30	40	3
8	3	PC	CSD	22CSD308	Software Lab-I	P	0	0	4	4	2		60	40	
9	3	PC	CV/CSD	22CSD309	Environmental Sustainability, Pollution and Management	**T**	3	0	0	3	3	30	20	50	3 Hrs
						TOTAL	**19**	**1**	**8**	**28**	**24**				
List of Mandatory Learning Course (MLC)															
1	3	HS	GE/T&P	MLC2123	YCAP3 -	**A**	2	0	0	2	0				
2	3	BES	CSD	MLC119	Technical Documentation	**A**	2	0	0	2	0				

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
FOURTH SEMESTER															
1	4	BS	GE	22CSD401	Discrete Mathematics and Graph Theory	T	3	1	0	4	4	30	30	40	3
2	4	PC	CSD	22CSD402	Operating Systems	T	3	0	0	3	3	30	30	40	3
3	4	PC	CSD	22CSD403	Lab : Operating Systems	P	0	0	2	2	1		60	40	
4	4	PC	CSD	22CSD404	Computer Networks	T	3	0	0	3	3	30	30	40	3
5	4	PC	CSD	22CSD405	Object Oriented Programming	T	3	0	0	3	3	30	30	40	3
6	4	PC	CSD	22CSD406	Lab:Object Oriented Programming	P	0	0	2	2	1		60	40	
7	4	PC	CSD	22CSD407	Design and Analysis of Algorithms	T	3	0	0	3	3	30	10	60	3
8	5	PC	CSD	22CSD409	Lab.:Design and Analysis of Algorithms	P	0	0	2	2	1		60	40	
9	4	PC	CSD	22CSD410	Software Lab-II	P	0	0	4	4	2		60	40	
						TOTAL	**15**	**1**	**10**	**26**	**21**				
List of Mandatory Learning Course (MLC)															
1	4	HS	GE/T&P	MLC2124	YCAP4 -	**A**	2	0	0	2	0				
2	4	BES	CSD	MLC120	Open Source Tool for Graphics	**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
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III SEMESTER

22CSD301: 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**

			July 2022	1.00	Applicable for AY 2022-23 Onwards
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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/

III SEMESTER

22CSD302: Microprocessors and Microcontrollers

Course Outcomes :

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

1. Identify a detailed software & hardware structure of the Microprocessor and microcontroller
2. Determine the addressing modes and instruction sets related to programming of 8086 and 8051
3. Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor and microcontroller.
4. Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.

Unit I: 8086 architecture	**(6 Hrs.)**
Internal architecture & pin diagram of 8086/8088 microprocessor, Minimum & Maximum mode, even & odd memory banks, Accessing memory & I/O ports, Memory mapping in minimum mode. **Contemporary Issues related to Topic**	
Unit II : Programming with 8086/8088	**(7 Hrs.)**
Addressing Modes, Instruction set, Instruction encoding format, Timing diagram Assembler directives, 8086 programming examples, String operations, File I/O processing, Far & Near procedures, Macros **Contemporary Issues related to Topic**	
Unit III: Interfacing with 8086/8088	**(6 Hrs.)**
Memory interfacing, Intel 8255 PPI, Block diagram & interfacing with ADC DAC, Modes & initialization. **Contemporary Issues related to Topic**	
Unit IV	**(6 Hrs.)**
Overview of 8051 Microcontroller family, Introduction to MCS 51 family, Architecture, Memory organization, Internal RAM, Flag Register, Register Banks, SFRs , Functional pin description and various resources of MCS 51. Hardware Overview **Contemporary Issues related to Topic**	
Unit V	**(7 Hrs.)**
Addressing modes, Instruction set and Assembly language programming Programs using look up table, Bit manipulation, 8051 I/O programming, Delay Programs **Contemporary Issues related to Topic**	
Unit VI	**(7 Hrs.)**
I/O Interfacing such as LED, switches, 7segment display, keyboard matrix programming, 8051 programming in C: Data types and time delay, I/O programming, Logic operations, Data conversion programs, Lookup table access. **Contemporary Issues related to Topic**	
Total Lecture	**39 Hours**

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Textbooks:	
1.	A.K ray and K.M.Bhurchandani Advanced microprocessors and peripherals 2nd edition 2006 TMH
2.	Muhammad Ali Mazidi The 8051 Microcontroller and Embedded systems using assembly & C 2nd edition Pearson Education Asia LPE

Reference Books:	
1.	K.Uma Rao, Andhe Pallavi The 8051 Microcontrollers, Architecture and programming and Applications Pearson,2009.
2.	Douglas V.Hall Microprocessors and Interfacing: Programming and Hardware Third edition TMH
3.	Kenneth.J.Ayala The 8051 microcontroller 3rd edition Cengage learning,2010

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

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=YqrFeU90Coo
2.	https://www.youtube.com/watch?v=Si9MzFqBs8E
3.	https://www.youtube.com/watch?v=6VF2Q0pgUFI

III Semester

CSD303 : LAB. Microprocessors and Microcontrollers

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Identify a detailed software & hardware structure of the Microprocessor and microcontroller 2. Determine the addressing modes and instruction sets related to programming of 8086 and 8051 3. Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor and microcontroller. 4. Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.

List of Practical's

Sr. No..	Problem Statements
1	Data block transfer using 8086 microprocessor
2	Find the maximum data byte in a block using 8086 microprocessor
3	Count even numbers present in a data block using 8086 microprocessor
4	Convert packed BCD number to its equivalent Hexadecimal number using 8086 microprocessor
5	Convert gray code into binary code using 8086 microprocessor
6	Generate square waveform using DAC using 8051
7	Generate sawtooth waveform using DAC using 8051
8	To find average of numbers using 8051 microcontroller
9	Toggle LED connected to port pin of micro-controller 8051
10	Display BCD no. on seven segment display

III SEMESTER

22CSD304 : Data Structure

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand basic data structures like array, list, stack, queue, tree, and graph. 2. Develop knowledge of basic data structures such as arrays, linked lists 3. Apply appropriate data structures in problem solving 4. Design application by using data structures and algorithms for real world problems.

Unit I	**(6 Hrs.)**
Data structures basics, Mathematical /algorithmic notations & functions, Complexity of algorithms, Sub algorithms. Big oh and theta notations and omega notations, Average, best and worst case analysis String processing: storing strings, character data type, string operations, word processing, and pattern matching algorithms. **Contemporary Issues related to Topic**	
Unit II	**(7 Hrs.)**
Linear arrays and their representation in memory, traversing linear arrays, inserting & deleting operations, sorting Techniques, Linear search and Binary search algorithms. Multidemensional arrays, Pointer arrays. Record structures and their memory representation. Matrices and sprase matrices. **Contemporary Issues related to Topic**	
Unit III	**(7 Hrs.)**
Linked lists and their representation in memory, traversing a linked list, searching a linked list. Memory allocation & garbage collection. Insertion deletion opeartions on linked lists. Header linked lists, Two-way linked lists. polynomial representations and manipulations are using linked list, circular linked list, doubly linked list, Generalized list. **Contemporary Issues related to Topic**	
Unit IV	**(6 Hrs.)**
Stacks and their array representation. Arithmetic expressions: Polish notation. Quick sort, an application of stacks, Recursion. Tower of Hanoi problem. Implementation of recursive procedures by stacks, Queues. , Circular queues, Priority Queues, Dequeue **Contemporary Issues related to Topic**	
Unit V	**(7 Hrs.)**
Trees, Binary trees & and their representation in memory, Traversing binary trees. Traversal algorithms using stacks, Header nodes : threads. Threaded Binary Trees, Binary search trees, searchng, inserting and deleting in binary trees. Applications, The concept of balancing and its advantages, B-Trees, B+ Trees, AVL Trees. Heap and heapsort. General trees. **Contemporary Issues related to Topic**	

Unit VI	(6 Hrs.)
Graphs and digraphs: Representations, Breadth and depth first searches, connected component, spanning trees, shortest path–single source & all pairs , activity networks, topological sort, Hamiltonian path. Graph theory, sequential representations of graphs, Warshalls' algorithm, Linked representation, operations & traversing the graphs. Posets & Topological sorting. hash functions **Contemporary Issues related to Topic**	
Total Lecture	**39 Hours**

Textbooks:	
1.	Brian W. Kernighan and Dennis M. Ritchie The C Programming Language Prentice Hall of India
2.	E. Balaguruswamy Programming in ANSI C Tata McGraw-Hill
3.	R. G. Dromey How to Solve it by Computer Pearson Education

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

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology/5._DataStructuresAndAlgorithmsWith%20Python.pdf
2	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=YqrFeU90Coo
2.	https://www.youtube.com/watch?v=Si9MzFqBs8E
3.	https://www.youtube.com/watch?v=6VF2Q0pgUFI

III SEMESTER
22CSD305 : Lab. Data Structure

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

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

SN	**Experiments based on**
1	Write a program to perform following operations on Array. a) Traverse b) Insertion c) Deletion
2	Write a program to implement Sorting and Searching Techniques.
3	Program for allocating memory dynamically for single dimensional array and sort it using quick sort and merge sort.
4	Write a program to implement following Operations in Linked List a) Traverse b) Insertion c) Deletion
5	Write an application to implement Tower of Hanoi Problem Algorithm
6	Write an application to implement Abstract data type stack.
7	Write a program to evaluate Post fix expression using stack.
8	Write a program to implement Preorder Traversal of a binary tree.
9	Program to create file for storing details of all the items needed for playing any game of your choice also perform display, insertion of new record at any location, deletion of any record.
10	Write a Program to Perform insertion or search in a specified level of a stack implemented tree-structured symbol table.

III SEMESTER
22CSD306 : Computer System Organization

Course Outcomes :

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

1. Students will be able to describe fundamentals of computer architecture and organization
2. Students will be able to write control sequence for instructions
3. Students will be able to identify control unit operations and understand performances issue in processor and memory.
4. Students will be able to perform arithmetic operations and describe its storage formats.
5. Students will be able to design main memory organization that uses banks for different word size operations and describe the concept of cache mapping techniques.
6. Students will be able to describe the concept of I/O organization and discuss some advanced methods for improving systems performance.

Unit I	**(7 Hrs.)**
Basic Structure of Computer Hardware and Software: Functional Units, Basic Operational Concepts, addressing methods and machine program sequencing : Memory Locations , addressing and encoding of information, Main memory operation . Instruction Format, limitations of Short word- length machines, High level language considerations **Contemporary Issues related to Topic**	
Unit II	**(8 Hrs.)**
Processing Unit: Some fundamental concepts, Single, two, three bus organization, Instruction set architecture of a CPU – registers, instruction execution cycle, RTL interpretation of instruction, Instruction sequencing, addressing modes. Case study – instruction sets of some common CPUs. **Contemporary Issues related to Topic**	
Unit III	**(7 Hrs.)**
Hardwired Control : Design Micro-programmed Control: Microinstructions, Grouping of control signals, Micro program sequencing, Micro Instructions with next Address field, Perfecting microinstruction, Emulation, Bit Slices. Case study – design of a simple hypothetical CPU **Contemporary Issues related to Topic**	
Unit IV	**(8 Hrs.)**
Arithmetic: Number Representation, Addition of Positive numbers, Logic Design for fast adders, Addition and Subtraction , Arithmetic and Branching conditions, Multiplications of positive numbers, Signed- Operand multiplication, fast Multiplication, Booth's Algorithm, Integer Division, Floating point numbers and operations. **Contemporary Issues related to Topic**	

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Unit V	**(8 Hrs.)**
The main Memory: some basic concepts, semiconductor RAM memories, Memory system consideration, semiconductor ROM memories, Multiple module memories and interleaving, Cache Memory, Mapping techniques, Replacement algorithms, write policies Virtual memories, memory management requirements. **Contemporary Issues related to Topic**	
Unit VI	**(7 Hrs.)**
Computer Peripherals: I/O Devices, I/O device interface, DMA, Interrupt handling Role of interrupts in process state transitions, I/O device interfaces – SCII, USB Introduction to Pipelining, Throughput and speedup, pipeline hazards Introduction to parallel processors. **Contemporary Issues related to Topic**	
Total Lecture	**45 Hours**

Textbooks:	
1.	David A. Patterson and John L. Hennessy Computer Organization and Design: The Hardware/Software Interface 5th Edition Elsevier
2.	Carl Hamacher Computer Organization and Embedded Systems McGraw Hill Higher Education 6th Edition
3.	Carl Hamacher Computer architecture and organization McGraw Hill Higher Education 4th Edition

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

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

III SEMESTER

22CSD307 : Theoretical Foundation of Computer Sciences

Course Outcomes :

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

1. To apply basic properties of formal languages & to design Finite automata.
2. To analyze & formulate Regular Expression & Regular Grammar. And analyze & design Turing machine & demonstrate basic concept of Recursive Language
3. Understand Context Free Grammar & Construct CFG for the formal language
4. To apply properties of CFL & design of Push Down automata.
5. To demonstrate the understanding of key notions such as undeciadibility, post Correspondence problem & Recursive enumerable language

Unit I	**(5 Hrs.)**
Introduction: Alphabet, Symbols, Sets, Strings, Language, Operations, Relations, Finite Automata: Design of Finite Automata, Acceptance of strings and languages, Deterministic Finite Automation , Non-Deterministic Finite Automation, Equivalence between NFA and DFA , NFA with ε-transition, Minimization of FA. **Contemporary Issues related to Topic**	
Unit II	**(5 Hrs.)**
Regular sets, Regular expressions, Manipulation of regular expressions, Equivalence between RE and FA. Pumping Lemma for regular languages, closure properties of regular sets, properties of regular languages, Chomsky hierarchy of languages, Regular grammars, Right linear and left linear regular grammars, interconversion, Equivalence between regular grammar and FA, Interconversion between RE and RG. **Contemporary Issues related to Topic**	
Unit III	**(7 Hrs.)**
Context free grammar, Derivation trees (Parse tree), Syntax tree , Ambiguous Grammar, Context Free Language (CFL), Closure properties of CFL, Simplification of CFG, Normal Forms of grammar: Chomsky Normal Form (CNF), Greibach Normal Form (GNF), CYK algorithm. **Contemporary Issues related to Topic**	
Unit IV	**(9 Hrs.)**
Push down automata, definition and model, acceptance of CFL by empty Stack and by final state, Design of PDA for the CFL, equivalence CFG and PDA, Inter conversion, DPDA & NDPDA. **Contemporary Issues related to Topic**	
Unit V	**(8 Hrs.)**
Turing machine, Definition, Model of TM, Design of Turing Machine, Computable functions, Recursive enumerable language, Recursive Language, Properties of Recursive enumerable language, Variants of Turing machines, non deterministic TMs and equivalence with deterministic TMs, context sensitive language (CSG), Linear bounded automata. **Contemporary Issues related to Topic**	

Unit VI	(6 Hrs.)
Undecidability: Church-Turing thesis, Undecidable Problems related to Recursive enumerable language and Turing Machine, post correspondence problem (PCP), Universal Turing Machine, The universal and diagonalization languages, reduction between languages and Rice's theorem, Recursive function: Basis functions and operations on them. Bounded minimization, unbounded minimization, preemptive recursive function and μ recursive function. **Contemporary Issues related to Topic**	
Total Lecture	**40 Hours**

Textbooks:	
1.	John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman T1: Introduction to Automata Theory, Languages and computation Pearson Education Asia 2nd edition, 2000
2.	John C. Martin T2: Introduction to languages and the Theory of Automata Tata McGraw Hill 3rd edition, 2003.

Reference books:	
1.	Harry R. Lewis and Christos H. Papadimitriou R1: Elements of the Theory of Computation Pearson Education Asia
2.	Michael Sipser R2: Introduction to the Theory of Computation PWS Publishing
3.	O.G. Kakde R3: Theory of Computation USP 2008

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

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

III SEMESTER
22CSD308 : Software Lab

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand the basic data types, built in data structures, control statements and loops and write simple programs in Python 2. To understand the concepts of functions modules and packages and write complex programs using them. 3. To understand defining and handling Python objects and develop classes required for the given application 4. To develop a useful application in Python.

SN	Contents
1	Build-in Data types: Data type & Variables, Python numbers, Python Strings, Python built in data structures: Lists, Dictionaries, Tuples, Sets, Arrays. Datatype conversion. Statements: Assignment statement, import statement, print statement, input statement, Python Control Statements: if, if – else, elif statements, Loop statements: For, while, continue and break, try and except statement, raise, with statements, case statement.
2	The def statement, returning values, parameters, arguments, local variables, global variables and global statement, doc
3	Python Object and Classes: A simple class, defining methods, member variables, The constructor, calling methods, adding inheritance, class variables, class methods and static methods, Interfaces, New-style classes, Doc strings for classes, Private members, Python Operator Overloading, Python inheritance and polymorphism, Exception Handling, Python Modules.
4	Developing applications in Python using built in and customized modules and packages.

Sr.	Topics to be Covered	Sample Problem Statement
1.	Demonstration of Build-in Data types: Data type & Variables, Python numbers	Write a Python program to compute the roots of a quadratic equation
2.	Demonstration of Python Lists.	Write a Python program to perform following operations: Insertion of element in a given list Deletion of element from the given list
3.	Demonstration of different Statements: Assignment statement, import statement, print statement, input statement	Write a Python program to find square root of a number

4.	Demonstration of control statements: if, if – else, elif statements	Write a Python program to enter day number (1-7) and print the corresponding day of week name using if else. (e.g 5 then Friday)
5.	Demonstration of Loop statements: For, while, break, continue	Write a Python program to print all prime numbers from 1 to 100 (using nested loops, break and continue)
6.	Demonstration of try and except statement, raise, with statements, case statement	Write a Python program which take character as input and determine about vowels and consonants using case statement.
7.	Demonstration of Python Functions: The def statement, returning values, parameters, arguments	Write a Python program using user defined function to find the sum of following series. 1/1! + 2/2! + 3/3! + ……1/N!
8.	Demonstration of Python Mathematical Function	Write a Python Program to implement some mathematical functions
9.	Demonstration of Python File Handling	Write a Python program to read data from "Input.txt" file using File Input Class and write output to "Output.txt" using File Output class.
10.	Demonstration of Python Object and Classes: A simple class, defining methods, member variables	Write a program to define a class Employee with four data members such as Emp_name, Emp_id, Salary and department_id. Define appropriate methods to initialize and display the values of data members. Also calculate Gross salary of employee based on Basic Salary, TA, DA and HRA of employee
11.	Demonstration Python inheritance	Create a class Account that stores the customer name, account, number and type of account. From this derive the classes Current-acct and Saving-acct to make them more specific to their requirement. Include necessary methods in order to achieve the following tasks: (a) Accept deposit from a customer and update the balance. (b) Display the balance (c) Compute and deposit interest. (d) Permit withdrawals (e) Check the minimum balance, impose penalty, if necessary and update the balance
12.	Demonstration of Python Exception Handling.	Write a program to implement Exception handling in Python.
13	Building Application	Develop some useful application in Python

III SEMESTER

22CSD309 : 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**

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

Audit Course

III SEMESTER

MLC2123 : (YCAP 3)

Audit Course

III SEMESTER

MLC119 : Technical Documentation

Course Outcomes :
Upon successful completion of the course the students will be able to
1) Understand the use LaTeX.
2) Write mathematical documents via LaTeX.
3) Writes articles in different journal styles.
4) Draws graphs and figures in LaTeX.
5) Custimize LaTeX documents.
6) Prepare presentation using LaTeX.

