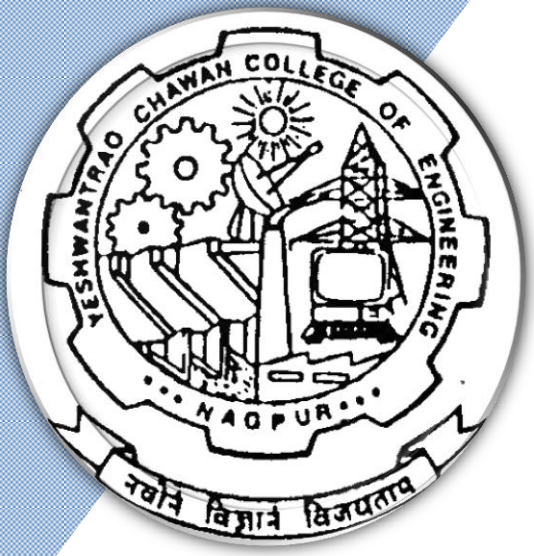
Nagar Yuwak Shikshan Sanstha's

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 Information Technology

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

B.TECH SCHEME OF EXAMINATION 2022

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

(Department of Information Technology)

B. Tech in Information Technology

SoE No. 22IT-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	22IT101	Calculus Sequences and Series	T	3	1	0	4	4	30	20	50	3 Hrs
2	1	BS	GE/CHE	22IT102	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3 Hrs
3	1	BS	GE/CHE	22IT103	Lab: Engineering Chemistry	P	0	0	2	2	1		60	40	
4	1	HS	GE/HUM	22IT104	Professional Communication	T	3	0	0	3	3	30	20	50	3 Hrs
5	1	BES	CV/CV	22IT105	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3 Hrs
6	1	BES	CV/CV	22IT106	Lab: Engineering Mechanics	P	0	0	2	2	1		60	40	
7	1	BES	EE/EE	22IT107	Basic Electrical and Electronics Engineering	T	3	0	0	3	3	30	20	50	3 Hrs
8	1	BES	IT/IT	22IT108	Programming for Problem Solving	T	3	0	0	3	3	30	20	50	3 Hrs
9	1	BES	IT/IT	22IT109	Lab: Programming for Problem Solving	P	0	0	2	2	1		60	40	
						TOTAL	**18**	**1**	**6**	**25**	**22**				
List of Mandatory Learning Course (MLC)															
1	1	HS	GE/HUM	GE2131	Universal Human Value	**A**	2	0	0	2	0				
2	1	HS	GE/T&P	MLC2121	YCAP1-Get Set Go	**A**	2	0	0	2	0				
SECOND SEMESTER															
1	2	BS	GE/MTH	22IT201	Differential Equation & Complex Analysis	T	3	1	0	4	4	30	20	50	3 Hrs
2	2	BS	GE/PHY	22IT202	Engineering Physics	T	3	0	0	3	3	30	20	50	3 Hrs
3	2	BS	GE/PHY	22IT203	Lab: Engineering Physics	P	0	0	2	2	1		60	40	
4	2	HS	GE/HUM	22IT204	Social Science	T	3	0	0	3	3	30	20	50	3 Hrs
5	2	BES	ME/ME	22IT205	Engineering Graphics	T	1	0	0	1	1	30	20	50	3 Hrs
6	2	BES	ME/ME	22IT206	Lab: Engineering Graphics	P	0	0	4	4	2		60	40	
7	2	BES	IT/IT	22IT207	Elements of AIML	T	3	0	0	3	3	30	20	50	3 Hrs
8	2	BES	IT/IT	22IT208	Computer Workshop	P	0	0	2	2	1		60	40	
9	2	BES	IT/IT	22IT209	Basics of Python Programming	T	3	0	0	3	3	30	20	50	3 Hrs
10	2	BES	IT/IT	22IT210	Lab: Basics of Python Programming	P	0	0	2	2	1		60	40	
						TOTAL	**16**	**1**	**10**	**27**	**22**				
List of Mandatory Learning Course (MLC)															
1	2	HS	GE/T&P	MLC2122	YCAP2 -Functional English	**A**	2	0	0	2	0				
2	2	BES	GE/CHE	GE2132	Environmental Science	**A**	2	0	0	2	0				

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

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

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

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

Applicable for AY 2022-23 Onwards

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)

B. Tech in Information Technology

SoE No. 22IT-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	22IT301	Linear Algebra	**T**	3	0	0	3	3	30	20	50	3 Hrs
2	3	PC	IT	22IT302	Data Structure and Program Design-I	**T**	3	0	0	3	3	30	20	50	3 Hrs
3	3	PC	IT	22IT303	**Lab:** Data Structures and Program Design-I	P	0	0	2	2	1		60	40	
4	3	PC	IT	22IT304	Computer Architecture and Organization	**T**	3	0	0	3	3	30	20	50	3 Hrs
5	3	PC	IT	22IT305	Computer Networks	**T**	3	1	0	3	3	30	20	50	3 Hrs
6	3	PC	IT	22IT306	**Lab:** Computer Networks	p	0	0	2	2	1		60	40	
7	3	PC	IT	22IT307	Digital Circuits and Microprocessors	**T**	3	0	0	3	3	30	20	50	3 Hrs
8	3	PC	IT	22IT308	**Lab:** Digital Circuits and Microprocessors	p	0	0	2	2	1		60	40	
9	3	PC	IT	22IT309	**Lab:** IT Workshop (Web. Programming*)	p	0	0	2	2	1		60	40	
					TOTAL THIRD SEM		**15**	**1**	**8**	**23**	**19**				
List of Mandatory Learning Course (MLC)															
1	3	HS	T&P	MLC123	YCCE Communication Aptitude Preparation (YCAP3)	**A**	3	0	0	3	0				
2	3	BES	IT	MLC113	Technical Documentation	**A**	2	0	0	2	0				
Fourth Semester															
1	4	PC	IT	22IT401	Discrete Mathematics and Graph Theory	**T**	3	0	0	3	3	30	20	50	3 Hrs
2	4	PC	GE/HUM	22IT402	Fundamentals of Management and Economics	**T**	3	0	0	3	3	30	20	50	3 Hrs
3	4	PC	IT	22IT403	Data Structure and Program Design-II	**T**	3	0	0	3	3	30	20	50	3 Hrs
4	4	PC	IT	22IT404	**Lab:** Data Structures and Program Design-II	p	0	0	2	2	1		60	40	
5	4	PC	IT	22IT405	Formal Language and Automata Theory	**T**	3	0	0	3	3	30	20	50	3 Hrs
6	4	PC	IT	22IT406	Operating System	**T**	3	1	0	3	3	30	20	50	3 Hrs
7	4	PC	IT	22IT407	**Lab:** Operating System	p	0	0	2	2	1		60	40	
8	4	PC	IT	22IT408	Object Oriented Programming	**T**	3	0	0	3	3	30	20	50	3 Hrs
9	4	PC	IT	22IT409	**Lab:** Object Oriented Programming	p	0	0	2	2	1		60	40	
10	4	PC	CV/IT	22IT410	Environmental Sustainability, Pollution and Management	**T**	3	0	0	3	3	30	20	50	3 Hrs
					TOTAL FOURTH SEM		**21**	**1**	**6**	**27**	**24**				
List of Mandatory Learning Course (MLC)															
1	4	HS	T&P	MLC124	YCCE Communication Aptitude Prepartion (YCAP 4)	**A**	3	0	0	3	0				
2	4	BES	IT	MLC114	Cyber Laws	**A**	2	0	0	2	0				