Unit I:	**(4 Hrs.)**
Installation of the software LaTeX, Understanding Latex compilation Basic Syntex, Writing equations, Matrix, Tables	
Unit II :	**(3 Hrs.)**
Page Layout – Titles, Abstract Chapters, Sections, Referrences, Equation references, citation.	
Unit III:	**(4 Hrs.)**
List making environments Table of contents, Generating new commands, Figure handling numbering, List of figures, List of tables, Generating index.	
Unit IV :	**(5 Hrs.)**
Packages: Geometry, Hyperref, amsmath, amssymb, algorithms, algorithmic graphic, color, tilez listing.	
Unit V:	**(4 Hrs.)**
Classes: article, book, report, beamer, slides, IEEEtran	
Unit VI:	**(4 Hrs.)**
Applications to: Writing Resume Writing question paper Writing articles/ research papers Presentation using beamer	
Total Lecture	**24 Hours**

Textbooks/ Reference Books :	
1.	LaTeX Beginner's Guide, 2nd Edition by Stefan Kottwitz
2.	A Beginners Guide to Latex by Chetan Shirore
3.	A Guide to LATEX: Document Preparation for Beginners and Advanced Users (3rd Edition) Subsequent Edition, by Helmut Kopka

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MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=TWRP_94eock
2.	https://www.youtube.com/watch?v=TyTx-BuLFh0

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Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

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

Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2022

4th Semester

(Department of Information Technology

B. Tech in Computer Science and Design

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 Information Technology)

Computer Science and Design

SoE No. 22CSD-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
THIRD SEMESTER															
1	3	BS	GE/GE	22CSD301	Linear Algebra	T	3	1	0	4	4	30	30	40	3
2	3	PC	CSD	22CSD302	Microprocessors and Microcontrollers	T	3	0	0	3	3	30	30	40	3
3	3	PC	CSD	22CSD303	Lab:Microprocessors and Microcontrollers	P	0	0	2	2	1		60	40	
4	3	PC	CSD	22CSD304	Data Structures	T	4	0	0	4	4	30	30	40	3
5	3	PC	CSD	22CSD305	Lab:Data Structures	P	0	0	2	2	1		60	40	
6	3	PC	CSD	22CSD306	Computer System Organization	T	3	0	0	3	3	30	30	40	3
7	3	PC	CSD	22CSD307	Theoretical Foundation of Computer Sciences	T	3	0	0	3	3	30	30	40	3
8	3	PC	CSD	22CSD308	Software Lab-I	P	0	0	4	4	2		60	40	
9	3	PC	CV/CSD	22CSD309	Environmental Sustainability, Pollution and Management	**T**	3	0	0	3	3	30	20	50	3 Hrs
						TOTAL	**19**	**1**	**8**	**28**	**24**				
List of Mandatory Learning Course (MLC)															
1	3	HS	GE/T&P	MLC2123	YCAP3 -	**A**	2	0	0	2	0				
2	3	BES	CSD	MLC119	Technical Documentation	**A**	2	0	0	2	0				

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
FOURTH SEMESTER															
1	4	BS	GE	22CSD401	Discrete Mathematics and Graph Theory	T	3	1	0	4	4	30	30	40	3
2	4	PC	CSD	22CSD402	Operating Systems	T	3	0	0	3	3	30	30	40	3
3	4	PC	CSD	22CSD403	Lab : Operating Systems	P	0	0	2	2	1		60	40	
4	4	PC	CSD	22CSD404	Computer Networks	T	3	0	0	3	3	30	30	40	3
5	4	PC	CSD	22CSD405	Object Oriented Programming	T	3	0	0	3	3	30	30	40	3
6	4	PC	CSD	22CSD406	Lab:Object Oriented Programming	P	0	0	2	2	1		60	40	
7	4	PC	CSD	22CSD407	Design and Analysis of Algorithms	T	3	0	0	3	3	30	10	60	3
8	5	PC	CSD	22CSD409	Lab.:Design and Analysis of Algorithms	P	0	0	2	2	1		60	40	
9	4	PC	CSD	22CSD410	Software Lab-II	P	0	0	4	4	2		60	40	
						TOTAL	**15**	**1**	**10**	**26**	**21**				
List of Mandatory Learning Course (MLC)															
1	4	HS	GE/T&P	MLC2124	YCAP4 -	**A**	2	0	0	2	0				
2	4	BES	CSD	MLC120	Open Source Tool for Graphics	**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**

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IV SEMESTER

22CSD401 : Discrete Mathematics and Graph Theory

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

Unit:1	**Mathematical Logic and Set Theory**	**6 Hours**
Statement and Notation: Negation, Conjunction, Disjunction, Tautologies, Truth Tables, Basic Concepts of Set Theory, Inclusion & equality of set, Power Set, Ordered Pairs and n-tuples, Operations on Sets, mathematical induction. Propositions, Predicate logic. **Contemporary Issues related to Topic**		

Unit:2	**Relations and Functions**	**6 Hours**
Relations and Ordering, Relation Matrix and Graphs, Partition and Covering of a set, Equivalence relation, Partial order relation, Partially Ordered sets, Functions, Composition of functions, Inverse Functions, Characteristics function of a set. **Contemporary Issues related to Topic**		

Unit:3	**Group Theory**	**7 Hours**
Groups, Subgroups and Homomorphism, Cosets and Lagrange's theorem, Normal subgroups. Semi groups and Monoids Homomorphism of semigroups and monoids, Sub semi groups and monoids. **Contemporary Issues related to Topic**		

Unit:4	**Rings**	**6 Hours**
Definitions and Examples, sub ring, Integral domain, ring homomorphism, ideal of ring polynomial. **Contemporary Issues related to Topic**		

Unit:5	**Field and Lattices**	**7 Hours**
Definitions and Examples, Finite Field, Ordered sets, Hasse Diagrams of partially Ordered sets. Lattices, Bounded Latices, Complements Latices, Definitions and Examples of Finite Field, Ordered sets, Hasse Diagrams of partially Ordered sets. Lattices, Bounded Latices, Complements Latices. **Contemporary Issues related to Topic**		

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Unit :6	Graph Theory	7 Hours
Basic concepts of graph theory, Basic definitions, Paths and circuits, Reach ability and connectedness, Matrix Representation of graphs, Tree and their representation and operations, Rooted trees, Path lengths in rooted trees, Multi graphs and weighted graphs, and graph isomorphism, shortest paths in weighted graphs, Hypergraphs, transitive closure, Spanning trees, Kruskal's algorithm, Prim's algorithm. **Contemporary Issues related to Topic**		
	Total Lecture Hours	**39 Hours**

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

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

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

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

IV SEMESTER

22CSD402 : Operating System

Course Outcomes :
Upon successful completion of the course the students will be 1. understand the fundamental concepts in Operating Systems (OS) and understand how various hardware features support OS functionality 2. Explain various OS mechanisms and policies for managing system resources. 3. Analyze algorithms and techniques for managing various OS resources in a multiprogramming and other environments. 4. Evaluate the performance of algorithms for managing various OS resources.

Unit I: Introduction to OS	**(6 Hrs.)**
evolution of OS, basic hardware support necessary for modern operating systems, Layered Structural of OS, Services provided by OS, system calls, Dual mode of operation. Input-output Management : Basics of I/O hardware, Polling, Interrupts and DMA. **Contemporary Issues related to Topic**	
Unit II	**(7 Hrs.)**
Introduction, process control block, process states, process context switch, introduction to threads, CPU scheduling, goals of scheduling, Algorithmic evaluation of CPU scheduling algorithms. **Contemporary Issues related to Topic**	
Unit III	**(6 Hrs.)**
Process cooperation and synchronization, race condition, critical region, mutual exclusion and implementation, semaphores, classic problems of Synchronization using semaphores. **Contemporary Issues related to Topic**	
Unit IV	**(7 Hrs.)**
Access methods, Directory Structure disk space management and space allocation strategies, disk arm scheduling strategies: FCFS, SSTF, SCAN, CSACN, LOOK, CLOOK, Selecting a disk scheduling algorithm. **Contemporary Issues related to Topic**	
Unit V	**(6 Hrs.)**
Contiguous allocation, static and dynamic partitioning, and non-contiguous, paging and segmentation, translation look aside buffer (TLB) and overheads. **Contemporary Issues related to Topic**	
Unit VI	**(7 Hrs.)**
Demand paging, page replacement algorithms, thrashing, working set model. **Deadlocks**: necessary conditions, deadlock detection, deadlock avoidance, deadlock prevention, recovery from deadlock. loss A/c and Balance Sheet **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.	Silberchatz & galvin Operating system concepts 8th Edition
2.	William Staling Operating System 5th Edition

Reference books:	
1.	A.S. Tanenbaum Modern operating systems 2nd Edition
2.	Milan MilenKovic Operating system concepts 2nd Edition

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

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

IV SEMESTER
22CSD403 : Lab. Operating Systems

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand the advanced OS commands 2. Understand the working of processes and threads and their synchronization practically. 3. Understand various algorithms and techniques used by OS for managing resources through software simulation.

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

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

IV SEMESTER

22CSD404 : Computer Networks

Course Outcomes :
Upon successful completion of the course the students will be 1. Explain the functions of the different layer of architectures and Models. 2. Demonstrate basic understanding of hardware, software and types of transmission media used in computer networks. 3. Describe the concept of various protocols used in data link layer. 4. Demonstrate the knowledge of adaptive and no adaptive routing algorithms 5. Demonstrate the concept of Quality of Service provided by the transport layer. 6. Apply basic knowledge cryptography techniques for network security.

Unit I	**(6 Hrs.)**
The use of computer networks, LAN‟s, MAN‟s, WAN‟s. topologies and their characteristics, wireless networks, protocol hierarchies, design issues for layers, interfaces and services, connection oriented and connectionless services, service primitives relationship of services to protocols.The Network Core ,Packet Switching, Circuit Switching, A Network of Networks ,Delay, Loss, and Throughput in Packet-Switched Networks , Overview of Delay in Packet-Switched Networks, Queuing Delay and Packet Loss,End-to-End Delay,Throughput in Computer Networks, Protocol Layers and Their Service Models, Layered Architecture Encapsulation The OSI reference model. TCP/IP reference model, Comparison of OSI & TCP/IP reference model. **Contemporary Issues related to Topic**	
Unit II	**(7 Hrs.)**
Physical layer: theoretical basis for data communication, Guided transmission media, wireless transmission: electromagnetic spectrum, radio transmission, infrared transmission. Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum. **Contemporary Issues related to Topic**	
Unit III	**(7 Hrs.)**
Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Switched Local Area Networks, Link-Layer Addressing and ARP, Ethernet, Link-Layer Switches, Virtual Local Area Networks (VLANs) **Contemporary Issues related to Topic**	
Unit IV	**(6 Hrs.)**
Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Switched Local Area Networks, Link-Layer Addressing and ARP, Ethernet, Link-Layer Switches, Virtual Local Area Networks (VLANs). **Contemporary Issues related to Topic**	

Unit V	**(6 Hrs.)**
Transport Layer: Connection-Oriented Transport: TCP , The TCP Connection Segment Structure , Round-Trip Time Estimation and Timeout , Reliable Data Transfer, Flow Control Connection Management , Principles of Congestion Control, The Causes and the Costs of Congestion, Approaches to Congestion Control , Network-Assisted Congestion, Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm. Performance issues: performance problems in networks, network performance measurement. **Contemporary Issues related to Topic**	
Unit VI	**(7 Hrs.)**
Application Layer: Principles of Network Applications , Network Application Architectures Processes Communicating 88, Transport Services Available to Applications ,Transport Services Provided by the Internet , Application-Layer Protocols, The Web and HTTP, Overview of HTTP, Non-Persistent and Persistent Connections , HTTP Message Format, User-Server Interaction: Cookies , Web Caching ,The Conditional GET, Firewalls, Network security: cryptography, introduction to symmetric and public key algorithms, digital signatures, authentication protocols, e-mail and web security. **Contemporary Issues related to Topic**	
Total Lecture	**39 Hours**

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

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

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1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology/39.Guide%20to%20computer%20network%20security.pdf

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

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IV SEMESTER

22CSD405 : Object Oriented Programming

Course Outcomes :

Upon successful completion of the course the students will be

1. Understand basic features of JAVA as an object oriented-programming language.
2. Write, compile, test and run simple Java programs
3. Write object based programs with object oriented features.
4. Demonstrate the ability to use simple data structures like arrays in a Java program. Use and explain the difference between a String and a StringBuffer object.
5. Demonstrate exceptions that can be recognized and handled by the Java programming language, Understand stream classes, Use it to save and read the data in a file
6. Be able Use Java programming language features to design and create Java applets.

Unit I	**(8 Hrs.)**
OOP concepts: Classes and objects, data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, procedural and object oriented programming paradigm. Java programming: History of java, comments data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow statements, jump statements, simple java stand alone programs, console input and output, formatting output, constructors ,methods, parameter passing, static fields and methods, access control, this reference, overloading methods and constructors, recursion, garbage collection **Contemporary Issues related to Topic**	
Unit II	**(7 Hrs.)**
Inheritance: Inheritance hierarchies, super and subclasses, member access rules, super keyword, preventing inheritance: final classes and methods, the object class and its methods; Polymorphism: dynamic binding, method overriding, abstract classes and methods; Interface: Interfaces VS Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface; Packages: Defining, creating and accessing a package, understanding CLASSPATH, importing packages **Contemporary Issues related to Topic**	
Unit III	**(8 Hrs.)**
Arrays, Strings Arrays, One Dimensional Arrays, Two Dimensional Arrays, variable size arrays, Strings and String Buffer classes, Wrapper Classes,Collection Vector and Framework: Introduction to collection framework, Vectors, Array List, Linked list, Hashset, Treeset, Hashmap **Contemporary Issues related to Topic**	
Unit IV	**(8 Hrs.)**
Exception Handling: Benefits of exception handling, the classification of exceptions , exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, exception specification, built in exceptions, creating own exception sub classes. Multithreading: Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter thread communication.	

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Unit V	**(7 Hrs.)**
Files: streams, byte streams, character stream, text input/output, binary input/output, random access file operations, file management using file class: Connecting to Database, querying a database and processing the results, updating data with JDBC. **Contemporary Issues related to Topic**	
Unit VI: Virtual memory	**(8 Hrs.)**
GUI Programming with Java: The AWT class hierarchy, introduction to swing, swings Vs AWT, hierarchy for swing components. Containers: JFrame, JApplet, JDialog, Jpanel, overview of some swing components: JButton, JLabel, JTextField, JTextArea, simple applications.Layout management: Layout manager types, border, grid and flow.Applets: Inheritance hierarchy for applets, differences between applets and applications, life cycle of an applet, passing parameters to applets **Contemporary Issues related to Topic**	
Total Lecture	**45 Hours**

Textbooks:	
1.	Bruce Eckel Thinking in Java Prentice Hall

Reference books:	
1.	Herbert Schildt Java2 Complete Reference McGraw-Hill
2.	E. Balagurusamy Programming with Java TATA McGraw-Hill

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

IV SEMESTER

22CSD406 : Lab. Object Oriented Programming

Course Outcomes
Upon successful completion of the course the students will be able to 1. Design, develop, test, and debug programs using object oriented principles using java.

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

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

IV SEMESTER

22CSD407 : Design & Analysis of Algorithms

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

Unit I:	**(7 Hrs.)**
Mathematical foundations, summation of arithmetic and geometric series, recurrence relations, solutions of recurrence relations using technique of characteristic equation and generating functions. **Contemporary Issues related to Topic**	
Unit II	**(6 Hrs.)**
Asymptotic notations of analysis of algorithms, analyzing control structures, worst case and average case analysis, amortized analysis, External Sorting, lower bound proof. **Contemporary Issues related to Topic**	
Unit III	**(7 Hrs.)**
Divide and conquer basic strategy, quick sort, merge sort etc. Greedy method – basic strategy, application to job sequencing with deadlines problem, minimum cost spanning trees, single source shortest path etc. **Contemporary Issues related to Topic**	
Unit IV	**(7 Hrs.)**
Dynamic Programming basic strategy, multistage graphs, all pair shortest path, optimal binary search trees, Matrix-chain Multiplication, traveling salesman problem. **Contemporary Issues related to Topic**	
Unit V	**(7 Hrs.)**
Connected components, Branch and bound, Backtracking basic strategy, 8 – Queen's problem, graph coloring, Hamiltonian cycles etc. **Contemporary Issues related to Topic**	
Unit VI	**(7 Hrs.)**
NP-hard and NP-complete problems, basic concepts, non-deterministic algorithms, NP-hard and NP-complete, Cook's Theorem, decision and optimization problems, polynomial reduction **Contemporary Issues related to Topic**	
Total Lecture	**41 Hours**

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Textbooks:	
1.	Jon Kleinberg and Éva Tardos Algorithm Design Latest edition pearson
2.	Thomas H. Cormen, Charles E. Leiserson,Ronald L. Rivest, Clifford Stein Introduction to Algorithm 3rd Edition, 2009 MIT press
3.	Brassard, Bratley Fundamentals of Algorithms 1st edition,1995 Prentice Hall
	Steven S. Skiena The Algorithm Design Manual 2nd Edition Springer

Reference books:	
1.	Michael Sipser Introduction to the Theory of Computation, 3rd Edition, 2013 Cengage Learning
2.	S. Dasgupta, C. H. Papadimitriou, and U. V. Vazirani Algorithms1st Edition, 2006
3.	Donald E. Knuth The art of Computer programming Vol. 3 2nd Edition, 1998 Addison-Wesley

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MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=zWg7U0OEAoE
2.	https://www.digimat.in/nptel/courses/video/106101060/L27.html

IV SEMESTER

22CSD408 : Lab. Design & Analysis of Algorithms

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand different analysis method and analyze it. 2. Understand different techniques and apply it.

Practical's to be performed from the list as below

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

IV SEMESTER

22CSD409 : Lab. : Software Lab II

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand the basic data types, built in data structures, control statements and loops and write simple programs in C#. 2. To understand the concepts of functions modules and packages and write complex programs using them. 3. To understand defining and handling C# objects and develop classes 4. To develop a useful application in C#.

Minimum Eight Practical's to be performed from the

Sr. No	Experiments Base On
1.	Implementing Edit Functionality for the Students List
2	Creating Methods, Handling Exceptions, and Monitoring Applications
3.	Extending the Class Enrolment Application Functionality
4.	Basic types and constructs of Visual C#
5.	Writing the Code for the Grades Prototype Application
6.	Creating Classes and Implementing Type-Safe Collections
7.	Adding Data Validation and Type-Safety to the Application
8.	Creating a Class Hierarchy by Using Inheritance
9.	Refactoring Common Functionality into the User Class
10.	Reading and Writing Local Data, Accessing a Database
11.	Implementation of an application for the given problem statement using Python using built in and customized modules and packages

Audit Course
IV SEMESTER
MLC124: (YCAP 4)

Audit Course

IV SEMESTER

MLC120 : Open Source Tool for Graphics

Course Outcomes :
Upon successful completion of the course the students will be able to 1. know different Open Source Tools for Graphics Design 2. understand features and usage of different Open Source Tools for Graphics Design 3. Use the tools for different graphics designing problems in real time situations.

Unit I: Canva	**(4 Hrs.)**
Usage, Features, Curved Text Generator, Photo Effects, Image Enhancer, Font Pairing, Colour Wheel	
Unit II : Inkscape	**(3 Hrs.)**
As drawing and painting tool, Professional vector graphics editor, Scalable Vector Graphics (SVG), Objects creation and manipulation, Fill and stroke, Rendering, Text editing and operations on path, Working with shape tools, Text tool, Object manipulation (transformations, grouping objects, layers).	
Unit III: Krita	**(4 Hrs.)**
Featured digital painting application, Illustrations, Comics, Animations, Concept art Or Storyboards, Animation with Onion Skinning, Comic book project management	
Unit IV : Blender	**(5 Hrs.)**
Open Source 3D creation suite, 3D pipeline- modelling, Sculpting, Rigging, 3D and 2D animation, Simulation, Rendering, Compositing, Motion Tracking And Video Editing.	
Unit V: Gravit Designer	**(4 Hrs.)**
Anchors, Auto-layouts, Bleed, Blending, Booleans, Effects (shadows, overlays, mirror, etc.), Fills, Frame text tool, Google Fonts, Grids, Knife tool, Layers, Path graphs, Pen shapes, SVG editing tool, Templates, Text editing, Text engine	
Unit VI: GIMP	**(4 Hrs.)**
Compatibility of the system, Painting with GIMP, Manipulation techniques, File format supported.	
Total Lecture	**24 Hours**

Textbooks/ Reference Books :	
1.	Grid systems in graphic design' by Josef Müller-Brockmann
2.	hinking with Type by Ellen Lupton,2nd Edition
3.	100 Ideas That Changed Design by Peter Fiell & Charlotte Fiell

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Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

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

Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2022

5th Semester

(Department of Information Technology

B. Tech in Computer Science and Design

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 Information Technology)

Computer Science and Design

SoE No. 22CSD-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
FIFTH SEMESTER															
1	5	HS	CSD	22CSD501	Cyber Laws & Professional Ethics	T	3	0	0	3	3	30	20	50	3 Hours
2	5	PC	CSD	22CSD502	Database Management Systems	T	3	0	0	3	3	30	20	50	3 Hours
3	5	PC	CSD	22CSD503	Lab: Database Management Systems	P	0	0	2	2	1		60	40	
4	5	PC	CSD	22CSD504	Principles of Compiler Design	T	3	0	0	3	3	30	20	50	3 Hours
5	5	PC	CSD	22CSD505	Lab.:Principles of Compiler Design	P	0	0	2	2	1		60	40	
6	5	PE	CSD		**Professional Elective-I**	T	3	0	0	3	3	30	20	50	3 Hours
7	5	PE	CSD		**Lab. Professional Elective-I**	P	0	0	2	2	1		60	40	
8	5	OE	CSD		**Open Elective -I**	T	3	0	0	3	3	30	20	50	3 Hours
9	5	OE	CSD		**Open Elective -II**	T	3	0	0	3	3	30	20	50	3 Hours
10	5	STR	CSD	22CSD506	Industrial training, Seminar & Report	P					1		60	40	
						TOTAL	**18**	**0**	**6**	**24**	**22**				

Professional Electives-I

1	5	PE-I	CSD	22CSD511	PE-I: Digital Image Processing
2	5	PE-I	CSD	22CSD512	PE-I: **Lab:** Digital Image Processing
3	5	PE-I	CSD	22CSD513	PE-I: Machine Learning
4	5	PE-I	CSD	22CSD514	PE-I: **Lab:** Machine Learning
5	5	PE-I	CSD	22CSD515	PE-I: Data Visualization
6	5	PE-I	CSD	22CSD516	PE-I: **Lab:** Data Visualization
7	5	PE-I	CSD	22CSD517	PE-I: Computer Graphics
8	5	PE-I	CSD	22CSD518	PE-I: **Lab:** Computer Graphics
9	5	PE-I	CSD	22CSD519	PE-I: Internet of Things
10	5	PE-I	CSD	22CSD520	PE-I: **Lab:**Internet of Things

Open Electives-I

1	5	OE-I	CSD	22CSD531	OE I : Computer Graphics
2	5	OE-I	CSD	22CSD532	OE I : Multimedia Design

Open Electives-II

1	5	OE-II	CSD	22CSD551	OE II : Advanced Web Designing
2	5	OE-II	CSD	22CSD552	OE II : Virtual Reality

List of Mandatory Learning Course (MLC)												
1	5	HS	T&P	MLC2125	YCAP5: YCCE Communication Aptitude Preparation	**A**	2	0	0	2	0	
2			R&D	MLC125	Design Thinking	**A**	2	0	0	2	0	

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

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

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

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

Applicable for AY 2022-23 Onwards

V SEMESTER

22CSD501 : Cyber Laws and Professional Ethics

Course Outcomes :
Upon successful completion of the course the students will be able to 1. State the importance of Engineering Ethics and differentiate between engineering and profession 2. Employ various Ethical Theories and Practice Ethical Engineering 3. Illustrate background and structure of constitution. 4. Identify fundamental rights, duties and directive principles enshrined under Constitution of India

Unit I: Historical background of Constitution	**(8Hrs.)**
Origin of history of Constitution, Concept of Preambles, Meaning of the constitution law and constitutionalism, Parliamentary Form of Government in India – The constitution powers and status of the President of India.	
Unit II: Federalism	**(7 Hrs.)**
Salient features of Federalism Structures and features of Indian Federalism, Difference between Indian and Federation of other states.	
Unit III: Fundamental Rights and Directive Principles	**(8 Hrs.)**
Scheme of the Fundamental rights, The scheme of the Fundamental duties and its legal status, Directive principles of state policy.	
Unit IV: Professionalism and Codes of Ethics	**(9 Hrs.)**
Is Engineering a Profession, Difference between Engineering and other professions, Codes of Engineering society, Solving Ethical Problems. .	
Unit V: Ethical Theories	**(8 Hrs.)**
History of Ethical Thoughts ,Ethical Theories(Moral, Utilitarianisms, cost benefit Analysis, duty ethics & right ethics ,Corporate morality),Kohlberg's Stages of moral Development, Paget's Theory, Carol Gilligan Theory.	
Unit VI: Ethical Issues	**(6 Hrs.)**
Conflict Problems and Whistle Blowing, Cross -Cultural Issues, Environmental Ethics. Computer Ethics, Ethics and Research, Intellectual Property Rights (IPRs) . .	
Total Lecture	**46 Hours**

Textbooks:	
1.	G. Austin (2004) Working of a Democratic Constitution of India, New Delhi: Oxford University Press.
2.	B.S. Grewal Khanna Publishers (2006) Higher Engineering Mathematics 40th edition, 2010
3.	Basu, D.D (2005), An Introduction to the Constitution of India, New Delhi, Prentice Hall.

Reference Books:	
1.	Singh, M.P & Saxena, R (2008) Indian Politics: Contemporary Issues and Concerns. New Delhi: PHI Learning
2.	Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004
3.	Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003.

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MOOCs Links and additional reading, learning, video material	
1.	https://youtu.be/xeDZalBaLkQ
2.	https://youtu.be/OYsY5B9pqYU

V SEMESTER

22CSD502 : Data Base Management Systems

Course Outcomes :
Upon successful completion of the course the students will be able to 1. To obtain sound knowledge in the theory, principles and applications of database management system. 2. Design and develop data model given their specifications and within performance and cost constraints. 3. Acquire and understand new knowledge, use them to develop data centric application and to understand the importance of lifelong learning. 4. Perform experiments in different disciplines of database management system.

Unit I	**(7 Hrs.)**
Introduction to Database Management System: General File System vs. DBMS, Data Abstraction, Data Independence, Keys, Data Modeling using the Entity Relationship(ER) Model, The enhanced Entity Relationship(EER) model.	
Unit II	**(6 Hrs.)**
Relational Model: Structure of Relational Databases, The Relational Algebra and Relational Calculus(TRC & DRC) Introduction to SQL Programming: (DDL, DML, Joins, Nested Queries/Sub Queries/Inner Queries) Integrity Constraints	
Unit III	**(8 Hrs.)**
Database Design: Functional Dependency and Normalization for Relational Databases, Desirable properties of decomposition Introduction to NoSQL , Types of NoSQL Databases: Key-Value (KV) Stores, Document Stores and Column Family Data stores.	
Unit IV	**(9 Hrs.)**
Query Processing: Overview, Measures of Query Cost, Selection Operation, Sorting, Join Operation, Other Operations, Evaluation of Expressions.Query Optimization: Overview, Transformation of Relational Expressions, Estimating Statistics of Expression Results.	
Unit V	**(8 Hrs.)**
Transaction Processing: Introduction to Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity, Transaction Isolation Levels, Implementation of Isolation Levels	
Unit VI	**(7 Hrs.)**
Concurrency control Techniques: Lock-Based Protocols, Deadlock Handling, Multiple Granularity, and Timesta	
Total Lecture | 45 Hours	

Textbooks:	
1.	Elmasri & Navathe , Fundamentals of Database System, 5th Edition(2006)
2.	McGraw-Hill Education, Abraham Silberschatz, Henry F. Korth and S. Sudarsha, Database System Concepts, 6th Edition, (2010)
3.	McGraw-Hill, 2002. Database Management Systems. Raghu Ramakrishnan, Johannes Gehrke. Second

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

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

V SEMESTER

22CSD503 : Lab: Data Base Management Systems

Course Outcomes :
Upon successful completion of the course the students will be able to 1. To obtain sound knowledge in the theory, principles and applications of database management system. 2. Design and develop data model given their specifications and within performance and cost constraints. 3. Acquire and understand new knowledge, use them to develop data centric application and to understand the importance of lifelong learning. 4. Perform experiments in different disciplines of database management system.

S.N.	Name of Practical
1	Database design using E-R Model for: Payroll processing system, Banking system Library Information System Student Information System, etc.
2	Mapping of E-R model to relational Schema and creation of Tables using DDL (Data Definition Language).
3	Modification of Database objects using DDL and DML (Data Manipulation Language).
4	Querying the Database based on various inbuilt functions (Date Function, Numeric Function, Character Function, Conversion Function, Miscellaneous Function).
5	Querying the Database based on Set, Arithmetic and Logical operator.
6	Querying the Database based on Join operation a)Simple Join and Self Join b)Outer Join and Inner Join
7	Querying the Database based nesting and applying various Clauses.
8	Querying the Database based on various data language commands (DCL, TCL) and implements them on the database.(DCL commands GRANT, REVOKE , TCL commands ROLLBACK,COMMIT,SAVEPOINT)
9	Querying the Database based on to create triggers for various events such as insertion, updation etc.,
10	To create and manipulate various database objects of the Table using views
11	Self-Learning – No SQL

V SEMESTER
22CSD504 : Principles of Compiler Design

Course Outcomes :

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

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

Unit I : Introduction to Abstract Model & Grammar	**(7 Hrs.)**
Introduction to Compilation Process, Compilers & Translators, Phase structure of Compiler, Role of Lex, Design of Lexical Analysis.	
Unit II: Specifying Syntactic	**(8 Hrs.)**
Structure of Programming Language using Context Free Grammars, The role of Parser, Top-down Parsing, and Bottom up Parsing, Predictive Parsers, and Recursive Decent Parser.	
Unit III :Construction	**(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 : Syntax Directed	**(8 Hrs.)**
Syntax Directed Translation: Intermediate Code, Postfix notation, Parse tree and Syntax Trees, Three address codes, quadruples, triples, Translation of Arithmetic Expression, Boolean expressions, Control Statements. Array references, Procedure Calls, Declarations, Case Statements, Use of Compiler writing tools (Lex/Flex, YACC /Biason).	
Unit V: Symbol	**(8 Hrs.)**
Symbol Tables: Contents, Representing scope information. Error detection and Recovery: Error handling, Lexical-phase, Syntactic phase and semantic phase.	
Unit VI Introduction to Code Optimization & Generation	**(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	**45 Hours**

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

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

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MOOCs Links and additional reading, learning, video material	
1.	https://youtu.be/5ZmFlxrNaN8
2.	https://youtu.be/yxnbvS2t_QA
3.	https://archive.nptel.ac.in/courses/106/105/106105190/

V SEMESTER
22CSD505: Lab: Principles of Compiler Design

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

List of Practical's

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

V SEMESTER
22CSD511 : PE I: Digital Image Processing+

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

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

Textbooks:	
1.	Digital Image Processing Rafael C. Gonzalez and Richard E. Woods Prentice Hall, 2007, 3rd edition
2.	Anil Jain K. "Fundamentals of Digital Image Processing", PHI Learning Pvt. Ltd., 2011

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

Reference Books:	
1.	Tinku Acharya & Ajoy K. Ray, Image Processing Principles & Applications, Willey Inter-Science, 2005
2.	Willliam K Pratt, "Digital Image Processing", John Willey, 2002. 3.
3.	Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "Digital Image Processing Using MATLAB", Third Edition Tata Mc Graw Hill Pvt. Ltd., 2011
4.	Malay K. Pakhira, "Digital Image Processing and Pattern Recognition", First Edition, PHI Learning Pvt. Ltd., 2011

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MOOCs Links and additional reading, learning, video material	
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2.	https://youtu.be/CVV0TvNK6pk
3.	https://archive.nptel.ac.in/courses/117/105/117105135/
4.	https://onlinecourses.nptel.ac.in/noc22_ee116/preview

V SEMESTER
CSD512 : Lab: PE I: Digital Image Processing

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

List of Practical

S. No	Name of practical
	Introduction to MATLAB
1	Image sampling and quantization
2	Analysis of spatial and intensity resolution of images.
3	Intensity transformation of images.
4	DFT analysis of images
5	Introduction to Transform
	a. Walsh Transform b. Hadamard Transform c. DCT Transform d. Haar Transform
6	Histogram Processing
7	Image Enhancement-Spatial filtering
8	Image Enhancement- Filtering in frequency domain
9	a.Edge detection b. line detection c. point detection
10	Basic Morphological operations
11	Basic Thresholding functions
12	Analysis of images with different color models

SEMESTER V
22CSD513 : PE I: Machine Learning

Course Outcomes :
Upon successful completion of the course the students will be 1. Understand various models of supervised and unsupervised learning 2. analyze a problem and identify the machine learning algorithm appropriate for its solution 3. apply supervised learning for the given set of labelled samples and design the model to meet the desired needs 4. apply unsupervised learning for the given set of samples, and design the model to meet the desired needs

Unit I: Introduction to machine learning.	**(7 Hrs.)**
What Is Machine Learning, Examples of Machine Learning Applications, Learning Associations, Classification, Regression, Supervised and Unsupervised Learning, Reinforcement Learning, Generalization, Over-fitting, and Under-fitting.	
Unit II : Supervised Learning-1	**(7 Hrs.)**
K-Nearest Neighbours, linear Models, Naive Bayes Classifiers, Decision Trees.	
Unit III : Supervised Learning-2	**(7 Hrs.)**
Kernelized Support Vector Machines, Uncertainty Estimates from Classifiers, The Decision Function, predicting Probabilities, Uncertainty in Multiclass Classification, multivariate classification and regression.	
Unit IV : Unsupervised Learning:	**(8 Hrs.)**
K-Means Clustering, Expectation-Maximization Algorithm, Supervised Learning after Clustering, Hierarchical Clustering, Choosing the Number of Clusters.	
Unit V :Design and Analysis of Machine Learning Experiments:	**(8 Hrs.)**
Factors, Response, and Strategy of Experimentation, Randomization, Replication, and Blocking, Guidelines for Machine Learning Experiments , Cross-Validation and Resampling Methods, K-Fold Cross-Validation, Bootstrapping, Measuring Classifier Performance, Hypothesis Testing, Assessing a Classification Algorithm's Performance, Comparing Two Classification Algorithms.	
Unit VI: Advances in Machine Learning:	**(8 Hrs.)**
Combining multiple learners, bagging and boosting, introduction to learning using Neural networks, shallow and deep networks.	
Total Lecture	**45 Hours**

Textbooks:	
1.	Ethem Alpaydın, Introduction to Machine Learning, Second Edition, The MIT Press
2.	Andreas C. Müller and Sarah Guido, Introduction to Machine Learning with Python, A Guide for Data Scientists, ORIELLY
3.	Tom M. Mitchell- Machine Learning - McGraw Hill Education, International Edition
4.	Marc Peter Deisenroth, A. Aldo Faisal, Cheng Soon Ong, Mathematics for Machine Learning, Cambridge University Press (23 April 2020)

Reference books:	
1.	Tom M. Mitchel, Machine Learning, McGraw Hill
2.	Christopher M. Bishop Pattern Recognition and Machine Learning - Springer, 2nd editio
3.	Trevor Hastie, Robert Tibshirani, and Jerome Friedman - The Elements of Statistical Learning: Data Mining, Inference, and Prediction - Springer, 2nd edition

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2.	https://archive.nptel.ac.in/courses/106/106/106106139/
3.	https://archive.nptel.ac.in/courses/106/106/106106139

V SEMESTER
22CSD514 : Lab: PE I: Machine Learning

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand various models of supervised and unsupervised learning 2. Analyze a problem and identify the machine learning algorithm appropriate for its solution 3. Apply supervised learning for the given set of labelled samples and design the model to meet the desired needs 4. Apply unsupervised learning for the given set of samples, and design the model to meet the desired needs.

S. N.	List of Practical's
1	Experiment on k-Nearest Neighbors
2	Experiment on Naive Bayes Classifiers
3	Experiment on Decision Trees
4	Experiment on Kernelized Support Vector Machines
5	Experiment on *k*-Means Clustering
6	Experiment on Hierarchical Clustering
7	Experiment on K-Fold Cross-Validation
8	Experiment on combining multiple learners
9	Experiment on neural networks using back propagation algorithm
10	Experiment on deep neural networks

V SEMESTER
22CSD515 : PE I: Data Visualization

Course Outcomes :
Upon successful completion of the course the students will be 1. To know the history of data visualization and its connection with computer graphics. 2. To know categories of visualization and application areas. 3. To understand the types of transformation the data has undergone to improve the effectiveness of the visualization. 4. To understand the techniques that has been applied to spatial data.

Unit I : Introduction	**(8 Hrs.)**
Introduction to data visualization, what it is and why required, A reasons for using visualization, visualization pipeline and its relationship to other data analysis pipelines, Data foundation, Human Perception and Information Processing.	
Unit II : Visualization foundations,	**(8 Hrs.)**
Visualization Techniques for Spatial Data, Visualization Techniques for Geospatial Data, Visualization Techniques for Time-Oriented Data, Visualization Techniques for Multivariate Data.	
Unit III : Text and Document	**(7 Hrs.)**
Visualization, Interaction Concepts, Interaction Techniques, Information Visualization, Visual Display of Quantitative Information, Power of Representation, Data-Ink and Graphical Redesign, Data Density, Interactive Data Visualization for the Web. Scalable, Versatile and Simple Constrained Graph Layout, Visualization of Adjacency Relations in Hierarchical Data.	
Unit IV : Designing	**(8 Hrs.)**
Effective Visualizations, Comparing and Evaluating Visualization Techniques	
Unit V visualization of volumetric data and evaluation of visualizations	**(8 Hrs.)**
Visualization of volumetric data, vector fields, processes and simulations, Visualization of maps, Geographic information, GIS systems, collaborative visualizations, Evaluating visualizations the module Compare GIS systems and Collaborative visualizations, Visualization Systems.	
Unit VI : Research	**(6 Hrs.)**
Research Directions in Visualization, Visualization of groups, trees, graphs, clusters, networks, software, and Metaphorical visualization. Various visualization techniques, data structures used in data visualization.	
Total Lecture	**45 Hours**

Textbooks:	
1.	Kieran Healy and Kieran Joseph Healy, Data Visualization: A Practical Introduction
2.	Andy Kirk, Data Visualization: A Handbook for Data Driven Design
3.	E. Tufte. "The Visual Display of Quantitative Information" 2nd Edition Graphics Press, 2001
4.	Ward, Grinstein, Keim, Interactive Data Visualization: Foundations, Techniques, and Applications. Natick, 2nd edition ,A K Peters, Ltd 2015.

Reference books:	
1.	Tamara Munzner,Visualization Analysis & Design ,1st edition,AK Peters Visualization Series 2014.
2.	Scott Murray,Interactive Data Visualization for the Web ,2nd Edition, 2017.

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

MOOCs Links and additional reading, learning, video material	
1.	https://youtu.be/sxQgzxJxap8
2.	https://youtu.be/JgA2p59sA4U
3.	https://elearn.nptel.ac.in/shop/iit-workshops/completed/data-visualization-with-r/?v=c86ee0d9d7ed

V SEMESTER
22CSD516 : Lab: PE I: Data Visualization

Course Outcomes
Upon successful completion of the course the students will be able to 1. To know the history of data visualization and its connection with computer graphics. 2. To know categories of visualization and application areas. 3. To understand the types of transformation the data has undergone to improve the effectiveness of the visualization. 4. To know the methods and algorithms used to map data to graphical depictions 5. To understand the techniques that has been applied to spatial data.

Sr. No.	List of Experiment
1	Introduction to Data Visualization and installation of tableau.
2	Connect Tableau to various Datasets: Excel and CSV files.
3	Create the bar charts, maps and pie charts according to specific data.
4	Create Table Calculations.
5	Create Dual Axis Charts.
6	Create Area Charts.
7	Create Scatterplots.
8	Create Treemaps.
9	Creating Data Extracts in Tableau.

V SEMESTER

CSD517 : PE 1: Computer Graphics

Course Outcomes :
Upon successful completion of the course the students will be 1. Understand basics of computer graphics. 2. Apply basic algorithms for line, circle and to solve, apply and list geometric transformation matrices including rotation, translation, scaling and reflection to transform a 2D object. 3. Apply basic algorithms and methods for segments, clipping and viewing transformation. 4. Understand various tools and apply to design the animation.

Unit I : Geometry and line generation	**(8 Hrs.)**
: points, lines, pixels, planes and frame buffers, types of display devices: Raster Scan display, Flat Panel, LCD, LED Display, 3D Viewing devices, Virtual Reality Systems. Introduction of GPU. Illumination Models.	
Unit II : DDA and Bresenham's line algorithms	**(7 Hrs.)**
DDA and Bresenham's line algorithms, Bresenham's algorithm for circle generation, algorithm for ellipse generation. Algorithms for polygon generation, polygon filling algorithms, NDC (normalized device co-ordinates), pattern filing, 2D transformation: scaling, rotation, translation, rotation about arbitrary point reflection, zooming	
Unit III : Segment	**(8Hrs.)**
Graphics primitives: displays file, Segment tables, operations on segments, Graphics file formats (jpeg, Tiff, Bmp, etc). Windowing and clipping: Window, view port, viewing transformation, clipping, line and polygon clipping.	
Unit IV : 3D Graphics	**(7 Hrs.)**
3D Graphics: 3D primitives, projection, parallel perspective, isometric, viewing transformations, hidden surfaces and line removal, painter's algorithm, Z-buffers, Warnock's algorithm.	
Unit V : Bezier and B-spline	**(8 Hrs.)**
Bezier and B-spline, sweeping, method of interpolation, Cubic Splines.	
Unit VI : Animation:	**(7 Hrs.)**
Animation: Definition & introduction to animation, Basics: Animation target objects, Types, animation timings. Design of an animation sequence, general computer animation functions, raster animation, computer animation language.	
Total Lecture	**45 Hours**

Textbook:	
1.	Donald Hearn & M. Pauline Baker, Computer Graphics C Version, Second Edition (1997)
2.	Foley, Vandam, Feiner and Huges, Computer Graphics Principles and Practice, 2nd edition,1996

Reference Books:

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

1.	David F. Rogers, Procedural Elements for Computer Graphics, 1998
2.	Steven Harrington, Computer Graphics, A Programming Approach, 2nd edition, 1987

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MOOCs Links and additional reading, learning, video material	
1.	https://youtu.be/01YSK5gIEYQ
2.	https://youtube.com/playlist?list=PLrjkTql3jnm9cY0ijEyr2fPdwnH-0t8EY&si=GIcsviVq_8n1P-8v
3.	https://archive.nptel.ac.in/courses/106/103/106103224/

V SEMESTER
22CSD518 : Lab: PE I: Computer Graphics

Course Outcomes :
Upon successful completion of the course the students will be 1. Basics of computer graphics. 2. Apply basic algorithms for line, circle and to solve, apply and list geometric transformation matrices including rotation, translation, scaling and reflection to transform a 2D object. 3. Apply basic algorithms and methods for segments, clipping and viewing transformation. 4. Understand various tools and apply to design the animation.