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

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

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

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

Applicable for AY 2022-23 Onwards

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)

B. Tech in Information Technology

SoE No. 22IT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
Fifth Semester															
1	5	PC	IT	22IT501	Database and Information System	**T**	3	0	0	3	4	30	20	50	3 Hrs
2	5	PC	IT	22IT502	**Lab.:** Database and Information System	p	0	0	2	2	1		60	40	
3	5	PC	IT	22IT503	Design & Analysis of Algorithm	**T**	3	0	0	3	3	30	20	50	3 Hrs
4	5	PC	IT	22IT504	**Lab.:**Design & Analysis of Algorithm	p	0	0	2	2	1		60	40	
5	5	PC	IT	22IT505	Software Engineering	**T**	3	0	0	3	3	30	20	50	3 Hrs
6	5	PE-I	IT		**Professional Elective -1**	**T**	3	0	0	3	3	30	20	50	3 Hrs
7	5	PE-I	IT		**Lab: Professional Elective -1**	P	0	0	2	2	1		60	40	
8	5	STR	IT	22IT506	Industrial training, Seminar & Report	P	0	0	1	1	1		60	40	
9	5	OE-I	IT		**Open Elective - I**	**T**	3	0	0	3	3	30	20	50	3 Hrs
10	5	OE-II	IT		**Open Elective - II**	**T**	3	0	0	3	3	30	20	50	3 Hrs
					TOTAL FOURTH SEM		**18**	**0**	**7**	**25**	**23**				

List of Lab. Professional Electives-I *

1	5	PE-I	PC	22IT511	Network Security & Cryptography
2	5	PE-I	PC	22IT512	**Lab.:** Network Security & Cryptography
3	5	PE-I	PC	22IT513	Data Science
4	5	PE-I	PC	22IT514	**Lab.:** Data Science
5	5	PE-I	PC	22IT515	Digital Image Processing
6	5	PE-I	PC	22IT516	**Lab.:** Digital Image Processing
7	5	PE-I	PC	22IT517	Customer Relationshiop Management
8	5	PE-I	PC	22IT518	**Lab.:** Customer Relationshiop Management

Open Elective-I

1	5	OE-I	PC	22IT531	Industry 5.0
2	5	OE-I	PC	22IT532	Core Java
3	5	OE-I	PC	22IT533	Introduction to Data Science

Open Elective-II

1	5	OE-II	PC	22IT551	Introduction to Machine Learning
2	5	OE-II	PC	22IT552	Network security and cryptography
3	5	OE-II	PC	22IT553	Concepts in Web Programming

List of Mandatory Learning Course (MLC)												
1	5	HS	T&P	MLC2125	YCAP5: YCCE Communication Aptitude Preparation	A	3	0	0	3	0	
2	5	HS	R&D	MLC125	Design thinking	A	2	0	0	2	0	

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

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Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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B.TECH SCHEME OF EXAMINATION 2022

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

(Department of Information Technology)

B. Tech in Information Technology

SoE No. 22IT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
Sixth Semester															
1	6	PC	IT	22IT601	Machine Learning	**T**	3	0	0	3	3	30	20	50	3 Hrs
2	6	PC	IT	22IT602	**Lab.:** Machine Learning	p	0	0	2	2	1		60	40	
3	6	PC	IT	22IT603	Principles of Compiler Design	**T**	3	0	0	3	3	30	20	50	3 Hrs
4	6	PC	IT	22IT604	**Lab.:** Principles of Compiler Design	p	0	0	2	2	1		60	40	
5	6	PE-II	IT		**Professional Electives -II**	**T**	3	0	0	3	3	30	20	50	3 Hrs
6	6	PE-III	IT		**Professional Electives -III**	**T**	3	0	0	3	3	30	20	50	3 Hrs
7	6	PE-III	IT		**Lab.:Professional Electives -III**	p	0	0	2	2	1		60	40	
8	6	PR	IT	22IT605	Project Phase I	P	0	0	4	4	2		60	40	
9	6	OE-I	IT		**Open Elective - III**	**T**	3	0	0	3	3	30	20	50	3 Hrs
10	6	OE-II	IT		**Open Elective - IV**	**T**	3	0	0	3	3	30	20	50	3 Hrs
					TOTAL SIXTH SEM		**18**	**0**	**10**	**28**	**23**				

List of Professional Electives- II & III

Professional Electives-II

1	6	PE-II	IT	22IT611	Cloud Computing
2	6	PE-II	IT	22IT612	Real Time Systems
3	6	PE-II	IT	22IT613	Mobile Communication
4	6	PE-II	IT	22IT614	UX and UI Design

Professional Electives-III

1	6	PE-III	IT	22IT631	Blockchain Technology
2	6	PE-III	IT	22IT632	**Lab.:** Blockchain Technology
3	6	PE-III	IT	22IT633	Business Intellegience
4	6	PE-III	IT	22IT634	**Lab.:** Business Intellegience
5	6	PE-III	IT	22IT635	Internet of Things
6	6	PE-III	IT	22IT636	**Lab.:** Internet of Things
7	6	PE-III	IT	22IT637	Mobile Operating Systems
8	6	PE-III	IT	22IT638	**Lab.:** Mobile Operating Systems

Open Elective-III

1	6	OE-III	IT	22IT651	Industry 5.0
2	6	OE-III	IT	22IT652	Core Java
3	6	OE-III	IT	22IT653	Introduction to Data Science

Open Elective-IV

1	6	OE-IV	IT	22IT671	Introduction to Machine Learning
2	6	OE-IV	IT	22IT672	Network security and cryptography
3	6	OE-IV	IT	22IT673	Concepts in Web Programming

List of Mandatory Learning Course (MLC)

1	6	HS		MLC126	**YCAP6:** YCCE Communication Aptitude Preparation	**A**	3	0	0	3	0

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

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B.TECH SCHEME OF EXAMINATION 2022

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

(Department of Information Technology)

B. Tech in Information Technology

SoE No. 22IT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
Seventh Semester															
1	7	PC	IT	22IT701	Data Mining	**T**	3	0	0	3	3	30	20	50	3 Hrs
2	7	PC	IT	22IT702	**Lab:** Data Mining	P	0	0	2	2	1		60	40	
3	7	PC	IT	22IT703	Artificial Intelligence	**T**	3	0	0	3	3	30	20	50	3 Hrs
4	7	PC	IT	22IT704	**Lab:** Artificial Intelligence	P	0	0	2	2	1		60	40	
5	7	PE-IV	IT		**Professional Electives -IV**	**T**	3	0	0	3	3	30	20	50	3 Hrs
6	7	PE-V	IT		**Lab: Professional Electives -IV**	P	0	0	2	2	1		60	40	
7	7	PE-V	IT		**Professional Electives -V**	**T**	3	0	0	3	3	30	20	50	3 Hrs
8	7	PE- VI	IT		**Professional Electives -VI**	**T**	3	0	0	3	3	30	20	50	3 Hrs
9	7	PR	IT	22IT705	Project Phase-II	**P**	0	0	10	10	5		60	40	
10	7	STR	IT	22IT706	Campus Recruitment Training (CRT)	**P**	0	0	0	0	2		100		
					TOTAL SEVENTH SEM		**15**	**0**	**16**	**31**	**25**				

List of Professional Electives-IV,V & VI

Professional Electives -IV

1	7	PE-IV	IT	22IT721	PE-IV: Parallel Computing
2	7	PE-IV	IT	22IT722	PE-IV: **Lab.:** Parallel Computing
3	7	PE-IV	IT	22IT723	PE-IV: Neural Network and Fuzzy Logic
4	7	PE-IV	IT	22IT724	PE-IV: **Lab.:** Neural Network and Fuzzy Logic
5	7	PE-IV	IT	22IT725	PE-IV: Big Data Analytics
6	7	PE-IV	IT	22IT726	PE-IV: **Lab.:** Big Data Analytics
7	7	PE-IV	IT	22IT727	PE-IV: Deep Learning
8	7	PE-IV	IT	22IT728	PE-IV: **Lab.:** Deep Learning
9	7	PE-IV	IT	22IT729	Dot Net Fullstack Development
10	7	PE-IV	IT	22IT730	**Lab.:** Dot Net Fullstack Development
11	7	PE-IV	IT	22IT731	Java Fullstack Development
12	7	PE-IV	IT	22IT732	**Lab**:Java Fullstack Development

Professional Electives -V

1	7	PE-V	IT	22IT741	PE-V: Information Retrival
2	7	PE-V	IT	22IT742	PE-V: Basics of Bioinformatics
3	7	PE-V	IT	22IT743	PE-V: Ethical Hacking and Cyber Forensic
4	7	PE-V	IT	22IT744	PE-V: E-Commerce
5	7	PE-V	IT	22IT745	PE-V: Advanced Computer Architecture

Professional Electives -VI

1	7	PE-VI	IT	22IT761	PE-VI: Wireless Sensor Network
2	7	PE-VI	IT	22IT762	PE-VI: Natural Language Processing
3	7	PE-VI	IT	22IT763	PE-VI: Computer Vision
4	7	PE-VI	IT	22IT764	PE-VI: Distributed Systems
5	7	PE-VI	IT	22IT765	Generative AI

Eighth Semester															
1	**8**	**STR**		22CT801	Internship - training / Seminar & Report	P	0	0	12	12	3		50	50	
2	**8**	**STR**		22CT802	Extra Curricular Activity Evaluation	P	0	0	0	0	2		100		
					TOTAL EIGHTH SEM		**0**	**0**	**12**	**12**	**5**				
					GRAND TOTAL		**121**	**3**	**75**	**198**	**163**				

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

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

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Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2022

1st Semester

(Department of Computer Technology)

B. Tech in Information Technology

28 June 2019

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

B.TECH SCHEME OF EXAMINATION 2022

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

(Department of Information Technology)

B. Tech in Information Technology

SoE No. 22IT-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	22IT101	Calculus Sequences and Series	T	3	1	0	4	4	30	20	50	3 Hrs
2	1	BS	GE/CHE	22IT102	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3 Hrs
3	1	BS	GE/CHE	22IT103	Lab: Engineering Chemistry	P	0	0	2	2	1		60	40	
4	1	HS	GE/HUM	22IT104	Professional Communication	T	3	0	0	3	3	30	20	50	3 Hrs
5	1	BES	CV/CV	22IT105	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3 Hrs
6	1	BES	CV/CV	22IT106	Lab: Engineering Mechanics	P	0	0	2	2	1		60	40	
7	1	BES	EE/EE	22IT107	Basic Electrical and Electronics Engineering	T	3	0	0	3	3	30	20	50	3 Hrs
8	1	BES	IT/IT	22IT108	Programming for Problem Solving	T	3	0	0	3	3	30	20	50	3 Hrs
9	1	BES	IT/IT	22IT109	Lab: Programming for Problem Solving	P	0	0	2	2	1		60	40	
						TOTAL	**18**	**1**	**6**	**25**	**22**				
List of Mandetory Learning Course (MLC)															
1	1	HS	GE/HUM	GE2131	Universal Human Value	**A**	2	0	0	2	0				
2	1	HS	GE/T&P	MLC2121	YCAP1-Get Set Go	**A**	2	0	0	2	0				
SECOND SEMESTER															
1	2	BS	GE/MTH	22IT201	Differential Equation & Complex Analysis	T	3	1	0	4	4	30	20	50	3 Hrs
2	2	BS	GE/PHY	22IT202	Engineering Physics	T	3	0	0	3	3	30	20	50	3 Hrs
3	2	BS	GE/PHY	22IT203	Lab: Engineering Physics	P	0	0	2	2	1		60	40	
4	2	HS	GE/HUM	22IT204	Social Science	T	3	0	0	3	3	30	20	50	3 Hrs
5	2	BES	ME/ME	22IT205	Engineering Graphics	T	1	0	0	1	1	30	20	50	3 Hrs
6	2	BES	ME/ME	22IT206	Lab: Engineering Graphics	P	0	0	4	4	2		60	40	
7	2	BES	CT/CT	22IT207	Elements of AIML	T	3	0	0	3	3	30	20	50	3 Hrs
8	2	BES	CT/CT	22IT208	Computer Workshop	P	0	0	2	2	1		60	40	
9	2	BES	IT/IT	22IT209	Basics of Python Programming	T	3	0	0	3	3	30	20	50	3 Hrs
10	2	BES	IT/IT	22IT210	Lab: Basics of Python Programming	P	0	0	2	2	1		60	40	
						TOTAL	**16**	**1**	**10**	**27**	**22**				
List of Mandetory Learning Course (MLC)															
1	2	HS	GE/T&P	MLC2122	YCAP2 -Functional English	**A**	2	0	0	2	0				
2	2	BES	GE/CHE	GE2132	Environmental Science	**A**	2	0	0	2	0				