List of Practical

S. No.	Name of Experiment
1	Digital Differential Analyzer Algorithm
2	Bresenham's Line Drawing Algorithm
3	Midpoint Circle Generation Algorithm
4	Ellipse Generation Algorithm
5	Creating various types of texts and fonts
6	Creating two dimensional objects
7	Two Dimensional Transformations
8	Coloring the Pictures
9	Three Dimensional Transformations
10	Curve Generation
11	Simple Animations using transformations

V SEMESTER

22CSD519 : PE I: Internet of Things

Course Outcomes :
Upon successful completion of the course the students will be 1. Students will able to describe various communication protocol and its building blocks. 2. Students will able to describe relevance of IoT with cloud and the application areas of IOT. 3. Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor 4. Able to understand building blocks of Internet of Things and characteristics.

Unit I : Introduction to IoT	**(8 Hrs.)**
History of IOT, Concepts, Products and Examples. IOT Paradigm, The Layering concepts of IOT, IOT Communication Model, IOT Architecture, The 6LoWPAN,Domains of IOT, M2M vs IOT, Management of IOT, IOT Platforms, IOT Languages, IOT Physical Systems, Tools for IOT	
Unit II : IoT Communication Protocols	**(7 Hrs.)**
Protocol Standardization for IOT, Issues with IOT Standardization, M2M and WSN Protocols, SCADA and RFID Protocols, IEEE 802.15.4, BACNet Protocol, Modbus, KNX, Zigbee Architecture, Unified Data Standards.	
Unit III : Web of Things	**(8 Hrs.)**
Web of Things versus Internet of Things, The Two Pillars of the Web, Architecture Standardization for Web of Things, Platform Middleware for Web of Things, Unified Multitier Web of Things Architecture, Web of Things Portals and Business Intelligence.	
Unit IV: Cloud of Things	**(8 Hrs.)**
Grid/SOA and Cloud Computing, Cloud Middleware, Cloud Standards, Cloud Providers & Systems, Mobile Cloud Computing, Cloud of Things Architecture. Models of Implementation, Service Level Agreement (SLA), Examples of Applications.	
Unit V : SOA and Cloud Computing	**(7 Hrs.)**
/SOA and Cloud Computing, Cloud Middleware, Cloud Standards, Cloud Providers & Systems, Mobile Cloud Computing, Cloud of Things Architecture. Models of Implementation, Service Level Agreement (SLA), Examples of Applications	
Unit VI : IoT Applications	**(7 Hrs.)**
IOT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IOT electronic equipment. Use of Big Data and Visualization in IOT. Role of IOT for Increased Autonomy and Agility in Collaborative Production Environments, Resource Management in the IOT.	
Total Lecture	**45 Hours**

Text book:	
1.	Arshdeep Bahga & Vijay Madisetti, Internet of Things: A Hands-on-Approach, Orient Blackswan Publisher
2.	Olivier Hersent, David Boswarthick & Omar Elloumi, The Internet of Things: Key Applications and Protocols, Wiley publication
3.	E. Balagurusway, "Programming in C", Tata McGrwal Hill.
4.	Computer fundamentals and c programming in c by Reemathareja, oxford university press

Reference books:	
1.	Introduction to C programming by REEMA THAREJA from OXFORD UNIVERSITY PRESS 2. 3. 5.
2.	E Balagurusamy: ―COMPUTING FUNDAMENTALS & C PROGRAMMING – Tata McGraw-Hill, Second Reprint 2008, ISBN 978-0-07-066909-3
3.	Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson Edition Publ, 2002. 4. Henry Mullish&HuubertL.Cooper: The Spirit of C An Introduction to modern Programming, Jaico Pub. House,1996.
4.	Y kanithkar, let us C BPB, 13 th edition-2013, ISBN:978-8183331630,656 pages.

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MOOCs Links and additional reading, learning, video material	
1.	https://youtu.be/LlhmzVL5bm8
2.	https://youtu.be/9hxZWMI7sRc

V SEMESTER
CSD520 : Lab: PE I: Internet of Things

Course Outcomes :
Upon successful completion of the course the students will be 1. Students will able to describe various communication protocol and its building blocks. 2. Students will able to describe relevance of IoT with cloud and the application areas of IOT. 3. Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor 4. Able to understand building blocks of Internet of Things and characteristics.

List of Practical

Sr. No.	Problem Statements
1	Study of Arduino Kit
2	Study of Raspberry Pi Kit
3	Study of different electronics components
4	Study of different sensors in IoT
5	Case study: Smart Irrigation System using IoT and cloud
6	Case Study: IOT Car Parking System
7	Case Study: IOT Based ICU Patient Monitoring System
8	Case Study: Smart Dustbin With IOT Notifications
9	Project: Designing of Home Automation System
10	Mini Project

V SEMESTER
22CSD531 : OE I: Computer Graphics

Course Outcomes :
Upon successful completion of the course the students will be 1. .To introduce the components of a graphics system and become familiar with building approach of graphics system components and algorithms related with them 2. To understand 2 Dimensional and 3-Dimensional computer graphics concepts. 3. To provide an understanding to the basic geometrical primitives and transformation of geometrical shapes. 4. Provide an understanding of mapping from a world coordinate to device coordinates, clipping, and projections.

Unit I : Introduction to Multimedia	**(8 Hrs.)**
Overview of Graphics Systems: Graphics applications-CAD, Computer art, Education & Training, Entertainment, Visualization, Image Processing **Video display devices** –Cathode Ray Tube, Raster–scan displays, Random–scan displays, color CRT monitors – Beam penetration, shadow mask, Flat panel displays – plasma panel, LCD. Graphics Workstation & Viewing system, Interactive Input devices, Hard copy devices	
Unit II : Graphics Output Primitives	**(8 Hrs.)**
2 Dimensional world coordinate reference frame in openGL, openGL – point function, Line functions, Polygon Fill – Area functions, character function. Line drawing Algorithm-DDA and Bresenham's, Circle drawing Algorithm–DDA and midpoint, Attributes of Graphics Primitives – color and gray scale, OpenGL-Color functions, Point attributes, Line attributes, Fill area attributes, Character attributes.	
Unit III : Geometric Transformations	**(8 Hrs.)**
Dimensional transformation - translation,rotation and scaling, Matrix representation and homogenous coordinates, Inverse transformation, Composite translate, rotation and scaling, general 2D pivot point rotation, general 2Dfixed point scaling. OpenGL functions for 2-D geometric transformation.	
Unit IV : Two-Dimensional Viewing	**(7 Hrs.)**
2 D viewing pipeline, clipping window, Normalization and viewport transformations. OpenGL - 2 D viewing functions. 2 D Clipping - Point clipping, Line clipping-Cohen Sutherland Line clipping, Nicholl-LeeNicholl line clipping, Polygon clipping – Sutherland Hodgeman polygon clipping, WeilerAtherton polygon clipping, Text clipping.	
Unit V : Three Dimensional Viewing and Computer animation:	**(7Hrs.)**
3 Dimensional Viewing: Overview of 3 D viewing concepts, 3D viewing pipelining , three dimensional geometric Transformations Translation, **Rotation and Scaling, Visible surface detection methods** - Back face detection, Depth buffer method, Octrees methods, ray casting method.	
Unit VI : Interactive Input Methods and GUI	**(7 Hrs.)**
Logical classification of Input devices, Input functions for graphical data, Interactive Picture Construction techniques. **Computer Animation:** Raster methods for Computer Animation, Design of Animation Sequences, Motion specifications, Periodic motions. OpenGL Animation Procedures.	
Total Lecture	**45 Hours**

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Textbooks:	
1.	Donald Hearne and M. Pauline Baker, "Computer Graphics, C Versions." Prentice Hal
2.	Foley, Vandam, Feiner and Huges, Computer Graphics Principles and Practice, 2nd edition,1996

Reference Books:	
1.	David F. Rogers, Procedural Elements for Computer Graphics, 1998
2.	Steven Harrington, Computer Graphics, A Programming Approach, 2nd edition, 1987

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3.	https://archive.nptel.ac.in/courses/106/103/106103224/

V SEMESTER
22CSD532 : OE I: Multimedia Design

Course Outcomes :
Upon successful completion of the course the students will be 1. Define what is multimedia and how it works. 2. Understand multimedia components using various tools and techniques. 3. Discuss about different types of media format and their properties. And justify the right way of manipulating multimedia systems. 4. To design Multimedia Application.

Unit I : Introduction to Multimedia	**(8 Hrs.)**
Definition of Multimedia, Multimedia objects: Text, Graphics, Animation, Audio, images, Video. Definition of HyperText and HyperMedia. Multimedia Applications in Education, Entertainment. Advertising world etc. Components of a Multimedia System, Desirable Features for a Multimedia System, requirements of Multimedia Communication, Applications of multimedia – benefits and problems.	
Unit II : Representation of Multimedia Objects	**(7 Hrs.)**
Representation of Analog Signals, A/D: Sampling and quantization. Font and their representation (bitmap, true type) Graphics: Raster & Vector representation, aliasing problems Image: (bit depth, resolution, color (RGB, CMYK, HSB), introduction to BMP, GIF, TIFF, PNG and JPEG formats) Audio (speech and wideband audio, sampling rate and aliasing, quantization, introduction to MP3, WMA, WAV, MIDI etc.) Video (frame rate and resolution, interlaced and non-interlaced video, colour planes (YCBCR, YUV), Video broadcast standards (PAL, NTSC, SECAM), HD Video, 3D TV, Video representation: AVI, MPEG, Quick Time, real video (.rm)	
Unit III: Concepts of Multimedia Editing:	**(8 Hrs.)**
Digital Audio, Music Sequencing and Notation, Image/Graphics Editing, Video Editing (Linear, Non-linear), Subtitling	
Unit IV: Introduction to Compression Technology :	**(8 Hrs.)**
Concept of lossy and lossless compression. Concept of rate-distortion characteristics, Basics image compression (JPEG, JPEG 2000), Basics of Audio compression (MP3, MP4), Basics of Video Compression (MPEG, H.264)	
Unit V: Multimedia Application Design:	**(7 Hrs.)**
Content design, technical design, visual design, design metaphors, example studies, interactivity	
Unit VI : Multimedia Authoring and Publishing	**(7 Hrs.)**
Definition of an Authoring System, uses of an authoring system, Definition an function of Authoring Metaphor, Different Metaphors. Offline Publishing: Flash, Power Point. Online Publishing: HTML5, Dreamweaver.	
Total Lecture	**45 Hours**

Textbooks:	
1.	Li & Drew, Fundamentals of Multimedia, Pearson Education, 2009
2.	Rajneesh Aggarwal & B. B Tiwari, Multimedia Systems, Excel Publication, New Delhi, 2007
3.	Tay Vaughan, Multimedia making it work, Tata McGraw-Hill, 2008.

Reference Books:	
1.	Parekh Ranjan, Principles of Multimedia, Tata McGraw-Hill, 2007
2.	Anirban Mukhopadhyay and Arup Chattopadhyay, Introduction to Computer Graphics and Multimedia, Vikas Publishing House, Second Edition

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

MOOCs Links and additional reading, learning, video material	
1.	https://nptel.ac.in/courses/117105083
2.	https://archive.nptel.ac.in/courses/124/107/124107002/

V SEMESTER
22CSD551 : OE II: Advanced Web Designing

Course Outcomes :
Upon successful completion of the course the students will be 1. The different tags of HTML and Implement interactive web pages using HTML, DHTML and CSS. 2. Apply the concept of Markup languages and Make the use of mark up languages in development of web pages. 3. Develop interactive web pages using java script and client and server side programming. 4. Develop web applications using Node and Angular JS.

Unit I : Creation of web pages	**(8 Hrs.)**
HTML tags, special characters, images, tables, forms, the hyperlinks, Frames	
Unit II : Dynamic HTML (DHTML):	**(7 Hrs.)**
Introduction, Cascading Style Sheets (CSS), DHTML Document Object Model and Collections .	
Unit III: Scripting Languages	**(8 Hrs.)**
Java Script objects and forms, server side and client side scripting languages.	
Unit IV : XML	**(8 Hrs.)**
XML basics, understanding mark-up languages, structures and syntax, valid Vs. Well-formed XML, DTD (document type Definitions) classes, Element Type Declaration, Attribute Declarations, Limitations of DTDs, XML processor, Introduction to Schema, Complex Types, Extensible Style sheet Language Transformations (XSLT),Basics of Parsing.	
Unit V: JavaScript	**(7 Hrs.)**
The importance of being asynchronous, Blocking vs. non-blocking code, Server-side, What is Node.js?, Why use Node.js?,Features, Process Model, Setup Node.js Development Environment, Node.js Basics, Node.js Module, File System.	
Unit VI: Virtual memory	**(8 Hrs.)**
Introduction to AngularJS, AngularJS Expressions: Numbers, Strings, Objects, Arrays, Expressions using {{ }} and ng-bind. Modules: Creating a module, adding a controller & directive, myApp.js, myCtrl.js, Loading library. Directives: Data Binding, ng-init, ng-repeat, ng-app & ng-model directives, custom directives.2 way binding, Validating User Input, Status, ng-empty, ng-touched, ng-valid, ngpending. Data Binding: Synchronization between model and view. AngularJS Controllers: ng-controller, Controller Methods, External Files. Scope: $scope, understanding the scope, $rootScope.	
Total Lecture	**45 Hours**

Textbooks:	
1.	Thomas A.Powell, The Complete Reference HTML and XHTML, McGraw Hill Pub, 5th Edition
2.	Dayley, Brad Dayley, Learning angular JS

Reference books:	
1.	**Robin Nixon,** Learning PHP, MySQL, JavaScript, and CSS: A Step-by-Step Guide to Creating Dynamic Websites, O'RELLY,3rd

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

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/playlist?list=PLPmnoMVpkxfgvx6K9WCv-zlbIksh7yJd-
2.	https://www.slideshare.net/slideshow/1-advanced-web-designing-12th-it-1pdf/266727491
3.	https://onlinecourses.nptel.ac.in/noc20_cs52/preview

V SEMESTER
22CSD552 : OE II: Virtual Reality

Course Outcomes :
Upon successful completion of the course the students will be 1. Describe how VR systems work and list the applications of VR. 2. Understand the design and implementation of the hardware that enables VR systems to be built. 3. Understand the system of human vision and its implication on perception and rendering. 4. Explain the concepts of motion and tracking in VR systems

Unit I Introduction to Virtual Reality:	**(8 Hrs.)**
Virtual Reality and Virtual Environment: Introduction, Computer graphics, Real time computer graphics, Flight Simulation, Virtual environment requirement, benefits of virtual reality, Historical development of VR, Scientific Landmark.	
Unit II Representing the Virtual World	**(7 Hrs.)**
Representation of the Virtual World, Visual Representation in VR, Aural Representation in VR and Haptic Representation in VR	
Unit III The Geometry of Virtual Worlds &The Physiology of Human Vision	**(8 Hrs.)**
Geometric Models, Changing Position and Orientation, Axis-Angle Representations of Rotation, Viewing Transformations, Chaining the Transformations, Human Eye, eye movements & implications for VR.	
Unit IV Visual Perception & Rendering	**(8 Hrs.)**
Visual Perception - Perception of Depth, Perception of Motion, Perception of Colour, Combining Sources of Information Visual Rendering -Ray Tracing and Shading Models, Rasterization, Correcting Optical Distortions, Improving Latency and Frame Rates .	
Unit V Computer Graphics And Geometric Modelling:	**(7 Hrs.)**
Introduction, The Virtual world space, positioning the virtual observer, the perspective projection, human vision, stereo perspective projection, Color theory, Conversion From 2D to 3D, 3D space curves, 3D boundary representation, Simple 3D modelling, 3D clipping, Illumination models, Reflection models, Shading algorithms. Geometrical Transformations: Introduction, Frames of reference, Modelling transformations, Instances, Picking, Flying, Scaling the VE, Collision detection.	
Unit VI: AR / VR Applications:	**(8 Hrs.)**
Introduction, Engineering, Entertainment, Science, Training.	
Total Lecture	**45 Hours**

Textbooks:	
1.	M. LaValle, Virtual Reality, Cambridge University Press, 2016
2.	William R Sherman and Alan B Craig, Understanding Virtual Reality", Interface, Application and Design, The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002

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

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

MOOCs Links and additional reading, learning, video material	
1	https://youtube.com/@360?si=tiyDetjDbqjOUeWS
2.	https://wildlifesos.org/chronological-news/wildlife-sos-top-videos/?gad_source=1&gclid=Cj0KCQjwgJyyBhCGARIsAK8LVLMYnTygXOMJGw0aDnZxiIEesG9hFhG3KWSlhIBFd6Ttv5nDs5yTHTUaAgOkEALw_wcB

Audit Course
V SEMESTER
MLC125: (YCAP5) YCCE Communication Aptitude

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 Information Technology

B. Tech in Computer Science and Design

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 Information Technology)

Computer Science and Design

SoE No. 22CSD-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
SIXTH SEMESTER															
1	6	HS	GE/HUM	22CSD601	Fundamentals of Management and Economics	T	3	0	0	3	3	30	20	50	3 Hours
2	6	PC	CSD	22CSD602	Software Architecture & Design	T	3	0	0	3	3	30	20	50	3 Hours
3	6	PC	CSD	22CSD603	Computer Game Design and Programming	T	3	0	0	3	3	30	20	50	3 Hours
4	6	PC	CSD	22CSD604	Lab: Computer Game Design and Programming	P	0	0	2	2	1		60	40	
5	6	PE2	CSD		**Professional Elective-II**	T	3	0	0	3	3	30	20	50	3 Hours
6	6	PE2	CSD		**Lab. Professional Elective-II**	P	0	0	2	2	1		60	40	
7	6	STR	CSD	22CSD605	Design Workshop	P	0	0	4	4	2		60	40	
8	6	OE3	CSD		**Open Elective -III**	T	3	0	0	3	3	30	20	50	3 Hours
9	6	OE4	CSD		**Open Elective -IV**	T	3	0	0	3	3	30	20	50	3 Hours
10	6	PR	CSD	22CSE606	PROJECT PHASE 1	**P**	0	0	4	4	2		60	40	
						TOTAL	**18**	**0**	**12**	**30**	**24**				

Professional Electives-II

1	6	PE-II	CSD	22CSD611	PE-II: Multimedia Design & Processing
2	6	PE-II	CSD	22CSD612	PE-II: **Lab:** Multimedia Design & Processing
3	6	PE-II	CSD	22CSD613	PE-II: Advanced Web Designing
4	6	PE-II	CSD	22CSD614	PE-II: **Lab:** Advanced Web Designing
5	6	PE-II	ME	22CSD615	PE-II: Design Manufacturing and Assembly
6	6	PE-II	ME	22CSD616	PE-II: **Lab:** Design Manufacturing and Assembly
7	6	PE-II	CSD	22CSD617	PE-II: UX &UI Design
8	6	PE-II	CSD	22CSD618	PE-II: **Lab:** UX & UI Design
9	6	PE-II	CSD	22CSD619	PE-II: Introduction to Deep Learning
10	6	PE-II	CSD	22CSD620	PE-II: **Lab:** Introduction to Deep Learning

Open Electives-III

1	6	OE-III	CSD	22CSD631	OE III : Computer Graphics
2	6	OE-III	CSD	22CSD632	OE III : Multimedia Design

Open Electives-IV					
1	6	OE-IV	CSD	22CSD651	OE IV : Advanced Web Designing
2	6	OE-IV	CSD	22CSD652	OE IV : Virtual Reality

List of Mandatory Learning Course (MLC)												
1	6	HS	T&P	MLC2126	YCAP6 : YCCE Communication Aptitude Preparation	**A**	2	0	0	2	0	

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

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

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

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

Applicable for AY 2022-23 Onwards

VI Semester

22CSD601 : Fundamentals of Economics & Management

Course Outcomes
Upon successful completion of the course the students will be able to 1. Develop perspective about economy based on logical reasoning and estimate the economic outcomes. 2. Interprets comparative advantage of resources. **3.** Explain the Functions of Management and identify tools and techniques of Marketing of goods and services. 4. Analyse the role of Financial Accountancy and Management in the Organisation.

Unit I : Market structures - equilibrium output and price	**(7 Hrs.)**
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.	
Unit II : Engineering Production and Costs	**(6 Hrs.)**
Factors of Production: Land, Labor, 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.	
Unit III : Market structures - equilibrium output and price	**(6 Hrs.)**
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.	
Unit IV : Principle of Management	**(7 Hrs.)**
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.	
Unit V : Financial Accountancy and Management :	**(7 Hrs.)**
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- Journal, Posting of transaction into ledger and preparation of trial balance, Introduction of trading account, profit and loss account and balance sheet.	
Unit VI: Government Intervention	**(6 Hrs.)**
The Economic Role of Government with respect to Market Price Ceiling, Price Floor and Market Adjustment (with short case studies of agricultural administered price, minimum wage and rent control); Black Market; Tax and market adjustment ; Elasticity and Tax incidence Comparison of markets with and without government.	
Total Lecture	**45 Hours**

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

Textbooks:	
1.	Modern Economics: H. L. Ahuja, 13th Edition, S. Chand Publisher, 2009.
2.	Modern Economic Theory: K. K. Devett, 3rd edition, S. Chand Publisher,2007
3	Principle of Economics: Mankiw N. Gregory, 7th edition, Thomson, 2013
4	Harold Koontz Ramchandra, Principles of Management, Tata McGrow hills
5	Ramaswamy V.S. and Namakumari S - Marketing Management: Planning, Implementation and Control (Macmillian, 3rd Edition).
6	Khan M Y - Financial Services (Tata Mc Graw Hill, 19)
7	Principle of Economics: Mankiw N. Gregory, 7th edition, Thomson, 2013
8	Harold Koontz Ramchandra, Principles of Management, Tata McGrow hills

Reference Books :	
1	Advance Economic Theory: H. L. Ahuja, 17th Edition, S. Chand Publisher, 2099.
2	International Trade: M. L. Zingan, 12th edition, Vindra Publication, 2007.
3	Macro Economics: M. L. Zingan, 11th edition, Vindra Publication, 2007.
4	Fabozzi - Foundations of Financial Markets and Institutions (Pretice hall, 3rd Ed.)
5	Monitory Economics: M. L. Sheth, 1st Edition, Himayalaya Publisher, 1995.
6	Economics of Development and Planning: S. K. Misra and V. K. Puri, 12th edition,
7	Himalaya Publishing House, 2006.
8	Rajan Saxena: Marketing Management, Tata McGraw Hill.
9	Parameswaran- Fundamentals of Financial Instruments (Wiley India)
10	Bhole L M - Financial Institutions and Markets (Tata McGraw-Hill, 3rd edition, 2003).