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

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

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

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

Applicable for AY 2022-23 Onwards

I SEMESTER

22IT101: Calculus, Sequences and Series

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

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

			July 2022	1.00	Applicable for AY 2022-23 Onwards
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Textbooks:	
1.	Erwin Kreyzig, Advance Engineering Mathematics, 6th Edition, John Wiley and Sons, INC.
2.	H.K. Dass, Engineering Mathematics, 11th revised edition, S. Chand, Delhi.
3.	H.K. Dass, Advanced Engineering Mathematics, 8th revised edition, S. Chand, Delhi.
4.	Dr. B.S. Grewal, Higher Engineering Mathematics, 43rd edition, Khanna Publishers.
5.	P.N.Wartikar and J.N.Wartikar, Applied Mathematics, 4th Edition, Vidyarthi GrihaPrakashan.

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

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

MOOCs Links and additional reading, learning, video material	
1.	https://nptel.ac.in/courses/111/106/111106146/
2.	https://nitkkr.ac.in/docs/5-Multiple%20Integrals%20and%20their%20Applications.pdf
3.	https://nptel.ac.in/courses/111/106/111106100/

I SEMESTER

22IT102: Engineering Chemistry

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

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

Textbooks:	
1.	S S. Dara , A Text book of Engineering Chemistry , S.Chand & Co New Delhi. Eleventh Edition.
2.	P.C. Jain and Monica Jain , Engineering Chemistry , Dhanpat Rai & sons New Delhi , Sixteenth Edition.
3	P. W. Atkins, Physical Chemistry ,Oxford Publications,Eighth edition .
4	Erach Bharucha ,Textbook for Environmental studies for UGC,Universities press ,Third edition.

Reference Books:	
1.	B.K.Sharma Krishna , Engineering Chemistry ,Prakashan media private LTD. 1st Edition, 2014.
2.	CNR Rao ,Chemistry of Advanced Materials , Willey Publications, 1993.
3.	Fred. Billmeyer Jr. ,A textbook of polymer science ,Wiley India, 2nd Edition.
4.	Robert B Leighou , Chemistry of Engineering Materials ,Hill Book Company, Inc New York
5.	T.G. Miller, Environmental Science Wadsworth Publishing Co, 13th edition.

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

MOOCs Links and additional reading, learning, video material	
1.	Silicon Chips: What is Computer Chips Made Of? https://www.intel.com/content/www/us/en/history/museum-making-silicon.html
2.	https://www.youtube.com/watch?v=XTt3gXB0a84
3.	https://www.youtube.com/watch?v=iihYXx79QiE
4.	https://www.youtube.com/watch?v=JfJ7MlP9Dco
5.	https://www.youtube.com/watch?v=L2VSOccUrSk

I SEMESTER

22IT103: Lab : Engineering Chemistry

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

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

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

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

I SEMESTER
22IT104: Professional Communication

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

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

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

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

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

I SEMESTER

22IT105: Engineering Mechanics

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

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

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

I SEMESTER

22IT106: Lab. : Engineering Mechanics

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

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

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

I SEMESTER

22IT107: Basic Electrical and Electronics Engineering

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand the fundamental concepts of Analog Electronic and Electrical Circuits 2. Apply the concepts of Electrical and Electronic Circuits to obtain the desired parameter 3. Analyse analog Electrical Circuits for given application. 4.Analyze analog Electronic Circuits for given application.

Unit I: CIRCUIT ELEMENTS AND ENERGY SOURCES	**(7 Hrs.)**
Circuit Elements, Series and Parallel Combination of Resistances, Inductance and Capacitances, Energy Sources, Source Transformation, Sources with Periodic Waveforms, A.C. in Inductance and Capacitance, Star-Delta Connection **(Contemporary Issues related to Topic)**	
Unit II: ANALYSIS OF NETWORK	**(7 Hrs.)**
Kirchhof's Laws, Current Division, Voltage Division, Nodal and Mesh Analysis of Electric Circuits, Superposition Theorem, Thevenin's Theorem. **(Contemporary Issues related to Topic)**	
Unit III: TRANSFORMER AND MOTORS	**(7 Hrs.)**
Introduction to Transformer, Construction, Working principle, Types of transformers, Introduction to DC Motor, Working Principle of DC Motor, Types of Motors. **(Contemporary Issues related to Topic)**	
Unit IV: DIODE AND TRANSISTOR	**(7 Hrs.)**
Introduction to Semiconductor, P-N junction diodes, Biasing & Characteristics of diodes. Diode Circuits - Half wave rectifier, full wave rectifier, bridge rectifier. Introduction to BJT- NPN and PNP, Modes of operation, Configuration and its Characteristics. **(Contemporary Issues related to Topic)**	
Unit V: OPERATIONAL AMPLIFIER AND ITS APPLICATION	**(7 Hrs.)**
Introduction to Op-Amp, Inverting and Non-Inverting Amplifier, Linear Applications of OP-AMP like adder, Subtractor, integrator, differentiator and non-linear application using Comparator. **(Contemporary Issues related to Topic)**	
Unit VI: Electronics Measurement	**(7 Hrs.)**
Introduction to Measurement System, Generalized block diagram of Measurement System, Static & dynamic characteristics of measurement system, Types of errors & their sources, Statistical analysis. **(Contemporary Issues related to Topic)**	
Total Lecture	**42 Hours**

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

Textbooks:	
1.	Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford Higher Education, First Edition 2005
2.	Electronics Devices and circuits, Millman Jacob, McGraw Hill Education, Fourth Edition (2015)
3.	Circuit Theory (Analysis and Synthesis) , by A. Chakrabarti, Dhanpat Rai & Co., Reprint Edition 2014

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

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1	http://link.springer.com/openurl?genre=book&isbn=978-1-4613-6193-0
2	https://onlinelibrary.wiley.com/doi/book/10.1002/9780470168042

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

I SEMESTER

22IT108: Programming for Problem Solving

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

Unit I: Computer System Basics:	**(6 Hrs.)**
Introduction to components of a computer system (disks, memory, processor), how program is executed, understanding of concepts such as operating system, compilers, source and object programs, etc. Introduction to algorithms and flowcharts. **Basic building blocks of C:** Character set, variables, identifiers & keywords, Data types, Operators: arithmetic, logical and relational operators, precedence of operators **(Contemporary Issues related to Topic)**	
Unit II: Basics of C Programming	**(6 Hrs.)**
Expressions, sizeof () operator, constants, typedef statement, basic input/output statements and functions (scanf, printf, getch, putch, gets, puts), Introduction to library functions, writing straight line programs. Decision control statements: if, if - else and nested if-else statements, else-if ladder statement, switch-case control statement. **(Contemporary Issues related to Topic)**	
Unit III: Loop Structures:	**(6 Hrs.)**
While, do while and for loops, break and continue statement, "goto" statement, real life programming examples based on these loop structures, bitwise operators, real life programming examples. **(Contemporary Issues related to Topic)**	
Unit IV: Modular programming:	**(7 Hrs.)**
Concept of functions, user defined functions, function prototypes, formal parameters, actual parameters, return types, call by value , C programs using functions, Recursive functions, comparing recursion against iteration, C programs using recursive functions, Concepts of a pointer, call by reference, types of programming errors, real life programming examples **(Contemporary Issues related to Topic)**	
Unit V: Arrays:	**(7 Hrs.)**
One dimensional array, array manipulation, insertion, deletion of an element, searching techniques- Linear and binary search, sorting techniques – Bubble sort , and selection sort. Two-dimensional arrays: matrix representation, programs for basic matrix operations such as addition, multiplication and transpose, Array as function arguments. Strings: string representation and string handling functions, real life programming examples **(Contemporary Issues related to Topic)**	
Unit VI: Structure and Union, Concepts of files:	**(7 Hrs.)**
Introduction to structure and union, types of files, file opening in various modes, file opening and closing, fseek(), reading and writing text files, concept of pre-processor directives and macros, command line arguments, real life programming examples **(Contemporary Issues related to Topic)**	
Total Lecture	**39 Hours**

			July 2022	1.00	Applicable for AY 2022-23 Onwards
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Textbooks:	
1.	Mastering C, K.R.Venugopal& S.R. Prasad, TMH,2007.
2.	Programming in ANSI C, E. Balaguruswamy, Mc Graw Hill Education
3.	The C Programming Language., J.B.W.Kernighan&D.M.Ritchie, Prentice Hall

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

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

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

I SEMESTER

22IT109: Lab: Programming for Problem Solving

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

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

I SEMESTER

Audit Course

GE2131: Universal Human Value

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

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

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

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

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

I SEMESTER
Audit Course
MLC2121: YCAP1-Get Set Go

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

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

Unit No.	Topic	Duration
1	Topic: Build a foundation for success - Explain the Importance of Process of improvement, stating your Name with Impact, Recall and Use Names, Name Remembering Formula o LIRA o PACE – Individual Activity o BRAMMS o Chaining Method, Introduce "My Vision	2.5 Hours
2	Topic: Communication Fundamentals for Building Trust- Be a good listener, use conversation links, show genuine interest Hi-Five of Success ♣ Build on Memory Skills and Enhance Relationships ♣ PEG words ♣ Explain Permanent PEG Memory System, energize our Communications – Explain 3Vs of communication – Visual-Vocal-Verbal	3.5 Hours
	Practice Conversations, Activity – Pause-Part-Punch, Group Activity	

Unit No.	Topic	Duration
3	Topic: Increase Self Confidence -• Use our experiences to communicate more confidently • Communicate with clarity and conciseness • Discover how past experiences influence behavior	2.5 Hours
4	Topic: Motivate Others and Enhance Relationships-• Learning Objectives • Explain Gain Willing Cooperation Principles • Group Presentation • Explain Demonstration of Leadership Principles • Explain "Evidence" critical in establishing credibility	4 Hours
	Individual Activity – Sharing of defining moment, Skit to demonstrate Leadership Principles, Stranded on Island	

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

Reference Books:

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

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

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

Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2022

2nd Semester

(Department of Information Technology)

B. Tech in Information Technology

June 2022

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)