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://link.springer.com/openurl?genre=book&isbn=978-1-4613-6193-0
	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/
2.	https://onlinecourses.nptel.ac.in/noc20_mg31/
3.	https://onlinecourses.nptel.ac.in/noc21_hs52/

VI Semester
22CSD602 : Software Architecture & Design

Course Outcome
On completion of this course, the student will be able to 1. Analyze and evaluate the different software process model and appropriate architectural style while developing a software 2. Understand and apply the software testing techniques in a variety of ways to test the software. 3. Analyze and design various UML diagram and UML based design and analysis with the help of various diagrams. 4. Demonstrate an ability to use the techniques and tools necessary for engineering practice

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

			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 Seventh Edition
2.	Lethbridge and Pearson Object Oriented Software Engineering 2nd Edition,2005 Pearson Education

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

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

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=AN5I6fFxyfs
2.	https://www.youtube.com/watch?v=w0LQh0vCeqI
3.	https://nptel.ac.in/courses/106101061

VI Semester

22CSD603 : Computer Game Design and Programming

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

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

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

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

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

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

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

VI Semester
22CSD604 : Lab: Computer Game Design and Programming

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

List of Practical's

Sr. No.	Problem Statements
1	Introduction of C#, Variables, If else
2	Program by using Loops, Arrays, Enums
3	Installation of a game engine, e.g., Unity, familiarization of the GUI. Conceptualize the theme for a 2D game
4	Character design, sprites.
5	movement and character control
6	Level design: design of the world in form of tiles along with interactive and collectible objects
7	Design of interaction between the player and the world, optionally using the physics engine.
8	Design of menus and user interaction in mobile platform.
9	Insert audio
10	Project

VI SEMESTER
22CSD611 : PE II: Multimedia Design & Processing

Course Outcomes :
On completion of this course, the student will be able to 1. To understand concept of multimedia design & processing 2. To analyze the different multimedia design. 3. To apply various operations using Multimedia tool 4. To design user interface and case study on different android applications 5. Expert talk on the recent advancements of media, society and ethics

Unit 1: Design Overview:	**(8 Hrs.)**
Need for design, Human factors, fundamentals of Human perception, Human skill level and behavior, dialogues and tasks, Learning and Learning Modes, Cognitive Domain Learning, Affective and Psychomotor Domain Learning, Multimedia Educational Software Modeling, System Quality, Elements of user Interface.	
Unit 2: Multimedia Authoring and User Interface:	**(7 Hrs.)**
Multi Media Authoring System and its type, Hypermedia Application Design consideration, User Interface Design, Information Access, Object Display / Playback Issues.	
Unit 3: Human Computer Interface Design:	**(8 Hrs.)**
Information design, interaction and sensorial design, guidelines for user interface design, dialogue design, Cognitive Walkthrough- case studies/ examples – Different Android applications, like Talking Tom, Monkey Trap etc.	
Unit 4: Multimedia Tool	**(7 Hrs.)**
Flash, Creating & Modifying elements, Line tool, fill/attributes, different shapes, text tools & pen tool, Selecting lines fill with arrow tool, selecting shapes, using lasso tool, performing basic editing tools, selecting & deselecting elements, modifying created objects.	
Unit 5: Animation Technology	**(8 Hrs.)**
Definition, History of Animation, Types of Animation – 2D and 3D, Basic principles of animation. Introduction to Multimedia tool – Flash, Creating & Modifying elements, Line tool, fill/attributes, different shapes, text tools & pen tool, Selecting lines fill with arrow tool, selecting shapes, using lasso tool, performing basic editing tools, selecting & deselecting elements, modifying created objects.	
Unit 6: Animation Design:	**(7 Hrs.)**
Introduction & Learning perspective drawing - Drawing for Animation: Gesture Drawing, Action Drawing, Line of action, Dynamic Poses, Action Sketches (Key Poses0 2D Design concepts & Composition. Principles of Animation. Process of 2D Animation film making. Editing & Animatics. Input Sound- Sound Effects – Sound Recording. Designing, Developing Characters (Realistic, Exaggerated & Stylized).	
Total Lecture	**(45 Hrs)**

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

Text Books	
1	Principles of Multimedia Parikh Tata McGraw Hill Education Pvt Ltd , New Delhi
2.	Multimedia Technologies Rajneesh Aggarwal & B. B Tiwari Excel Publication, New Delhi, 2007.
3.	Multimedia making it work Tay Vaughan Tata McGraw-Hill, 2008.

Reference Books	
1	Principles of Multimedia Parekh Ranjan Tata cGraw-Hill, 2007
2	Introduction to Computer Graphics and Multimedia Second Edition Anirban Mukhopadhyay and Arup ChattopadhyayVikas Publishing House.

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MOOCs Links and additional reading, learning, video material	
1.	https://nptel.ac.in/courses/117105083
2.	https://youtu.be/XdC5Udq-4Mo

VI SEMESTER

22CSD612: Lab: PE II: Multimedia Design & Processing

Course Outcomes :
On completion of this course, the student will be able to
1. To understand concept of multimedia design & processing 2. To analyze the different multimedia design. 3. To apply various operations using Multimedia tool 4. To design user interface and case study on different android applications 5. Expert talk on the recent advancements of media, society and ethics

List of Practical

Sr. No.	Problem Statements
1	Installation of various multimedia software li Photoshop/GIMP, Blender Flash Director or any open source software
2	Installing and use of various multimedia devices Scanner Digital camera, web camera Mike and speakers Touch screen Plotter and printers DVD , Audio CD and Video CD
3	Reading and writing of different format on CD/DVD
4	Transporting audio and video files
5	Using various features of Flash
6	Using various features of Photo-shop/GIMP
7	Using various features of Blender
8	Making multimedia presentations combining, Flash, Photo-shop/GIMP, such as department profile, lesson presentation, games and project presentations.

VI SEMESTER

22CSD613 : PE II: Advanced Web Designing

Course Outcomes :
On completion of this course, the student will be able to 1. The different tags of HTML and Implement interactive web pages using HTML, DHTML and CSS. 2. The client server architecture and Develop interactive web pages using java script and client and server side programming. 3. The concept of Markup languages and Make the use of markup languages in development of web pages. 4. The concepts of Node JS and Angular JS and Develop web applications using Node and Angular JS.

Unit 1: Creation of web pages	**(8Hrs)**
HTML tags, special characters, images, tables, forms, the hyperlinks, Frames.	
Unit 2: Dynamic HTML (DHTML)	**(8Hrs)**
Introduction, Cascading Style Sheets (CSS), DHTML Document Object Model and Collections .	
Unit 3: Scripting Languages	**(7Hrs)**
Java Script objects and forms, server side and client side scripting languages.	
Unit 4 : XML	**(7Hrs)**
XML basics, understanding mark-up languages, structures and syntax, valid Vs. Well-formed XML, DTD (document type Definitions) classes, Element Type Declaration, Attribute Declarations, Limitations of DTDs, XML processor, Introduction to Schema, Complex Types, Extensible Style sheet Language Transformations (XSLT), Basics of Parsing.	
Unit 5 : JavaScript	**(7Hrs)**
The importance of being asynchronous, Blocking vs. non-blocking code, Server-side JavaScript, What is Node.js?, Why use Node.js?,Features, Process Model, Setup Node.js Development Environment, Node.js Basics, Node.js Module, File System.	
Unit 6: Introduction to AngularJS	**(8Hrs)**
AngularJS Expressions: Numbers, Strings, Objects, Arrays, Expressions using {{ }} and ng-bind. Modules: Creating a module, adding a controller & directive, myApp.js, myCtrl.js, Loading library. Directives: Data Binding, ng-init, ng-repeat, ng-app & ng-model directives, custom directives.2 way binding, Validating User Input, Status, ng-empty, ng-touched, ng-valid, ngpending. Data Binding: Synchronization between model and view. AngularJS Controllers: ng-controller, Controller Methods, External Files. Scope: $scope, understanding the scope, $root Scope.	
Total Lecture	**45 Hours**

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

VI SEMESTER

22CSD614 : Lab: II: Advanced Web Designing

Course Outcomes :
On completion of this course, the student will be able to
1. The different tags of HTML and Implement interactive web pages using HTML, DHTML and CSS. 2. The client server architecture and Develop interactive web pages using java script and client and server side programming. 3. The concept of Markup languages and Make the use of markup languages in development of web pages. 4. The concepts of Node JS and Angular JS and Develop web applications using Node and Angular JS.

List of Practical

Sr. No.	Problem Statements
1	Design a page having suitable background color and text color with title "My First Web Page" using all the attributes of the Font tag.
2	Create a HTML document giving details of your [Name, Age], [Address, Phone] and [Register Number, Class] aligned in proper order using alignment attributes of Paragraph tag.
3	Write HTML code to design a page containing some text in a paragraph by giving suitable heading style.
4	Create a page to show different character formatting (B, I, U, SUB, SUP) tags. viz : log b m p = p logb m
5	Create a web page with an appropriate image towards the left hand side of the page, when user clicks on the image another web page should open.
6	Create web Pages using Anchor tag with its attributes for external links. Procedure
7	Write HTML code to create a Web Page that contains an Image at its center.
8	Create a web page for internal links; when the user clicks on different links on the web page it should go to the appropriate locations/sections in the same page.

VI Semester

22CSD615 : PE II: Design Manufacturing and Assembly

Course Outcomes :
On completion of this course, the student will be able to 1. Concepts of Design for Manufacturing (DFM); Role of DFM in product specification and standardization 2. Methods of material, shape and process selections, Design rules for manufacturing and assembly processes, Design for quality and reliability. 3. Approach towards robust design, Design for optimization, Case studies on design for manufacturing and assembly.

Unit 1: Introduction	**(8 Hrs.)**
Need Identification and Problem Definition. Concept Generation and Evaluation. Embodiment Design	
Unit 2: Selection of Materials and Shapes	**(8 Hrs.)**
Properties of Engineering Materials. Selection of Materials – I. Selection of Materials - II. Case Studies - I. Selection of Shapes. Co-selection of Materials and Shapes.	
Unit 3: Selection of Manufacturing Processes	**(7 Hrs.)**
Design Impact on Cost, Design for "X" – DFM approach, DFM Framework, Material and Process Evaluation, General DFM Guidelines, Machining and Casting Guidelines and Examples, Minimize Finishing Requirements. Computer applications for DFMA .Design features to facilitate machining: datum features – functional and manufacturing. Component design – machining considerations, redesign for manufacture, examples. Form design of castings and weldments.	
Unit 4 : Design for Assembly	**(7 Hrs.)**
Tolerance Analysis: Process capability, process capability metrics, Tolerance – cost aspects, feature tolerances, geometric tolerances, relationship between attainable tolerance grades and different machining process. Cumulative effect of tolerances – sure fit law, normal law and truncated normal law. Interchangeable part manufacture and selective assembly – control of axial play – introducing secondary machining operations, laminated shims – examples.	
Unit5 : Design for Reliability and Quality	**(7 Hrs.)**
Datum Systems: Degrees of freedom, grouped datum systems – computation of translational and rotational accuracy – geometric analysis and applications. True Position Theory: Co-ordinate and conventional method of feature location, tolerance and true position tolerance, virtual size concept, floating and fixed fasteners, projected tolerance zone, assembly with gasket, zero true position tolerance, functional gauges, paper layout gauging – examples.	
Unit 6: Introduction to Robust Design	**(8 Hrs.)**
Principles of Design for Assembly, Minimize Part Count, Standardization and Minimize Par Variety, Design guidelines for manual assembly, DFA analysis, DFA index, Design for Automated Assembly. Introduction to usage of DFMA software Failure Mode and Effect Analysis .Design for Quality. Design for Reliability. Approach to Robust Design. Design for Optimization.	
Total Lectures	**(45 Hrs.)**

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Textbooks:	
1.	Boothroyd G., Dewhurst P. and Knight W. – 'Product Design for Manufacture and Assembly' – Marcel Dekker, New York – 2012 – 4th Edition
2.	Peck H. – 'Designing for Manufacture' – Pitman Publications – 1983

Reference Books	
1	M F Ashby and K Johnson, Materials and Design - the art and science of material selection in product design, Butterworth-Heinemann, 2003
2	G Dieter, Engineering Design - a materials and processing approach, McGraw Hill, NY, 2000.
3	M F Ashby, Material Selection in Mechanical Design, Butterworth-Heinemann, 1999.
4	T H Courtney, Mechanical Behavior of Materials, McGraw Hill, NY, 2000.
5	K G Swift and J D Booker, Process selection: from design to manufacture, London: Arnold, 1997.

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

MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/112/106/112106249/
2.	https://www.classcentral.com/course/youtube-design-for-quality-manufacturing-and-assembly-47428

VI Semester
22CSD616 : Lab: PE II : Design Manufacturing and Assembly

Course Outcomes :

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

1. Concepts of Design for Manufacturing (DFM); Role of DFM in product specification and standardization
2. Methods of material, shape and process selections, Design rules for manufacturing and assembly processes, Design for quality and reliability.
3. Approach towards robust design, Design for optimization, Case studies on design for manufacturing and assembly.

List of Practical

Sr. No.	Problem Statements
1	List of design of machine element Page
2	Design of rigid coupling
3	Design of flexible coupling
4	Create a page to show different character formatting (B, I, U, SUB, SUP) tags. viz : log b m p = p logb m
5	Design of helical spring
6	Design of leaf spring
7	Design of clutches
8	Design of Helical Gear

VI Semester
22CSD617 : PE-II: UX &UI Design

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

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

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

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Reference Books:	
1.	Alan Cooper, The Essential Of User Interface Design", Wiley DreamTech, 2009

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

VI Semester

22CSD618 : Lab: PE-II: UX &UI Design

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

List of Practical's

S. N.	Problem Statements
1	PART-1 Lab based o Formal Elements of Interface Design (Introductory Part) (Demonstration of available open source tool for designing)
2	PART-2 Lab based Active Elements of Interface Design • Imagery • Typography
3	PART-2 Lab based Active Elements of Interface Design • Design Before Design • Look and Feel
4	PART-2 Lab based Active Elements of Interface Design • Language as a design tool • Color and Shape
5	PART-2 Lab based Active Elements of Interface Design • Language as a design tool • Color and Shape
6	PART-2 Lab based Active Elements of Interface Design • Icons
7	PART-3 Lab based composing the Elements of Interface Design • Static to Active • Functionality • Buttons
8	PART-3 Lab based composing the Elements of Interface Design • Speed and Style • Composition and Structure
9	PART-3 Lab based composing the Elements of Interface Design Not Buttons • States and Changes
10	Case study based on complete UI/UX Designing on the selected application with the use of open source tool.

VI Semester

22CSD619 : PE-II: Introduction to Deep Learning

Course Outcome:
On completion of this course, the student will be able to 1. Comprehend the neural networks as means for computational learning and to analyze the basic network architectures and algorithms for supervised and unsupervised learning. 2. Recognize the characteristics of deep learning models that are useful to solve real-world problems. 3. Understand the motivation for different neural network architectures and select the appropriate architecture for a given problem. 4. Build deep learning models and interpret the result.

Unit1:Fundamentals of Artificial Neural Networks:	**(8 Hrs.)**
Overview of Artificial Intelligence, Types of AI, Machine Learning, Types of Learning algorithms, relation between AI, ML, and DL, Overview of Neural Network, Types of ANN, Feed forward NN,The McCulloch-Pitts Network, Perceptron, Multi-Layer Perceptron Activation Functions : Sigmoid, ReLU, Leak y ReLU,Hyperbolic, Softmax.	
Unit 2: Gradient Descent and Backpropagation	**(7 Hrs.)**
Gradient Descent, Stochastic Gradient Descent, Mini-Batch Gradient Descent, Backpropagation, Momentum based Gradient descent, Nestrov Accelerated Gradient, Some problems in ANN **Optimization and Regularization**: Error functions, Overfitting and Capacity, Cross Validation, Feature Selection, Weight Regularization, L1 & L2 Regularization, Hyper-parameters.	
Unit 3: Introduction to Convolutional Neural Networks:	**87 Hrs.)**
Introduction to CNNs, Components of CNN Architecture: Convolutional layer, Pooling/Down-sampling layer, Flattening layer, Fully connected Layer, Receptive fields, Feature Maps, Filters and Activation Maps, Padding, Properties of CNN, Architecture of CNN(LeNet, AlexNet, ZFNet, GoogleNet, VGGNet, ResNet, DenseNet), Applications of CNN.	
Unit 4: Introduction to Recurrent Neural Networks	**(7 Hrs.)**
Introduction to RNNs, Challenges with vanishing and exploding gradients, Unfolded RNNs, Seq2Seq RNNs, LSTM, Gated Recurrent Unit(GRU), RNN application.	
Unit 5: Deep Unsupervised Learning:	**(7 Hrs.)**
De Autoencoders : Features, Types (Vanilla, Multilayer, Stacked, Deep, Autoencoders : Features, Types (Vanilla, Multilayer, Stacked, Deep, noising, Convolutional, Regularized), Variational Autoencoders, Generative Adversarial Networks, Cycle GA	
Unit 6: Deep Learning applications:	**(8 Hrs.)**
Detection Method using CNN, Region based CNN, Fast R-CNN, Faster RCNN, Region Proposal Network, YOLO, and SSD.	
Total Lectures	**(45 Hrs.)**

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Text Books	
1	Deep Learning Goodfellow, I., Bengio, Y. and Courville, A. MIT Press, 2016.

Reference Books	
1	Pattern Recognition and Machine Learning Bishop, C. M. Springer, 2006.
2	Neural Network and Deep Learning Charu C Agarwal Springer
3	Lecture slides of Prof. Fei Fei Li's, Stanford University, USA. Andrew Ng, Coursera Course on CNN.

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

MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/106/106/106106184/
2.	https://onlinecourses.nptel.ac.in/noc21_cs76/preview

VI Semester
22CSD620 : Lab: PE-II: Introduction to Deep Learning

Course Outcome:

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

1. Comprehend the neural networks as means for computational learning and to analyze the basic network architectures and algorithms for supervised and unsupervised learning.
2. Recognize the characteristics of deep learning models that are useful to solve real-world problems.
3. Understand the motivation for different neural network architectures and select the appropriate architecture for a given problem.
4. Build deep learning models and interpret the result.

List of Practical

Sr .No.	Problem Statements
1	Implementation of different activation functions to Deep Learning
2	Implementation of different Learning Rules
3	Implementation of Adeline network for system identification.
4	Implementation of Madeline network 6. Pattern matching using different rules.
5	Project related to application of machine learning in healthcare.
6	Implementation of Perceptron Networks
7	Application of machine learning in business analysis
8	Application of machine learning in sports analytics

V SEMESTER
22CSD631 : OE III: Computer Graphics

Course Outcomes :
Upon successful completion of the course the students will be 1. .To introduce the components of a graphics system and become familiar with building approach of graphics system components and algorithms related with them 2. To understand 2 Dimensional and 3-Dimensional computer graphics concepts. 3. To provide an understanding to the basic geometrical primitives and transformation of geometrical shapes. 4. Provide an understanding of mapping from a world coordinate to device coordinates, clipping, and projections.