B. Tech in Information Technology

SoE No. 22IT-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	22IT101	Calculus Sequences and Series	T	3	1	0	4	4	30	20	50	3 Hrs
2	1	BS	GE/CHE	22IT102	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3 Hrs
3	1	BS	GE/CHE	22IT103	Lab: Engineering Chemistry	P	0	0	2	2	1		60	40	
4	1	HS	GE/HUM	22IT104	Professional Communication	T	3	0	0	3	3	30	20	50	3 Hrs
5	1	BES	CV/CV	22IT105	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3 Hrs
6	1	BES	CV/CV	22IT106	Lab: Engineering Mechanics	P	0	0	2	2	1		60	40	
7	1	BES	EE/EE	22IT107	Basic Electrical and Electronics Engineering	T	3	0	0	3	3	30	20	50	3 Hrs
8	1	BES	IT/IT	22IT108	Programming for Problem Solving	T	3	0	0	3	3	30	20	50	3 Hrs
9	1	BES	IT/IT	22IT109	Lab: Programming for Problem Solving	P	0	0	2	2	1		60	40	
						TOTAL	**18**	**1**	**6**	**25**	**22**				
List of Mandetory Learning Course (MLC)															
1	1	HS	GE/HUM	GE2131	Universal Human Value	**A**	2	0	0	2	0				
2	1	HS	GE/T&P	MLC2121	YCAP1-Get Set Go	**A**	2	0	0	2	0				
SECOND SEMESTER															
1	2	BS	GE/MTH	22IT201	Differential Equation & Complex Analysis	T	3	1	0	4	4	30	20	50	3 Hrs
2	2	BS	GE/PHY	22IT202	Engineering Physics	T	3	0	0	3	3	30	20	50	3 Hrs
3	2	BS	GE/PHY	22IT203	Lab: Engineering Physics	P	0	0	2	2	1		60	40	
4	2	HS	GE/HUM	22IT204	Social Science	T	3	0	0	3	3	30	20	50	3 Hrs
5	2	BES	ME/ME	22IT205	Engineering Graphics	T	1	0	0	1	1	30	20	50	3 Hrs
6	2	BES	ME/ME	22IT206	Lab: Engineering Graphics	P	0	0	4	4	2		60	40	
7	2	BES	CT/CT	22IT207	Elements of AIML	T	3	0	0	3	3	30	20	50	3 Hrs
8	2	BES	CT/CT	22IT208	Computer Workshop	P	0	0	2	2	1		60	40	
9	2	BES	IT/IT	22IT209	Basics of Python Programming	T	3	0	0	3	3	30	20	50	3 Hrs
10	2	BES	IT/IT	22IT210	Lab: Basics of Python Programming	P	0	0	2	2	1		60	40	
						TOTAL	**16**	**1**	**10**	**27**	**22**				
List of Mandetory Learning Course (MLC)															
1	2	HS	GE/T&P	MLC2122	YCAP2 -Functional English	**A**	2	0	0	2	0				
2	2	BES	GE/CHE	GE2132	Environmental Science	**A**	2	0	0	2	0				

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

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

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

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Applicable for AY 2022-23 Onwards

II SEMESTER

22IT201: Differential Equation and Complex Analysis

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

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

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

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

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

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

II SEMESTER

22IT202: Engineering Physics

Course Outcomes :

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

1. Correlate fundamentals of quantum mechanics to solve problems dealing with quantum particle.
2. Justify the characteristics of semiconductor materials in terms of crystal structures, charge carriers and energy bands.
3. Illustrate working principle of lasers and optical fibers for their use in the field of industry.
4. Analyse the motion of charged particles in electric and magnetic field and its applications to electron optic devices.
5. Assess the characteristics of nano materials, synthesis methods and their applications.

Unit:1 Quantum Physics	**(6 Hrs.)**
Wave-particle duality, Davisson and Germer experiment, Wave packet, Heisenberg uncertainty principle, thought experiment, Significance, Applications. **(Contemporary Issues related to Topic)**	
Unit II: Introduction to Quantum Computing	**(7 Hrs.)**
Introduction of complex numbers, operators, eigen values, eigen functions. Wave function and its probability interpretation, Schrodinger Equation, Particle in infinite and finite potential well, quantum tunnelling, Introduction to Bits and Qubits. **(Contemporary Issues related to Topic)**	
Unit III: Semiconductor Physics	**(7 Hrs.)**
Formation of energy bands in solids; Classification of solids, Energy band diagram of Si/Ge, Intrinsic and extrinsic semiconductors, Conductivity, Law of mass action, Hall effect, Direct and Indirect semiconductor materials. **(Contemporary Issues related to Topic)**	
Unit IV: Fundamentals of Optical Communication	**(7 Hrs.)**
Interaction of radiation with matter, Population Inversion and Optical resonance cavity, diode laser, Properties and engineering applications of laser. Optical Fibre: Principle, structure and classification, Acceptance angle, Numerical aperture, Losses. **(Contemporary Issues related to Topic)**	
Unit V: Electron Ballistics and Devices	**(7 Hrs.)**
Motion of a charged particle in uniform electric and magnetic field, Cross field configuration; Electron refraction, Electron lens. Cathode ray oscilloscope (CRO), Block diagram, Application of CRO for amplitude, frequency and phase determination **(Contemporary Issues related to Topic)**	
Unit VI: Physics of Advanced Materials	**(6 Hrs.)**
Introduction to Nanoscience and nanomaterials, types of nano structures (0-D, 1-D, 2-D and 3-D) and their properties (structural, electrical, optical, magnetic and mechanical), Synthesis of nanomaterials: Top down and Bottom – up approach, Applications of nanomaterials. **(Contemporary Issues related to Topic)**	
Total Lecture	**40 Hours**

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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.	Hitendra K Malik, A K Singh, Engineering Physics, 2nd Edition, Tata McGraw Hill Education Private Limited, 2015.

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

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

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

II SEMESTER

22IT203: Lab: Engineering Physics

Course Outcomes
Upon successful completion of the course the students will be able to 1. Correlate fundamentals of quantum mechanics to solve problems dealing with quantum particle. 2. Justify the characteristics of semiconductor materials in terms of crystal structures, charge carriers and energy bands. 3. Illustrate working principle of lasers and optical fibers for their use in the field of industry. 4. Analyse the motion of charged particles in electric field and magnetic field and its applications to electron optic devices. 5. Assess the characteristics of nano materials, synthesis methods and their applications.

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

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

II SEMESTER

22IT204: Social Science

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

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

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

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

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

II SEMESTER

22IT205: Engineering Graphics

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

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

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

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

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

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

II SEMESTER
22IT206: Lab : Engineering Graphics

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

Practical's to be performed from the list as below

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

II SEMESTER

22IT207: Elements of AIML

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

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

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

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

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

II SEMESTER

22IT208: Computer workshop

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

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

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

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

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

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

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

II SEMESTER

22IT209: Basics of Python Programming

Course Outcomes

After completion of the course:

1. Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.
2. Express proficiency in the handling of strings and functions.
3. Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.