Unit I : Introduction to Multimedia:	**(8 Hrs.)**
Overview of Graphics Systems: Graphics applications-CAD, Computer art, Education & Training, Entertainment, Visualization, Image Processing **Video display devices** –Cathode Ray Tube, Raster–scan displays, Random–scan displays, color CRT monitors – Beam penetration, shadow mask, Flat panel displays – plasma panel, LCD. Graphics Workstation & Viewing system, Interactive Input devices, Hard copy devices	
Unit II : Graphics Output Primitives:	**(8 Hrs.)**
2 Dimensional world coordinate reference frame in openGL, openGL – point function, Line functions, Polygon Fill – Area functions, character function. Line drawing Algorithm-DDA and Bresenham's, Circle drawing Algorithm–DDA and midpoint, Attributes of Graphics Primitives – color and gray scale, OpenGL-Color functions, Point attributes, Line attributes, Fill area attributes, Character attributes.	
Unit III : Geometric Transformations:	**(8 Hrs.)**
Basic 2 Dimensional transformation - translation,rotation and scaling, Matrix representation and homogenous coordinates, Inverse transformation, Composite translate, rotation and scaling, general 2D pivot point rotation, general 2Dfixed point scaling. OpenGL functions for 2-D geometric transformation.	
Unit IV: Two-Dimensional Viewing	**(7 Hrs.)**
: 2 D viewing pipeline, clipping window, Normalization and viewport transformations. OpenGL - 2 D viewing functions. 2 D Clipping - Point clipping, Line clipping-Cohen Sutherland Line clipping, Nicholl-LeeNicholl line clipping, Polygon clipping – Sutherland Hodgeman polygon clipping, WeilerAtherton polygon clipping, Text clipping	
Unit V: Three Dimensional Viewing and Computer animation:	**(7Hrs.)**
3 Dimensional Viewing: Overview of 3 D viewing concepts, 3D viewing pipelining , three dimensional geometric Transformations Translation, **Rotation and Scaling, Visible surface detection methods** - Back face detection, Depth buffer method, Octrees methods, ray casting method.	
Unit VI: Interactive Input Methods and GUI:	**(7 Hrs.)**
Logical classification of Input devices, Input functions for graphical data, Interactive Picture Construction techniques. **Computer Animation:** Raster methods for Computer Animation, Design of Animation Sequences, Motion specifications, Periodic motions. OpenGL Animation Procedures.	
Total Lecture	**45 Hours**

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Textbooks:	
1.	Donald Hearne and M. Pauline Baker, "Computer Graphics, C Versions." Prentice Hal
2.	Foley, Vandam, Feiner and Huges, Computer Graphics Principles and Practice, 2nd edition,1996

Reference Books:	
1.	David F. Rogers, Procedural Elements for Computer Graphics, 1998
2.	Steven Harrington, Computer Graphics, A Programming Approach, 2nd edition, 1987

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MOOCs Links and additional reading, learning, video material	
1.	https://youtu.be/01YSK5gIEYQ
2.	https://youtube.com/playlist?list=PLrjkTql3jnm9cY0ijEyr2fPdwnH-0t8EY&si=GIcsviVq_8n1P-8v
3.	https://archive.nptel.ac.in/courses/106/103/106103224/

VI SEMESTER

22CSD632 : OE III: Multimedia Design

Course Outcomes :
On completion of this course, the student will be able to 1. To understand concept of multimedia design 2. To analyze the different multimedia design. 3. To apply various operations using Multimedia tool 4. To design user interface and case study on different android applications

Unit 1: Introduction to Multimedia	**(8 Hrs.)**
Definition of Multimedia, Multimedia objects: Text, Graphics, Animation, Audio, images, Video. Definition of HyperText and HyperMedia. Multimedia Applications in Education, Entertainment. Advertising world etc. Components of a Multimedia System, Desirable Features for a Multimedia System, requirements of Multimedia Communication, Applications of multimedia – benefits and problems.	
Unit 2: Representation of Multimedia Objects	**(7 Hrs.)**
Representation of Analog Signals, A/D: Sampling and quantization. Text: Font and their representation (bitmap, true type). Graphics: Raster & Vector representation, aliasing problems. Image: (bit depth, resolution, color (RGB, CMYK, HSB), introduction to BMP, GIF, TIFF, PNG and JPEG formats),.Audio (speech and wideband audio, sampling rate and aliasing, quantization, introduction to MP3, WMA, WAV, MIDI etc.). Video (frame rate and resolution, interlaced and non-interlaced video, color planes (YCBCR, YUV), Video broadcast standards (PAL, NTSC, SECAM), HD Video, 3D TV, Video representation: AVI, MPEG, Quick Time, real video.	
Unit 3: Human Computer Interface Design	**(8 Hrs.)**
Digital Audio, Music Sequencing and Notation, Image/Graphics Editing, Video Editing (Linear, Non-linear), Subtitling.	
Unit 4: Multimedia Tool	**(7 Hrs.)**
Content design, technical design, visual design, design metaphors, example studies, interactivity	
Unit 5: Multimedia Application Design	**(7 Hrs.)**
Content design, technical design, visual design, design metaphors, example studies, interactivity	
Unit 6: Multimedia Authoring and Publishing	**(8 Hrs.)**
Definition of an Authoring System, uses of an authoring system, Definition and function of Authoring Metaphor, Different Metaphors. Offline Publishing: Flash, Power Point. Online Publishing: HTML5, Dreamweaver	
Total Lectures	**(45 Hrs.)**

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Text Books	
1	Principles of Multimedia Parikh Tata McGraw Hill Education Pvt Ltd , New Delhi
2.	Multimedia Technologies Rajneesh Aggarwal & B. B Tiwari Excel Publication, New Delhi, 2007.
3.	Multimedia making it work Tay Vaughan Tata McGraw-Hill, 2008.

Reference Books	
1	Principles of Multimedia Parekh Ranjan Tata cGraw-Hill, 2007
2	Introduction to Computer Graphics and Multimedia Second Edition Anirban Mukhopadhyay and Arup ChattopadhyayVikas Publishing House.

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

MOOCs Links and additional reading, learning, video material	
1.	https://nptel.ac.in/courses/117105083
2.	https://youtu.be/XdC5Udq-4Mo

VI SEMESTER
CSD651 : OE II: Advanced Web Designing

Course Outcomes :
Upon successful completion of the course the students will be 1. The different tags of HTML and Implement interactive web pages using HTML, DHTML and CSS. 2. Apply the concept of Markup languages and Make the use of markup languages in development of web pages. 3. Develop interactive web pages using java script and client and server side programming. 4. Develop web applications using Node and Angular JS.

Unit I: Creation of web pages	**(8 Hrs.)**
: HTML tags, special characters, images, tables, forms, the hyperlinks, Frames	
Unit II: Dynamic HTML (DHTML)	**(7 Hrs.)**
Introduction, Cascading Style Sheets (CSS), DHTML Document Object Model and Collections	
Unit III : Scripting Languages:-	**(8 Hrs.)**
Java Script objects and forms, server side and client side scripting languages	
Unit IV XML	**(8 Hrs.)**
:XML basics, understanding mark-up languages, structures and syntax, valid Vs. Well-formed XML, DTD (document type Definitions) classes, Element Type Declaration, Attribute Declarations, Limitations of DTDs, XML processor, Introduction to Schema, Complex Types, Extensible Style sheet Language Transformations (XSLT),Basics of Parsing	
Unit V : JavaScript	**(7 Hrs.)**
The importance of being asynchronous, Blocking vs. non-blocking code, Server-side, What is Node.js?, Why use Node.js?,Features, Process Model, Setup Node.js Development Environment, Node.js Basics, Node.js Module, File System	
Unit VI: Virtual memory	**(8 Hrs.)**
Introduction to AngularJS, AngularJS Expressions: Numbers, Strings, Objects, Arrays, Expressions using {{ }} and ng-bind. Modules: Creating a module, adding a controller & directive, myApp.js, myCtrl.js, Loading library. Directives: Data Binding, ng-init, ng-repeat, ng-app & ng-model directives, custom directives.2 way binding, Validating User Input, Status, ng-empty, ng-touched, ng-valid, ngpending. Data Binding: Synchronization between model and view. AngularJS Controllers: ng-controller, Controller Methods, External Files. Scope: $scope, understanding the scope, $rootScope	
Total Lecture	**45 Hours**

Textbooks:	
1.	Thomas A.Powell, The Complete Reference HTML and XHTML, McGraw Hill Pub, 5th Edition
2.	Dayley, Brad Dayley, Learning angular JS

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Reference books:	
1.	**Robin Nixon,** Learning PHP, MySQL, JavaScript, and CSS: A Step-by-Step Guide to Creating Dynamic Websites, O'RELLY,3rd

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

MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/106/106/106106156/
2.	https://youtu.be/lxQLS3kkPxg

VI SEMESTER
CSD652 : OE IV: Virtual Reality

Course Outcomes :
Upon successful completion of the course the students will be 1. Describe how VR systems work and list the applications of VR. 2. Understand the design and implementation of the hardware that enables VR systems to be built. 3. Understand the system of human vision and its implication on perception and rendering. 4. Explain the concepts of motion and tracking in VR systems

Unit I : Introduction to Virtual Reality:	**(8 Hrs.)**
Virtual Reality and Virtual Environment: Introduction, Computer graphics, Real time computer graphics, Flight Simulation, Virtual environment requirement, benefits of virtual reality, Historical development of VR, Scientific Landmark.	
Unit II: Representing the Virtual World	**(7 Hrs.)**
Representation of the Virtual World, Visual Representation in VR, Aural Representation in VR and Haptic Representation in VR	
Unit III : The Geometry of Virtual Worlds &The Physiology of Human Vision	**(8 Hrs.)**
Geometric Models, Changing Position and Orientation, Axis-Angle Representations of Rotation, Viewing Transformations, Chaining the Transformations, Human Eye, eye movements & implications for VR.	
Unit IV : Visual Perception & Rendering	**(8 Hrs.)**
Visual Perception - Perception of Depth, Perception of Motion, Perception of Color, Combining Sources of Information Visual Rendering -Ray Tracing and Shading Models, Rasterization, Correcting Optical Distortions, Improving Latency and Frame Rates	
Unit V Computer Graphics And Geometric Modelling:	**(7 Hrs.)**
Introduction, The Virtual world space, positioning the virtual observer, the perspective projection, human vision, stereo perspective projection, Colour theory, Conversion From 2D to 3D, 3D space curves, 3D boundary representation, Simple 3D modelling, 3D clipping, Illumination models, Reflection models, Shading algorithms. Geometrical Transformations: Introduction, Frames of reference, Modelling transformations, Instances, Picking, Flying, Scaling the VE, Collision detection.	
Unit VI : AR / VR Applications:	**(8 Hrs.)**
Introduction, Engineering, Entertainment, Science, Training	
Total Lecture	**45 Hours**

Textbooks:	
1.	M. LaValle, Virtual Reality, Cambridge University Press, 2016
2.	William R Sherman and Alan B Craig, Understanding Virtual Reality", Interface, Application and Design, The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002

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

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MOOCs Links and additional reading, learning, video material	
1.	https://bestdavestore.com/antivirus/pl2
2.	https://youtu.be/eXsNX_2AzM8

Audit Course
VI SEMESTER
MLC126: (YCAP6) YCCE Communication Aptitude

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 Information Technology

B. Tech in Computer Science and Design

28 June 2019

VII Semester

22CSD701 – Virtual and Augmented Reality

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

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

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

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

VII Semester
22CSD702 : Lab: Virtual and Augmented Reality

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

List of Practical

S. N.	List of Practical
1	Installation of Unity and Visual Studio, setting up Unity for VR development, understanding documentation of the same.
2	Demonstration of the working of HTC Vive, Google Cardboard, Google Daydream and Samsung gear VR.
3	Develop a scene in Unity that includes: i. A cube, plane and sphere, apply transformations on the 3 game objects. ii. Add a video and audio source.
4	Develop a scene in Unity that includes a cube, plane and sphere. Create a new material and texture separately for three Game objects. Change the colour, material and texture of each Game object separately in the scene. Write a C# program in visual studio to change the colour and material/texture of the game objects dynamically on button click.
5	Develop a scene in Unity that includes a sphere and plane. Apply Rigid body component, material and Box collider to the game Objects. Write a C# program to grab and throw the sphere using vr controller.
6	Develop a simple UI (User interface) menu with images, canvas, sprites and button. Write a C# program to interact with UI menu through VR trigger button such that on each successful trigger interaction display a score on scene.
7	Create an immersive environment (living room/ battlefield/ tennis court) with only static game objects. 3D game objects can be created using Blender or use available 3D models.
8	Include animation and interaction in the immersive environment created in Assignment 7.
9	Mini-Projects/ Case Study Create a virtual environment for any use case. The application must include at least 4 scenes which can be changed dynamically, a good UI, animation and interaction with game objects. (e.g. VR application to visit a zoo)

VII Semester

22CSD703 : Computer Aided Design

Course outcomes:
After completion of the course students would be able to 1. Distinguish the various CAD CAM tools and also evaluate criteria for CAD CAM systems 2. Design 2D and 3D Transformation matrices 3. Calculate and analyse the parametric equations for wire frame. surface and solid modeling entities 4. Design the applications of modeling and evaluate data exchange formats

Unit I : CAD TOOLS	**(6 Hrs.)**
Definition of CAD Tools, Types of system, CAD/CAM system evaluation Criteria, functional areas of CAD, Modelling and viewing, efficient use of CAD software.	
Unit II : Two/Three Dimensional Transformations	**(6 Hrs.)**
Two & Three dimensional geometric and co-ordinate transformations like scaling, translation, rotation, reflection,shear. Concept of homogeneous representation and concatenated transformations. Inverse transformations	
Unit III Wire Frame Modeling:	**(7Hrs.)**
Types of mathematical representation of curves, wire frame models, wire frame entities, parametric representation of analytical and synthetic curves- Hermit cubic splines, Bezier curves, B Splines	
Unit IV : Surface Modeling:	**(7 Hrs.)**
Mathematical representation of surfaces, Surface model, Surface entities, surface representation, parametric representation of surfaces, plane surface, ruled surface, surface revolution, Tabulated surface.	
Unit V : Solid Modeling	**(8 Hrs.)**
Solid Representation - Boundary Representation (B-rep), Constructive Solid Geometry (CSG) and other methods,	
Unit VI: 6 Data Exchange	**(8Hrs.)**
Evaluation of different data-exchange formats, IGES, STEP, ACIS, Para data representations and structure	
Total Lecture	**45 Hours**

Text Books	
1	CAD/CAM, theory & practice Ibrahim Zeid The Structured Approach", 2005.
2	Procedural elements for computer graphics D Roger
3	Computer Graphics D Hearn & M.P.Baker
4	Computer Graphics:: S Harrington

Reference Books:	
1	"Automation, Production Systems and Computer Integrated Manufacturing", Mikell.P.Groover Prentice Hall of India, 2008.
2	"CAD/CAM/CIM",Radhakrishnan P, Subramanyan S. and Raju V 2nd Edition, New Age International (P) Ltd

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VII Semester
22CSD704 : Lab : Computer Aided Design

Course outcomes:

After completion of the course students would be able to
1. Study, design and develop the model for mechanical engineering parts.
2. Conceptualize & model any machine component
3. Build the CAD Model and CAM Model for simple machine elements.

List of Practical

S. N.	List of practical
1	Programs on 2-D transformations- scaling, rotation, reflection and translation
2	D Wireframe object modeling
3	D Wireframe object modeling
4	Basics of surface modeling using Extrude, Revolve, sweep, variable section sweep commands
5	Creating fill surfaces, lofted multi-section surfaces, blended surfaces
6	Creating objects through Solid modeling
7	Creating special features like hole, fillet, chamfer
8	To generate at least two simple assembly model
9	Exporting the cad file in different legacy Data Exchange Formats for various applications
10	Exporting CAD Geometry in Neutral file formats and analyzing their data structure with any open source viewer

VII Semester
22CSD711 - PE:-III: GPU Computing

Course Outcome
On completion of this course, the student will be able to 1. Compare & Compute speedup, efficiency, and scaled speedup of parallel computations. 2. Analyze and resolve the dependences in single, double and multi-level loops. 3. Describe common GPU architectures and programming models to implement efficient algorithm using kernels. 4. Given a problem, implement an efficient and correct code to solve it, analyze its performance, and give convincing written and oral presentations explaining the achievements.

UNIT I : Introduction to parallel computing:	**6(Hrs)**
Need of ever increasing performance, building parallel systems, need to write parallel programs, Parallel hardware, Parallel Software, Coordinating the processes/threads, Shared-memory, Distributed-memory, Programming hybrid systems. **Principles of Parallel Algorithm Design:** Preliminaries, Decomposition Techniques, Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing.	
UNIT-II Dendence Concepts	**6(Hrs)**
Basic introduction of dependence in single loop and double loop, Loop carried and Loop-independent dependences, Techniques for extraction of parallelism, index and iteration spaces and perfect loop nest, test for dependences, GCD test, and Bound test.	
UNIT-III Homogeneous Parallel Computing With CUDA:	**7(Hrs)**
History, GPU Architecture, Clock speeds, CPU / GPU comparisons, Heterogeneity, Accelerators, Parallel Programming, CUDA OpenCL / OpenACC, Kernels Launch parameters, Thread hierarchy, Warps/Wavefronts, Threadblocks/Workgroups, Streaming multiprocessors, 1D/2D/3D thread mapping, Device properties, Simple Programs	
UNIT-IV Memory hierarchy :	**7(Hrs)**
DRAM global, local / shared, private / local,textures, Constant Memory, Pointers, Parameter Passing, Arrays and dynamic Memory, Multi-dimensional Arrays, Memory Allocation, Memory copying across devices, Programs with matrices, Performance evaluation with different memories	
UNIT V : Synchronization:	**7(Hrs)**
Memory Consistency, Barriers (local versus global), Atomics, Memory fence. Prefix sum, Reduction. Programs for concurrent Data Structures such as Worklists, Linked-lists. Synchronization across CPU and GPU.**Functions:** Device functions, Host functions, Kernels functions, Using libraries (such as Thrust), and developing libraries.	

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UNIT VI : Debugging GPU Programs.	**8(Hrs)**
Profiling, Profile tools, Performance aspects Asynchronous processing, tasks, Task-dependence, Overlapped data transfers, Default Stream, Synchronization with streams. Events, Event-based- Synchronization - Overlapping data transfer and kernel execution, pitfalls. Dynamic parallelism, Unified Virtual Memory, Multi-GPU processing	

Text Books	
1	Introduction to Parallel Computing Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, Pearson Edn.
2	Dependence Concept Utpal Banerjee Intel Corp.
3	CUDA by Example: An Introduction to General- Purpose GPU Programming Jason Sanders, Edward Kandrot Addison-Wesley

VII Semester
22CSD712 - Lab: GPU Computing

Course Outcome
On completion of this course, the student will be able to 1. Compare & Compute speedup, efficiency, and scaled speedup of parallel computations. 2. Analyze and resolve the dependences in single, double and multi-level loops. 3. Describe common GPU architectures and programming models to implement efficient algorithm using kernels. 4. Given a problem, implement an efficient and correct code to solve it, analyze its performance, and give convincing written and oral presentations explaining the achievements.

List of Practical

S.N.	List of Practical
1	Write a "Hello world" Program Using OpenMP pragmas. Directive
2	Write a OpenMP program to find Sum of Natural Numbers using OpenMP Parallel FOR Directive.
3	Write a OpenMP program to find Sum of Natural Numbers using OpenMP REDUCTION
4	Write a OpenMP program for Loop-carried dependence using OpenMP parallel Directive.
5	Write a OpenMP program to illustrate Data Race condition
6	.Write a OpenMP program to illustrate Managing Shared& Private Data.
7	Write a "Hello world" Program Using MPI to illustrate the parallel programming model.
8	Install CUDA tool kit and study CUDA liabraries
9	Write a program for matrix multiplication using CUDA.

VII Semester
22CSD713 - PE-III: Digital Audio Design and Synthesis

Course Outcomes:

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

1. Analyze the recording and transmission principles in digital audio.
2. Analyze the various compression techniques.
3. Design and analyze the digital audio editing.
4. Analyze the various application of digital audio.

UNIT-I : Hi Fi Audio Amplifier	**6(Hrs)**

Introduction to Amplifiers: Mono, Stereo, Public Address; Difference between stereo amplifierand Mono amplifier; Block diagram of Hi Fi amplifier and explanation; Graphic equalizer concept, circuit diagram and operation. (5 Point Circuit diagram); Dolby NR recording system;Types of speaker woofer, Midrange and Tweeter; Cross over network circuit and its function.

UNIT-II :CD Player	**(6Hrs)**

CD – material used, size; Block diagram of CD player and explanation; Principle and working of detection used in CD player; Component used for CD mechanism (i) CD pick-up assembly, (ii) gear system, (iii) drive motors, (iv) CD lens; Function of controls; Parts, function of remote control (transmitter unit) and function of receiver used in CD player; Advantages of florescent display system used in CD player.

UNIT-III : Short time Fourier analysis	**7(Hrs)**

Filtering interpretation, Filter bank summation method, Gamma tone filter, other considerations in filter bank design, speech spectrum analysis using FFT.