UNIT I : Introduction	**[09 Hrs.]**

Generations of computer, computer languages. Introduction to Python Programming Language, Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type() Function and Is Operator, Dynamic and Strongly Typed Language, Control Flow Statements, The if Decision Control Flow Statement, The if…else Decision Control Flow Statement, The if…elif…else Decision Control Statement, Nested if Statement,
(Contemporary Issues related to Topic)

UNIT II : Control Structure and Functions	**[08 Hrs.]**

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

UNIT III : Strings and Lists	**[08 Hrs.]**

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

UNIT IV : Dictionaries	**[08 Hrs.]**

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

UNIT V : Files	[08 Hrs.]
Files, Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, The Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules, **Regular Expression Operations,** Using Special Characters, Regular Expression Methods, Named Groups in Python Regular Expressions, Regular Expression with glob Module **(Contemporary Issues related to Topic)**	
UNIT VI : Visualizing Information	**[08 Hrs.]**
Visualizing Information: what is data visualization, use of Pyplot Matplotlib Library, Creating Line charts and scatter plot, Creating bar charts and Pie Charts, Customizing the plots, Creating Histogram with PyPlot and other library, Creating Frequency Polygons, Creating Box plot, Plotting data from Data frame. **(Contemporary Issues related to Topic)**	
Total Lecture	**49 Hours**

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

Reference Books:	
1	"Python Data Science Handbook: Essential Tools for Working with Data", **1st Edition, Jake VanderPlas, O'Reilly Media**
2	"Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems", **2nd Edition, Aurelien Geron** **O'Reilly Media**
3	"Core Python Applications Programming", **3rd Edition, Wesley J Chun, Pearson Education**

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/DTEL%20Material/7.Information%20Technology/DTEL%20PPTs/
3	

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

II SEMESTER

22IT210: Lab : Basics of Python Programming

Sr. No	Problem Statements
1	a) Write a program to demonstrate different number datatypes in python. b) Write a program to perform different arithmetic operations on numbers in python.
2	a) Write a python program to find largest of three numbers b) Write a python program to convert temperature to and from Celsius to Fahrenheit.
3	Write a program to create, concatenate and print a string and accessing substring from a given string.
4	Write a python script to print the current date in following format "SunMay 29 02:26:23 IST 2017"
5	Write a python program to create, append and remove lists in python.
6	Write a program to demonstrate working with tuples in python.
7	Write a program to demonstrate working with dictionaries in python.
8	Write a python program to that accepts length of three sides of a triangle as inputs. The program should indicate whether or not the triangle is a right-angled triangle (use Pythagorean theorem):
9	Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first the second file.
10	Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.

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

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

II SEMESTER
Audit Course
GE2132: Environmental Science

Course Outcome :

Upon successful completion of the course the students will be able

1. To understand the basic concepts and problems and follow sustainable development practices
2. To enhance knowledge skills and attitude towards environment
3. To understand natural environment and its relationship with human activities.
4. To evaluate local, regional and global environmental topics related to resource use and management.

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

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

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

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

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

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

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

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

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

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

Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2022

3rd Semester

(Department of Information Technology)

B. Tech in Information Technology

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

B.TECH SCHEME OF EXAMINATION 2022

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

(Department of Information Technology)

B. Tech in Information Technology

SoE No. 22IT-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	22IT301	Linear Algebra	**T**	3	0	0	3	3	30	20	50	3 Hrs
2	3	PC	IT	22IT302	Data Structure and Program Design-I	**T**	3	0	0	3	3	30	20	50	3 Hrs
3	3	PC	IT	22IT303	**Lab:** Data Structures and Program Design-I	P	0	0	2	2	1		60	40	
4	3	PC	IT	22IT304	Computer Architecture and Organization	**T**	3	0	0	3	3	30	20	50	3 Hrs
5	3	PC	IT	22IT305	Computer Networks	**T**	3	1	0	3	3	30	20	50	3 Hrs
6	3	PC	IT	22IT306	**Lab:** Computer Networks	p	0	0	2	2	1		60	40	
7	3	PC	IT	22IT307	Digital Circuits and Microprocessors	**T**	3	0	0	3	3	30	20	50	3 Hrs
8	3	PC	IT	22IT308	**Lab:** Digital Circuits and Microprocessors	p	0	0	2	2	1		60	40	
9	3	PC	IT	22IT309	**Lab:** IT Workshop (Web. Programming*)	p	0	0	2	2	1		60	40	
					TOTAL THIRD SEM		**15**	**1**	**8**	**23**	**19**				
List of Mandatory Learning Course (MLC)															
1	3	HS	T&P	MLC123	YCCE Communication Aptitude Preparation (YCAP3)	**A**	3	0	0	3	0				
2	3	BES	IT	MLC113	Technical Documentation	**A**	2	0	0	2	0				
Fourth Semester															
1	4	PC	IT	22IT401	Discrete Mathematics and Graph Theory	**T**	3	0	0	3	3	30	20	50	3 Hrs
2	4	PC	GE/HUM	22IT402	Fundamentals of Management and Economics	**T**	3	0	0	3	3	30	20	50	3 Hrs
3	4	PC	IT	22IT403	Data Structure and Program Design-II	**T**	3	0	0	3	3	30	20	50	3 Hrs
4	4	PC	IT	22IT404	**Lab:** Data Structures and Program Design-II	p	0	0	2	2	1		60	40	
5	4	PC	IT	22IT405	Formal Language and Automata Theory	**T**	3	0	0	3	3	30	20	50	3 Hrs
6	4	PC	IT	22IT406	Operating System	**T**	3	1	0	3	3	30	20	50	3 Hrs
7	4	PC	IT	22IT407	**Lab:** Operating System	p	0	0	2	2	1		60	40	
8	4	PC	IT	22IT408	Object Oriented Programming	**T**	3	0	0	3	3	30	20	50	3 Hrs
9	4	PC	IT	22IT409	**Lab:** Object Oriented Programming	p	0	0	2	2	1		60	40	
10	4	PC	CV/IT	22IT410	Environmental Sustainability, Pollution and Management	**T**	3	0	0	3	3	30	20	50	3 Hrs
					TOTAL FOURTH SEM		**21**	**1**	**6**	**27**	**24**				
List of Mandatory Learning Course (MLC)															
1	4	HS	T&P	MLC124	YCCE Communication Aptitude Prepartion (YCAP 4)	**A**	3	0	0	3	0				
2	4	BES	IT	MLC114	Cyber Laws	**A**	2	0	0	2	0				

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

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

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

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

Applicable for AY 2022-23 Onwards

III SEMESTER

22IT301 : 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
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

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

22IT302 : Data Structure and Program Design-I

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand basic data structures like list, stack, queue, tree, graph and hash table. 2. Apply appropriate data structures in problem solving. 3. Analyze the performance of sorting and searching algorithms based on data structures. 4. Design application by using data structures and algorithms for real world problems.