UNIT-IV : TV Fundamental	**(6Hrs)**

Concept of Aspect ratio, image continuity, interlace scanning, scanning periods, horizontal and vertical, vertical resolution, horizontal resolution; Vestigial sideband transmission, bandwidth for Colour signal, picture tube, brightness, contrast, viewing distance luminance, hue, saturation, compatibility; Colour theory, primary colors and secondary colors, additive Colour mixing subtractive Colour mixing; Composite Video Signal, Pedestal height, Blanking pulse, Colour burst, Horizontal sync pulse details, Vertical sync pulse details, Equalizing pulses, CCIR Bstandards for Colour signal transmission and reception

UNIT-V : Linear predictive coding of speech	**6(Hrs)**

Basic principles of linear predictive analysis, Solution of LPC equations, Prediction error signal, Frequency domain interpretation, Relation between the various speech parameters, Synthesis of speech from linear predictive parameters, Applications

UNIT-VI : Audio Processing	**6(Hrs)**

Auditory perception and psychoacoustics - Masking, frequency and loudness perception, spatial perception, Digital Audio, Audio Coding - High quality, low-bit-rate audio coding standards, Multichannel audio - Stereo, Multichannel surround sound

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Text Books	
1	Speech and audio signal processing 1ST Ben gold and N Morgan John Wiley and sons
2	"Digital Processing of Speech Signals L. R. Rabiner and R. W. Schafer Pearson Education (Asia) Pte. Ltd., 2004
3	Audio Video Systems (R.G. Gupta) Tata McGraw Hill

Reference Books	
1	Speech Communications: Human and Machine O'Shaughnessy, Universities Press
2	Fundamentals of Speech Recognition L. R. Rabiner and B. Juang Pearson Education (Asia)

VII Semester
22CSD714 - Lab: Digital Audio Design and Synthesis

Course Outcome
On completion of this course, the student will be able to: 1.Analyze the recording and transmission principles in digital audio. 2.Analyze the various compression techniques. 3.Design and analyze the digital audio editing. 4.Analyze the various application of digital audio

List of Practical

S. N.	List of Practical
1	Study of circuit diagram of color TV receiver
2	CCVS for different test patterns
3	RF tuner
4	Video IF & detector
5	Video Amplifier
6	Sync separators (V & H)
7	Sound IF
8	Horizontal section
9	Vertical section
10	Trouble shooting of color TV

VII Semester
22CSD715 - PE-III Special Effects Techniques

Course Outcome
On completion of this course, the student will be able to: 1. Apply Computer basics and perform installation, customization of Operating System, related software in a computer for Multimedia purpose following safety precaution. 2. Perform safe handling of Multimedia devices Video Camera, Digital Camera, Microphone, Webcam and Basics of Digital Photography, Video Recording and data transfer. 3. Perform Photo editing and apply special effects by using Adobe Photoshop and Adobe Illustrator. 4. Implement Video editing and apply special effects by using Adobe Premier and Adobe After Effect.

UNIT-I : Introduction to the class	**6(Hrs)**
Introduction to the class. What are Visual Effects? – Photographic principles Photographi principles. Forced perspective: theory.	
UNIT-II : Introduction to the Interface	**(6Hrs)**
Introduction to the Interface. Basic Animation. Basic Rendering. Basic tools Rear Projection, Stop Motion Animation, Matte Paintings. Advanced Animation Anchor point, Key frames	
UNIT-III : Motio	**7(Hrs)**
Sketch Special vs Visual Effects Stunts, explosions, water, fire – safety. Transparency Masks and the Pen tool. Planning a visual effect Storyboards, pre-viz, planning workflows. MID-TERMS In-class animation exercise.	
UNIT-IV : Modern tools Model	**(6Hrs)**
Miniatures, Green Screen, Motion Control. Time & Layer control More on transparency. Editing in After Effects. Layer control.– The VFX Pipeline Planning & Management..	
UNIT-V : Parenting & Nesting	**6(Hrs)**
Creating more complex animations through layer control. Computer-generated Images. Performance capture. Advanced visual effect techniques: Avatar. Track & Key Demo Introducing the tools in After Effects for advanced compositing	
UNIT-VI : Job specialization.	**6(Hrs)**
Job Description, Job Specifications & Role Analysis, Factors affecting Job Design, Techniques of Job Design,Cases and Exercises in understanding Job Analysis. Job Analysis – Meaning, Uses, Process and methods of collecting data for job analysis	
Total Hrs.	31

Text Books	
1	Special effects : The History & Techniques Richard Rickitt Publisher Watson-Guptil
2	Maya Visual effects : The innovator's guide Eric Keller Publisher Sybex Maya Documentation

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VII Semester

22CSD716 - Lab: Special Effects Techniques

Course Outcomes
Upon successful completion of the course the students will be able to 1. Apply Computer basics and perform installation, customization of Operating System, related software in a computer for Multimedia purpose following safety precaution. 2. Perform safe handling of Multimedia devices Video Camera, Digital Camera, Microphone, Webcam and Basics of Digital Photography, Video Recording and data transfer. 3. Perform Photo editing and apply special effects by using Adobe Photoshop and Adobe Illustrator. 4. Implement Video editing and apply special effects by using Adobe Premier and Adobe After Effect.

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

1	To study the Multimedia BASIC SOFTWARE TOOLS.
2	A program to view a bmp file using c or c++ language
3	A program to to produce animation effect of triangle transform into square and then into circle
4	Study about the morphing
5	A program to create a file splitter
6	Study about the flash
7	Study about the dreamweaver
8	Study about the photoshop
9	Progprogram to draw a line using c or c++
10	Study program for tossing up a coin

VII Semester

22CSD717 : PE-III Animation Principles & Design

Course Outcome
On completion of this course, the student will be able to : 1. Prepare images using different color models. 2. Edit images using Graphical Processing Tools 3. Build Website with multimedia contents 4. Create 2D animation objects.

UNIT : I History of Animation	**6 (Hrs)**
Persistence of Vision, Early Animation Devices,The Digital Image - Analog v/s Digital and the Binary world - Digital Colour, Channels, bit depth and resolutions - Bitmap and Vector graphics - Boolean operations and Blend modes Getting Real world into the Digital Realm - Input tools like digital photography, video,	
UNIT –II Principles of Animation	**5(Hrs)**
: Key-frames, In-betweens, Cycles,Morphing 1,Timing and Spacing Charts, Squash and Stretch, Morphing2, Slow In, Slow Out, Squash and Stretch, Timing, Anticipation Visual Rhythm Transitions	
UNIT-II Walk Cycle	**5(Hrs)**
Walk and Run, Overlapping Action, Attitude Rotoscope Technique, Cycles, Locomotion Staging • Solid Drawing • Appeal Character Design-Puppet • Reference • Personality • Visual Contrast • Replacement Parts	
UNIT- IV Concepts of Design	**5(Hrs)**
Composition of a scene • Color Design • Value • FG, MG, BG elements, Replacement Animation • Lip Sync • Stop Motion	
UNIT- V Poetry, Music and Animation•	**6(Hrs)**
Creating a mood • Visual Abstraction • Overview of Text **Writing a Treatment** Story vs Theme Visual Techniques for Theme/Story • Creating a mood • Color, Texture, Composition	
UNIT- VI Storyboarding	**6(Hrs)**
Storyboarding Shot Composition Directing the Audience Transitions, Creating an Animatic	

Text Books	
1	The Animator's Survival Kit Richard Williams,

Reference Books	
1	The Human Figure in Motion Eadweard Muybridge

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VII Semester

22CSD718 : Lab.: PE-III. Animation Principle and Design

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand the concept of Animation using Adobe animate. 2. Apply the concept in Motion Graphics technology and make a puppet.. 3. Design story boarding using Photoshop software.

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

1	Understand Animation- Key-framing (position/scale/rotation/opacity).
2	Demonstration of using a timing sheet for the bouncing ball.
3	Anchor Point, Creating Shapes, Motion Paths, using Markers, Importing Audio.
4	Animating a Puppet, Building Hierarchies (parenting, nesting, precomping) .
5	Creating a Character Ready For Animation .
6	Lip Sync Animation, Working with Sound, Using Audio Cues.
7	To Demonstrate walk cycle in detail.
8	Demonstration of storyboard setup in Photoshop.
9	Show how to import storyboards and edit an animatic (sequencing and trimming layers.
10	Project to make storyboarding in animatic view.

VII Semester

22CSD719: Product Design and Development

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Apply the principles of generic development process; product planning; customer need analysis for new product design and development. 2. Set product specifications and generate, select, screen, test concepts for new product design and development. 3. Apply the principles of product architecture, industrial design and design for manufacturing principles in new product development. 4. Apply the adopt Prototyping techniques and Design of Experiment principles to develop a robust design and document a new product for patent.

Unit I : INTRODUCTION TO PRODUCT DESIGN	**(8 Hrs.)**
Introduction, Characteristics of Successful Product Development , Duration and Cost of Product Development, The Challenges of Product Development, Product Development Processes and Organizations – Product Planning Process, Process of Identifying Customer Needs.	
Unit II : PRODUCT SPECIFICATIONS, CONCEPT GENERATION, SELECTION AND TESTING	**(8 Hrs.)**
Establish Target and Final product specifications – Activities of Concept Generation - Concept Screening and Scoring - Concept Testing Methodologies.	
Unit III : PRODUCT ARCHITECTURE	**(8 Hrs.)**
Product development management - establishing the architecture - creation - clustering -geometric layout development - Fundamental and incidental interactions - related system level design issues - secondary systems - architecture of the chunks - creating detailed interface specifications	
Unit IV : INDUSTRIAL DESIGN	**(8 Hrs.)**
Introduction to Industrial Design , The Impact of Industrial Design, The Industrial Design Process, Management of the Industrial Design Process, Assessing the Quality of Industrial Design	
Unit V: DESIGN FOR MANUFACTURING, PROTOTYPING AND ROBUST DESIGN	**(7 Hrs.)**
Definition - Estimation of Manufacturing cost-reducing the component costs and assembly costs – Minimize system complexity - Prototype basics - Principles of prototyping - Planning for prototypes - Economic Analysis	
Unit VI : MANAGING PROJECT	**(7 Hrs.)**
Understanding and representing tasks-baseline project planning - accelerating the project-project execution.	
Total Lecture	**46 Hours**

Textbooks:	
1.	Product Design and Development, Karl T.Ulrich and Steven D.Eppinger, McGraw –Hill International Edns.1999

Reference Books:	
1.	Kenneth Crow, "Concurrent Engineering/Integrated Product Development". DRM Associates, 6/3,Via Olivera, Palos Verdes, CA 90274(310) 377-569,Workshop Book
2.	Kevin N Otto, Kristin L Wood, "Product Design – Techniques in Reverse Engineering and New Product Development", Pearson Education, Inc, 2016

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
	https://dokumen.pub/product-design-and-development-7thnbsped-1260043657-9781260043655.html

VII SEMESTER

22CSD721: PE III: Java Full Stack Development

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

Unit I	**(7 Hrs.)**
Java Basics OOP Concepts, Data Structures, Collection Framework, File handling, JDBC, Introduction to JUnit	
Unit II	**(7 Hrs.)**
Advance Java Features Introduction to Java 8 Features, Interface Enhancements, Functional Interfaces, Lambda Expression, ForEach , Method References, Streams API, JavaDocs	
Unit III	**(7 Hrs.)**
User Interface Design Building Responsive Web Pages HTML5, CSS3 and JavaScript, Basic Single Page Applications Using Angular OR React	
Unit IV	**(9 Hrs.)**
Spring Framework Working with Spring Core, Dependency Injection, Spring MVC, Spring Boot, Introduction to Hibernate and Spring Microservices	
Unit V	**(8 Hrs.)**
Cloud and Virtualization Virtualization Basics, Introduction to Cloud, RDB Cloud Fundamentals (SaaS, PaaS, IaaS), Introduction to AWS (S3 Buckets, RDS), AWS Cloudfront	
Unit VI	**(7 Hrs.)**
Compute Unified Device Architecture (CUDA):CUDA Architecture, Introduction to CUDA C, Kernel Call, Passing parameters, Querying Devices, Thread Cooperation: Splitting blocks, Shared Memory and Synchronization.	
Total Lecture	**45 Hours**

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

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

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

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

VII SEMESTER

22CSD722 : Lab : PE III Java Full Stack Development

Course Outcomes :

Upon successful completion of the course the students will be

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

List of Practical's

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

VII SEMESTER

22CSD723: PE III Dot Net Full Stack Development

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

Unit I :Introduction .Net	(8 Hrs.)
Introduction .NET, application and structure of application, Object Oriented Programming Concept in C#, Exceptional Handling, Delegates and Events	
Unit II: Introduction to DataBase	(8 Hrs.)
LINQ, SQL Sever, DataBase Object introduction, Sql, Triggers	
Unit III: Introduction to Front End	(8 Hrs.)
ADO.NET, HTML, CSS, UI and Front End, Java Script	
Unit IV:MVC	(8 Hrs.)
What is MVC, components, Interaction among components, Program.cs and StartUp.cs file, Configure Services and Configure Methods, Middleware components, Model View Controllers, Creating first app in MVC	
Unit V:API	(7 Hrs.)
Implementing data validation, annotations and Validation Summary and Exception handling mechanism in MVC, what is API, create project, test API, API Controllers, configure Web API,routing, parameter binding,	
Unit VI: Introduction to DevOps	(6 Hrs.)
Introduction to Coding Principle, DevOps, Docker	
Total Lecture	**45Hours**

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

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

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

VII SEMESTER

22CSD724 : PE III Lab: Dot Net Full Stack Development

Course Outcomes :
Upon successful completion of the course the students will be 1. Understand the concept of .NET full Stack Development using C#, ASP, MVC Controller. 2. Apply the concept in NET full Stack Development. 3. Design various applications using .NET framework.

Sr.No.	Name of Practical
1	Program Based on object oriented programming concepts in C#
2	Program Based on Exceptional Handling
3	Program Based on Delegates and Events
4	Program Based on LINQ
5	Program Based on SQL Server database objects
6	Program Based on SQL Triggers
7	Program Based on ADO.Net for connectivity with database
8	Program Based on MVC Validations and Exception Handling
9	Web Application project

VII Semester

22CSD731 - PE-IV: Mobile Computing

Course Outcome
On completion of this course, the student will be able to: 1. Understand different wireless mobile architecture. 2. Understand control mechanism and RadioInterfaces. 3. Understand the concepts of Adhoc Network. 4. Understand the need and the trend towardmobility. .

UNIT-I :	8(Hrs**)**
Review of radio transmission, antennas, modulation & demodulation, Radio propagation. Concept of cellular working, Multiplexing in space, frequency time, Code division multiplexing, Spread spectrum medium access methods	6
UNIT-II :	(8 Hrs)
Wireless telecom Systems: Evolution, study of 2G system GSM. Network architecture, radio interface, System's internal interfaces, role of VLRs & HLRs. Handover algorithms, security, Operation Maintenance systems	
UNIT-III :	8(Hrs)
3G Systems & beyond : Evolution towards 3G systems based on GSM & CDMA networks. Radio interface, system internal functioning, handover scenarios, security,	
UNIT-IV	(8 Hrs)
Wireless LAN systems : Medium access control mechanism in 802.11 networks. Radio interface, protocol architecture	
UNIT-V :	8(Hrs)
Mobile adhoc networks. Networking with a view of 4G Wireless Imperatives and Challenges ,Algorithms for routing & overall network function. Mobile satellite networks	
UNIT-VI :	6(Hrs)
Support for mobility : Mobile IP, TCP for mobile hosts. Other developments in the TCP/IP stack for mobility support, Introduction to IoT, Introduction to 5G Technology.	
Total Hrs.	**46(Hrs.)**

Text Books	
1	J.Schiller"Mobile Communications"
2	Zuber Patel, Shilpi Gupta, Nithin Kumar Y. B." Advances in VLSI and Embedded Systems"

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VII SEMESTER

22CSD732 : PE-V– Information Retrieval

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand different Information retrieval models. 2. Know about evaluation methods of the information retrieval model. 3. Know the challenges associated with each topic

Unit I	**(8 Hrs.)**
Introduction to Information retrieval: Information retrieval process, Indexing, Information retrieval model, Boolean retrieval model Dictionary and Postings: Tokenization, Stop words, Stemming, Inverted, index, Skip pointers, Phrase queries	
Unit II	**(8 Hrs.)**
Tolerant Retrieval :Wild card queries, Permuterm index, Bigram index, Spelling correction, Edit distance, Jaccard coefficient, Soundex Term Weighting and Vector Space Model: Wild card queries, Permuterm index, Bigram index, Spelling correction, Edit distance, Jaccard coefficient, Soundex	
Unit III	**(7 Hrs.)**
Evaluation: Precision, Recall, F-measure, E-measure, Normalized recall, Evaluation problems Latent Semantic Indexing: Eigen vectors, Singular value decomposition, Low rank approximation, Problems with Lexical Semantics	
Unit IV	**(8 Hrs.)**
Query Expansion :Relevance feedback, Rocchio algorithm, Probabilistic relevance feedback, Query Expansion and its types, Query drift Probabilistic Information Retrieval :Probabilistic relevance feedback, Probability ranking principle, Binary Independence Model, Bayesian network for text retrieval	
Unit V	**(8 Hrs.)**
XML Indexing and Search :Data vs. Text-centric XML, Text-Centric XML retrieval, Structural terms Content Based Image Retrieval: Introduction to content Based Image retrieval, Challenges in Image retrieval, Image representation, Indexing and retrieving images, Relevance feedback	
Unit VI	(6 Hrs.)
Web Information Retrieval Hypertext, web crawling, search engines, ranking, link analysis, PageRank, HITS.	
Total Lecture	**45 Hours**

Textbooks:	
1.	Christopher D. Manning, Raghavan and Schutze, Introduction to Information Retrieval Cambridge University Press,2008

Reference Books:	
1.	Tanveer Siddiqui and U. S. Tiwary Natural Language Processing And Information Retrieval Oxford Higher Education,2008

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YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology/39.Guide%20to%20computer%20network%20security.pdf

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=kNkCfaH2rxc&list=PLaZQkZp6WhWwoDuD6pQCmgVyDbUWl_ZUi

VII Semester

22CSD733 : Image and Video Processing

Course Outcomes :
Upon successful completion of the course the students will be able to 1. To understand the basic fundamentals of digital image processing and Image Transforms. 2. Apply the Image Processing Techniques in Spatial Domain and Frequency Domain. 3. To learn and analyze the fundamentals of various Image compression models. 4. Design and analyze the image compression systems.

Unit I	(8 Hrs.)
Fundamentals of Image Processing and Image Transforms: - Digital Image fundamentals, Sampling and quantization of an Image, Relationship between pixels. Image Transforms: 2-D Discrete Fourier Transform, Properties, Discrete cosine Transform, Hadamard Transform	
Unit II	**(8 Hrs.)**
Image Processing Techniques and Image Enhancement: Spatial Domain methods, Histogram Processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening Spatial filters. Frequency Domain methods, Basics of filtering in frequency domain, image smoothing, image sharpening. Image Restoration: Degradation Model, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration	
Unit III	**(8 Hrs.)**
Image Compression: Image compression fundamentals – coding Redundancy, spatial and temporal redundancy. Compression models : Lossy and Lossless, Huffmann coding, Arithmetic coding, run length coding, transform coding, predictive coding , JPEG standards	
Unit IV	**(8 Hrs.)**
Image Segmentation: Introduction to image segmentation, Detection of discontinuities - point, line and edge and combined detection; Edge linking and boundary description - local and global processing using Hough transform, Thresholding, Region oriented segmentation - basic formulation, region growing by pixel aggregation, region splitting and merging.	
Unit V	**(7 Hrs.)**
Image Morphology: Introduction to Morphology, Dilation and Erosion, Opening and Closing, Hit-or-Miss Transformation, Some Basic Morphological Algorithms.	
Unit VI	**(7 Hrs.)**
Basic Steps Of Video Processing: Analog video, Digital video, Time varying image formation model, Geometric image formation, formation, sampling of video signal.2D Motion Estimation Optical flow, Pixel based motion estimation, Region based Motion estimation, Multi resolution motion estimation.	
Total Lecture	**46 Hours**

Textbooks:	
1.	Gonzaleze and Woods ,"Digital Image Processing ", 3rd edition , Pearson
2.	Yao wang, Joem Ostarmann and Ya – quin Zhang, "Video processing and communication ",1stedition , PHI

Reference Books:	
1.	M. Tekalp ,"Digital video Processing", Prentice Hall International

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

MOOCs Links and additional reading, learning, video material	
1.	https://onlinecourses.nptel.ac.in/noc22_ee116/preview
2.	https://archive.nptel.ac.in/courses/117/105/117105135/
3.	https://www.youtube.com/watch?v=PXfjUzc3XA&list=PLKhAMheLIZKAhdujrUqzPH7dlOOLxCfis

VII Semester
22CSD734 : PE-IV Computer Vision

Course Outcome
On completion of this course, the student will be able to 1. Appreciate the detailed models of image formation. 2. Analyse the techniques for image feature detection and matching. 3. Apply various algorithms for pattern recognition. 4. Examine various clustering algorithms. 5. Analyze structural pattern recognition and feature extraction techniques

UNIT-I Image formation and Image model	**6(Hrs)**
Components of a vision system- Cameras- camera model and camera calibration- Radiometry- Light in space- Light in surface - Sources, shadows and shading.	
UNIT-II Multiple images	**5(Hrs)**
The Geometry of multiple views- Stereopsis- Affine structure from motion- Elements of Affine Geometry Affine structure and motion from two images- Affine structure and motion from multiple images- From Affine to Euclidean images.	
UNIT-III High level vision	**5(Hrs)**
Geometric methods- Model based vision- Obtaining hypothesis by pose consistency, pose clustering and using Invariants, Verification.	
UNIT-IV Introduction to pattern and classification	**5(Hrs)**
supervised and unsupervised learning, Clustering Vs classification, Bayesian Decision Theory- Minimum error rate classification Classifiers, discriminant functions, decision surfaces- The normal density and discriminant-functions for the Normal density.	
UNIT-V Linear discriminant based classifiers and tree classifiers	**6(Hrs)**
Linear discriminant function based classifiers- Perceptron- Minimum Mean Squared Error (MME) method, Support Vector machine, Decision Trees: CART, ID3.	
UNIT-VI Unsupervised Methods	6(Hrs)
Basics of Clustering; similarity / dissimilarity measures; clustering criteria. Different distance functions and similarity measures, K-means algorithm. **Recent Advances in Pattern Recognition** Neural network structures for pattern recognition, Pattern classification using Genetic Algorithms.	

Text Books	
1	Computer vision and applications Bernd Jahne and Horst HauBecker Academic press, 2000.
2.	David A. Forsyth & Jean Ponce Computer vision – A Modern Approach Prentice Hall, 2002.

Reference Books	
1	Multiple View Geometry in Computer Vision Second Edition Richard Hartley and Andrew Zisserman Cambridge University Press, 2004.

VII Semester

22CSD735 : PE-IV - Sensors & Actuators

COURSE OUTLINE :
1. This course is designed with an aim of educating students in microtechnology and its use to fabricate sensors and systems. 2. The students will have an exposure to sensors and its importance in the real world. The students will also be able to understand how to fabricate some of those sensors. 3. They will have an exposure towards how to fabricate the sensors and its application in the real world and understand and also learn modern day microsensors and microactuators, 4. how to simulate some of those sensors and characterise before fabricating it

UNIT-I INTRODUCTION TO MEASUREMENTS AND SENSORS	**7(Hrs)**
Classifications- Main technical requirement and trends Units and standards-Calibration methods-Classification of errors- Error analysis- Limiting error- Probable error Propagation of error- Odds and uncertainty- principle of transduction-Classification. Static characteristics- mathematical model of transducers- Zero, First and Second order transducers-Dynamic characteristics of first and second order transducers for standard test inputs.	
UNIT-II BASICS OF ENERGY TRANSFORMATION	**6(Hrs)**
Transducers, Sensors and Actuators , Understanding of thin film physics: Application in MOSFET and its variants , Thin Film Deposition Techniques: Chemical Vapor Deposition (APCVD, LPCVD, UHVCVD, PECVD, ALCVD, HPCVD, MOCVD) , Thin Film Deposition Techniques: Physical Vapor Deposition (Thermal Deposition, E-beam Evaporation, Sputtering, Pulsed Laser Deposition)	
UNIT- III VARIABLE AND OTHER SPECIAL SENSORS	**6(Hrs)**
Variable air gap type, variable area type and variable permittivity type- capacitor microphone Piezoelectric, Magnetostrictive, Hall Effect, semiconductor sensor- digital transducers-Humidity Sensor. Rain sensor, climatic condition sensor, solar, light sensor, antiglare sensor	
UNIT-IV BASIC UNDERSTANDING OF PHOTOLITHOGRAPHY FOR PATTERING LAYER.	**6(Hrs)**
Detailed overview of Etching methods. , Understanding various gas sensors: Optical gas sensor, Metal oxide semiconductor gas sensor, Field effect transistor gas sensor, Piezoelectric gas sensor, Polymer gas sensor, Nano-structured based gas sensors , Design and fabrication process of Microsensors: Force Sensors, Pressure Sensors, Strain gauges and practical applications Week 8: Explain working principles of Actuators. Piezoelectric and Piezoresistive actuators, micropumps and micro actuators with practical applications	
UNIT-V AUTOMATIC TEMPERATURE CONTROL ACTUATORS	**6(Hrs)**
Different types of actuators used in automatic temperature control- Fixed and variable displacement temperature control- Semi Automatic- Controller design for Fixed and variable displacement type air conditioning system.	

UNIT-VI BASICS OF MICROFLUIDICS TO ASSIST PHOTOMASK DESIGN USING CLEWIN SOFTWARE	6(Hrs)
Pattern transfer techniques, PDMS moulding and degassing, device bonding techniques. Simulation, Optimization and characterization of various sensors using COMSOL Multiphysics Understanding of Sensor Interfacing with Microprocessor to build electronic systems. ,: Static and Dynamic Characteristic Parameters for Sensors and Actuators, Calibration of Sensor based electronics systems	

Text Books	
1	Doebelin's Measurement Systems: 7th Edition (SIE),Ernest O. Doebelin DhaneshN.Manik McGraw Hill Publishers, 2019.
2	Robert Brandy, Automotive Electronics and Computer System, Prentice Hall,2001
3	William Kimberley, Bosch Automotive Handbook, 6th Edition, Robert Bosch GmbH, 2004
4	Bosch Automotive Electrics and Automotive Electronics Systems and Components, Networking and Hybrid Drive, 5th Edition, 2007, ISBN No: 978-3-658-01783-5.

Reference Books:	
1	James D Halderman, Automotive Electrical and Electronics , Prentice Hall, USA, 2013
2	Tom Denton, Automotive Electrical and Electronics Systems, Third Edition, 2004, SAE International
3	Patranabis.D, Sensors and Transducers, 2nd Edition, Prentice Hall India Ltd,2003
4	William Ribbens, "Understanding Automotive Electronics -An Engineering Perspective," 7th Edition, Elsevier Butterworth-Heinemann Publishers, 2012.

VII SEMESTER

22CSD736 : PE:IV Generative AI

Course Outcomes

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

1. Understand the fundamental concepts of Artificial Intelligence (AI) and Generative AI, and historical development and key milestones in the evolution of Generative AI.
2. Able to write effective prompts , understand the various techniques to write a prompt , identify the advantages of using text prompts in generative AI, recognize and address common Challenges in Generating Meaningful and Coherent Prompts.
3. Understand the Fundamental Math Concepts in Generative Modeling, various probability and sampling techniques and comprehend the principles of maximum likelihood estimation (MLE) and different types of Model
4. Understand GANs and VAEs, including their architectures, training processes, variants, and practical applications.
5. Understanding of GAI platforms, their features, capabilities, applications, and the challenges Associated with their use, various generation techniques, including text-to-text, text-to-image, and text-to-code.

Unit:1	**Introduction to Generative AI:**	**5 Hours**
Overview of AI and Generative AI, Historical context and evolution of Generative AI, Key concepts in Generative AI, Applications of Generative AI.		
Unit:2	**Prompt Engineering Techniques and Approaches**	**7 Hours**
Prompt Creation -Writing effective prompts -Techniques for using text prompts: Zero shot and few-shot prompt techniques – Prompt engineering approaches: Interview pattern, Chain-of Thought, Tree-of Thought - Benefits of using text prompts - Challenges in generating meaningful and coherent prompts.		
Unit:3	**Models For Generative AI**	**7 Hours**
Mathematical foundations of generative model, Probability distributions and sampling, Maximum likelihood estimation and Bayesian inference, Latent variable models and Gaussian Mixture Models (GMMs), Hidden Markov Models (HMMs).		
Unit:4	**Advancements in Generative AI using GANs and VAEs**	**7 Hours**
Introduction to GANs - Architecture and Training, Loss functions and common issues in GANs, Variants of GANs - Conditional GANs and DCGANs, Introduction to VAEs - Architecture and Training, Loss functions in VAEs and Conditional VAEs, Hierarchical VAEs and Disentangled VAEs, Applications of VAEs		
Unit:5	**Platforms For Generative AI**	**6 Hours**
Introduction to Platforms – Features of platforms – Capabilities -Applications - Pre-trained Models - Challenges – Generation of Text to Text – Generation of Text to Image – Text to Code Generation – Explainable AI – Benefits – Use cases.		

Unit :6	Ethical Issues and Limitations of Generative AI	6 Hours
Limitations of Generative AI, Issues and concerns, Considerations for Responsible Generative AI , Economic Implications, Social Implications, Case study on- Microsoft ChatGPT, Google Gemini, IBM Watson ,Facebook Lama2 and other generative models.		
Total Lecture Hours		**39 Hours**

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

VII Semester

22CSD751 : PE-V Spatial Computing

Course Outcome
On completion of this course, the student will be able to
1. Become familiar with technologies used in spatial and temporal data. 2. Use advanced technologies to build applications combined with geographical data. 3. Be familiar with tools and technologies to evaluate and compare systems.

UNIT-I Introduction: Geo-spatial science	**6(Hrs)**
systems and services, spatial concepts and data models: field vs object based, spatial query languages. Fundamental spatial algorithms: space filling curves, vornoi diagrams.	
UNIT-II Spatial storage and indexing	**5(Hrs)**
Grid files, Quad trees and R-trees, query processing, join strategies, and optimization. Spatial networks: conceptual, logical and physical level design issues, temporal databases, time domain, granularity, temporal data models and extensions of SQL, Sequenced semantics	
UNIT-III Spatial database	**5(Hrs)**
s, Query processing in spatial network databases, spatial data mining: classification, association and clustering. Spatial statistics: hot-spot and distributions using Arc. Conceptualization of spatial relationships: spatial autocorrelation by distance, autocorrelation, nearest neighbor, hot-spot analysis.	
UNIT-IV Exploratory regression	**5(Hrs)**
OLS, Geographically weighted regression, Spatial computing systems: Geographic Information Systems: Open Source GRASS GIS, ESRI ArcGIS family.	
UNIT-V Database Management Systems	**6(Hrs)**
PostgreSQL, PostGIS, IBM DB2 Spatial Extender, MS SQL Server Spatial. Spatial data mining platforms: R, standards opengeospatial.org, ISO TC 211. Spatial analysis in networks. Spatio-temporal computing: techniques of spatial and temporal analysis, point patterns, geostatistics, spectral analysis, wavelet analysis, interpolation, and mapping.	
UNIT-VI Spatial information services:	**6(HRS)**
Virtual globes, location based services, enterprise consulting. Application programming interfaces: HTML5 Geolocation API, Google Maps API, Bing Maps API, Flickr location API, Twitter location API.	
Total Lecture Hours	**39 Hours**

Text Books	
1	Spatial Analysis: Modeling in a GIS Environment 1st Paul Longley and Michael Batty Wiley
2	Spatial Analysis: Modeling in a GIS Environment 1st Paul Longley and Michael Batty Wiley

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VII Semester
Code(22CSD754) PE-V Artificial Intelligence

Course Outcome
On completion of this course, the student will be able to
1. Students will able to understand basics of AI, apply and choose proper state space search algorithm for the given problem (1 & 2)
2. Students will able to make intelligent choices from among available algorithms and knowledge representation schemes subject to specific design and performance constraints. (3 & 4)
3. Students will able to solve problems with appropriate algorithms, perform its implementation and their experimental evaluation for incomplete and/or uncertain information (5 & 6)

UNIT-I Introduction	**[08 Hrs.]**
What is AI?, History, Overview, Intelligent Agents, Performance Measure, Rationality, structure of agents, problem solving agents, Problem Formulation, searching for solutions – uniformed search.	
UNIT-II Informed (Heuristic) Search and Exploration	**[09 Hrs.]**
Greedy best first search, A* search, Memory bounded heuristic search, Heuristic functions, inventing admissible heuristic functions, Local Search algorithms, Hill-climbing, Simulated Annealing, Genetic Algorithms, Online search	
UNIT-III Constraint Satisfaction Problems	**[09 Hrs.]**
Backtracking Search, variable and value ordering, constraint propagation, intelligent backtracking, local search for CSPs, Adversarial Search, Games, The minimax algorithm, Alpha-Beta pruning, Imperfect Real-Time Decisions, Games that include an Element of Chance	
UNIT-VI Knowledge Based Agents: Logic	**[08 Hrs.]**
Propositional Logic, Inference, Equivalence, Validity and Satisfiability, Resolution, Forward and Backward Chaining, Local search algorithms, First Order Logic, Models for first order logic, Symbols and Interpretations, Terms, Atomic sentences, complex sentences, Quantifiers, Inference in FOL, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.	
UNIT-V Planning, Language of planning problems	**[07 Hrs.]**
planning with state-space search, forward and backward state-space search, Heuristics for state-space search, partial order planning, planning graphs, planning with propositional logic	

UNIT-VI Uncertainty, Handing uncertain knowledge	[08 Hrs.]
Rational decisions, basics of probability, axioms of probability, inference using full joint distributions, independence, Baye's Rule and conditional independence, Bayesian networks, Semantics of Bayesian networks, Exact and Approximate inference in Bayesian Networks. Introduction to machine learning	

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

Reference Books	
1	Artificial Intelligence E.Rich and K.Knight McGraw-Hill, 2nd edition
2	Introduction to Artificial Intelligence & Expert System D.W Patterson PHI, 2nd edition
3	Principles of Artificial Intelligence N.J Nilsson Narosa
4	Artificial Intelligence George F. Lugar Pearson Education, 4th edition

VII Semester
22CSD753 : PE-V- Cloud Computing

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

UNIT I Overview of Computing Paradigm	**[07 Hrs.]**
Recent trends in Computing, Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing, Evolution of cloud computing, Business driver for adopting cloud computing, Introduction to Cloud Computing, Cloud Computing (NIST Model), History of Cloud Computing, Cloud service providers, Properties, Characteristics & Disadvantages of Cloud Computing, Benefits of Cloud Computing, Role of Open Standards	
UNIT II Cloud Computing Architecture	**[08 Hrs.]**
Computing Architecture, Cloud computing stack, Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services, Service Models (XaaS), Infrastructure as a Service(IaaS), Platform as a Service(PaaS), Software as a Service(SaaS). Deployment Models, Public cloud Private cloud, Hybrid cloud, Community cloud.	
UNIT III Virtualization Technology: Fundamental concepts of compute	**[07 Hrs.]**
storage, networking, desktop and Application virtualization. Types of Virtualization, Virtualization benefits, server virtualization, Block and file level storage virtualization, Hypervisors, Hypervisor management software, Infrastructure Requirements, Virtual LAN (VLAN) and Virtual SAN (VSAN) and their benefits.	
UNIT IV Service Management in Cloud Computing	**[07 Hrs.]**
Service Level Agreements(SLAs), Billing & Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling: Benefitting enormously, Managing Data: Looking at Data, Scalability & Cloud Services, Database & Data Stores in Cloud, Large Scale Data Processing	
UNIT V Cloud Security, Infrastructure Security	**[07 Hrs.]**
Network level security, Host level security, Application level security, Data security and Storage: Data privacy and security Issues, Jurisdictional issues raised by Data location, Identity & Access Management, Access Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations	
UNIT=VI Case Study	**[06 Hrs.]**
: Google App Engine, Microsoft Azure, Amazon EC2	

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

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

VII Semester

22CSD754 : PE-V- Industry 4.0

Course Outcomes
After completion of this course: 1. Students will be Understand the basics of IoT and basics of Industry 4.0 2. Students will be Understand Business Model and Reference Architecture 3. Students will be able to understand the different Business issues in Industry 4.0 and how to solve them. 4. Students will be able to understand the need of Security and Fog Computing and applications of IIoT.

UNIT I	**[07 Hrs.]**
Introduction to IoT: History of IOT, Concepts, Products and Examples. IOT Paradigm, The Layering concepts of IOT, IOT Communication Model, IOT Architecture, IoT Sensing and Actuation, IoT Connectivity, IoT Networking. Introduction to Industry 4.0: History, Concept, The Journey so far: Developments in USA, Europe, China and other countries, The Fourth Revolution, Compelling Forces and Challenges for Industry 4.0, Comparison of Industry 4.0 Factory and Today's Factory, Globalization and Emerging Issues	
UNIT II	**[08 Hrs.]**
Basics of Industry 4.0: Cyber Physical Systems and Next Generation Sensors, Collaborative Platform and Product Life-cycle Management, Augmented Reality and Virtual Reality, Introduction to Artificial Intelligence, Big Data and Advanced Analysis, Cyber-Security in Industry 4.0, Industrial Processes, Industrial Sensing & Actuation, Industrial Internet Systems.	
UNIT III	**[07 Hrs.]**
Business Model and Reference Architecture: IIoT-Business Models, IIoT Reference Architecture, Industrial IoT-Layers: IIoT Sensing, IIoT Processing, IIoT Communication, IIoT Networking	
UNIT IV	**[07 Hrs.]**
Business issues in Industry 4.0:IIoT case studies, Opportunities and Challenges, Future of Works and Skills for Workers in the Industry 4.0 Era, Strategies for competing in an Industry 4.0 world	
UNIT V	**[07 Hrs.]**
Security and Fog Computing: Cloud Computing in IIoT, Fog Computing in IIoT, Security in IIoT. Application Domains: Factories and Assembly Line, Food Industry, Healthcare, Power Plants, Inventory Management & Quality Control, Plant Safety and Security (Including AR and VR safety applications),	
UNIT VI	**[06 Hrs.]**
Industrial IOT- Application domain: Milk Processing and Packaging Industries, Manufacturing Industries, Virtual Reality Lab, Steel Technology Lab. Facility Management, Oil, chemical and pharmaceutical industry, Applications of UAVs in Industries. Facility Management.	

Text Books	
1	Alasdair Gilchrist, "Industry 4.0: The Industrial Internet of Things"
2	Sabina Jeschke, Christian Brecher, Houbing Song, Danda B. Rawat, "Industrial Internet of Things: Cyber manufacturing Systems"

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VII Semester

Code(22CSD755) PE-V- Additive Manufacturing

Course outcomes:
Upon completion of this course the student will be able to: 1. Demonstrate the knowledge of Additive Manufacturing and Rapid Prototyping Technologies. 2. Describe different RP techniques. 3. Discuss fundamentals of Reverse Engineering.

Unit 1 Introduction to Additive Manufacturing (AM)	**7(Hrs)**
General overview Introduction to reverse engineering Traditional manufacturing vis AM Computer aided design (CAD) and manufacturing (CAM) and AM Different AM processes and relevant process physics AM process chain Application level: Direct processes – Rapid Prototyping, Rapid Tooling. Rapid Manufacturing; Indirect Processes - Indirect Prototyping. Indirect Tooling, Indirect Manufacturing	
Unit II Materials science for AM	**7(Hrs)**
Discussion on different materials used Use of multiple materials, multifunctional and graded materials in AM Role of solidification rate Evolution of non-equilibrium structure property relationship Grain structure and microstructure.	
Unit III AM technologies	**6(hrs)**
Powder-based AM processes involving sintering and melting (selective laser sintering, shaping, and electron beam melting. involvement). Printing processes (droplet based 3D Solid-based AM processes - extrusion based fused deposition modeling object Stereo lithography Micro- and Nano-additive.	
Unit VI : Mathematical Model for AM	**7(Hrs)**
Transport phenomena models: temperature, fluid flow and composition, buoyancy driven tension driven free surface flow pool) Case studies: Numerical Modeling of AM process, Powder bed melting based process, Droplet based printing process Residual stress, part fabrication time, cost, optimal orientation and optimal Defect in AM and role of transport Simulations (choice of parameter, Mo de! validation for different)	
Unit V: Process selection, planning, control for AM	**7(Hrs)**
Selection of AM technologies using decision methods, Additive manufacturing process plan: strategies and post processing. Monitoring and control of defects, transformation	
UNIT-VI: INTRODUCTION TO REVERSE ENGINEERING	**8(Hrs)**
Meaning, Use, RE-The generic process, Phase of RE–scanning, Contact Scanners, Noncontact Scanners, Point Processing, Application Geometric Model, Development.	

Text Books:	
1.	Ian Gibson, David W. Rosen, Brent Stucker , "Additive Manufacturing Technologies" ,Springer,2009
2	ChuaC. K., Leong K. F., and Lim C. S., "Rapid Prototyping: Principles and Applications", Second Edition, WorldScientific Publishers (2003
3.	Patri K. Venuvinod, Weiyin Ma "Rapid Prototyping: Laser-Based and OtherTechnologies" Springer , 2004

Reference Books :	
1.	Peter D. Hilton, Hilton/Jacobs, Paul F. Jacobs, "Rapid Tooling: Technologies and Industrial Applications", CRC Press,2000. 2. Burns. M, "Automated fabrication", Prentice-Hall,1993

Syllabus
VIII- Semester
B. Tech. in
Computer Science and Design

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

VIII- Semester

22CSD801: Major Project

COURSE OUTCOME
On successful completion of the course students will be able to: 1. Understand the knowledge gained from the various courses undergone in earlier years. 2. Able to work in team and adapt professional ethics and practice and how to write technical documents in professional style, and to demonstrate the product/software to technical audience. 3. Able to evaluate and analyze critically evaluate and analyze different sources of data available in the literature. 4. Able to learn and to apply the knowledge of tools/Technology.

The students will appear for the entrance examination of industry for Internship. After selection, students will join industry for a semester as a intern and will continue the project allotted by the industry and also will submit a project report based on their studies. Evaluation will be done continuously and viva voce conducted at the end of the semester.

VIII- Semester

22CSD802- Extra-Curricular Activity Evaluation

COURSE OUTCOME

1. An ability to work initially as well as part of team to achieve set goals.
2. An ability to work to serve society and for betterment of society.
3. An ability to communicate with people at large.

Due credits will be given to the students based on their performance and involvement in different extra and co-curricular activities conducted within the college or by other organizations/ institutions. Due credit will also be given to the student if they are successful in different competitive examinations conducted by different organizations. The guidelines as given in academic regulations will be followed for evaluation.