Unit I	**(5 Hrs.)**
Functions, parameter passing techniques, recursion, Scope rules, Storage Classes, pointers, dynamic allocation. **(Contemporary Issues related to Topic)**	
Unit II	**(5 Hrs.)**
Arrays and strings, representation of 1D, 2D arrays in memory, sparse matrices, polynomial representation and operations, Structure, union, file handling **(Contemporary Issues related to Topic)**	
Unit III	**(7 Hrs.)**
Time and space complexity algorithm, Abstract Data Type (ADT), ordered list, implementation using array and its operations, Stack, Queues and its operations **(Contemporary Issues related to Topic)**	
Unit IV	**(7 Hrs.)**
Applications of stacks and queues, Priority Queues, Circular Queue, Dequeue **(Contemporary Issues related to Topic)**	
Unit V	**(6 Hrs.)**
Linked list: implementation of linked list using arrays and pointers, operations on singly, doubly and circular linked list, linked stack and queue **(Contemporary Issues related to Topic)**	
Unit VI	**(5 Hrs.)**
Generalized list, Skip list, applications of linked list **(Contemporary Issues related to Topic)**	
Total Lecture	**35 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

22IT303 : Lab. : Data Structure and Program Design-I

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	Program for counting number of digits in a random number
2	Program for generating list of random numerals and print them in words.
3	Program to print Pascal's triangle **1** **1 1** **1 2 1** **1 3 3 1** **1 4 6 4 1** **1 5 10 10 5 1**
4	Program for finding GCD of two numbers using factorial method.
5	Program for finding GCD of two numbers using recursion. Also, print number of recursive calls.
6	Program for allocating memory dynamically for single dimensional array and sort it using quick sort and merge sort
7	Program for allocating memory dynamically for two-dimensional array printing it in spiral manner.
8	Program to create linked list of cell phone with any 3 attributes as data fields and print it
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	Program to implement stack and print MAX data item from it
11	To find support reactions of a simply supported beam using graphical method and hand calculation.
12.	To find the forces in the member of truss using graphical method and hand calculation.
13.	To find (1) Principle moment of inertia and (2) Moment of inertia and product of inertia about any inclined axis for a composite figure using Mohr's circle and hand calculation,

III SEMESTER

22IT304 : Computer Architecture and Organization

Course Outcomes :

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

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

Unit I	**(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)**	

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

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

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

III SEMESTER

22IT305 : Computer Networks

Course Outcomes :

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

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

Unit I	**(5 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	**(5 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.)**
Network layer: design issues, Classful and classless Internet Addresses, subnet addressing, implementation of subnet with mask, supernetting, Address block and CIDR notation, examples. Routing algorithms, congestion control algorithms, quality of service, internetworking, network layer in Internet: IP protocol, Input Processing ,Switching ,Output Processing, Where Does Queuing Occur, The Routing Control Plane ,The Internet Protocol (IP): Forwarding and Addressing in the Internet ,Datagram Format,IPv4 Addressing, Internet Control Message Protocol (ICMP) ,IPv6 ,A Brief Foray into IP Security **(Contemporary Issues related to Topic)**	
Unit IV	**(9 Hrs.)**
Network layer: design issues, Classful and classless Internet Addresses, subnet addressing, implementation of subnet with mask, supernetting, Address block and CIDR notation, examples. Routing algorithms, congestion control algorithms, quality of service, internetworking, network layer in Internet: IP protocol, Input Processing ,Switching ,Output Processing, Where Does Queuing Occur, The Routing Control Plane ,The Internet Protocol (IP): Forwarding and Addressing in the Internet ,Datagram Format,IPv4 Addressing, Internet Control Message Protocol (ICMP) ,IPv6 ,A Brief Foray into IP Security **(Contemporary Issues related to Topic)**	

Unit V	(8 Hrs.)
Transport Layer: Connection-Oriented Transport: TCP , The TCP Connection Segment Structure , Round-Trip Time Estimation and Timeout , Reliable Data Transfer, Flow Control Connection Management , Principles of Congestion Control, The Causes and the Costs of Congestion, Approaches to Congestion Control , Network-Assisted Congestion, Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm. Performance issues: performance problems in networks, network performance measurement.	
Unit VI	**(6 Hrs.)**
Application Layer: Principles of Network Applications , Network Application Architectures Processes Communicating 88, Transport Services Available to Applications ,Transport Services Provided by the Internet , Application-Layer Protocols, The Web and HTTP, Overview of HTTP, Non-Persistent and Persistent Connections , HTTP Message Format, User-Server Interaction: Cookies , Web Caching ,The Conditional GET, Firewalls, Network security: cryptography, introduction to symmetric and public key algorithms, digital signatures, authentication protocols, e-mail and web security	
Total Lecture	**40 Hours**

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

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

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

III SEMESTER

22IT306 : Lab. Computer Networks

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

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

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

III SEMESTER

22IT307 : Digital Circuits and Microprocessors

Course Outcomes :

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

1. Demonstrate the understanding of Digital Circuits and Microprocessor.
2. Apply the concepts of digital circuits and microprocessor in switching theory and ARM processor.
3. Able to analyze problem statement and interface the various programmable ICs.
4. Design and implement programs to simulate the functioning of 8086 processor.

Unit I	**(8 Hrs.)**
Basic logic circuits, Boolean laws, Simplification of function using algebraic methods, basic combinational logic circuits: Encoder, Decoder, Multiplexer, De-multiplexer, Totem pole and tristate output. **(Contemporary Issues related to Topic)**	
Unit II	**(8 Hrs.)**
Simplification of sum of product and product of sum, K-maps (Up to 4 Variable), simplification of completely/ incompletely specified functions using K-maps & Quine McCluskey's method,Introduction to Flip Flops (RS, D, T, JK), Memory organization using Flip-Flops. Racing Condition, J-K Master Slave Flip flop. Excitation tables, Conversion of one type to another type flips flop. **(Contemporary Issues related to Topic)**	
Unit III	**(7 Hrs.)**
Excitation tables, Introduction to sequential Circuits, Counters, Registers, Synchronous/Asynchronous Designs, modulo N counter with Reset or Clear facility, Design of Mod N counters Using K-map, Lock Free Counters. **(Contemporary Issues related to Topic)**	
Unit IV	**(8 Hrs.)**
Introduction: Internal architecture & pin diagram of 8086/8088 microprocessor, Minimum & Maximum mode, even & odd memory banks, Accessing memory & I/O ports, Memory mapping in minimum mode. **(Contemporary Issues related to Topic)**	
Unit V	**(8 Hrs.)**
Programming with 8086/8088: Addressing Modes, Instruction set, Instruction encoding format, Timing diagram Assembler directives, 8086 programming examples, String operations, File I/O processing, Far & Near procedures, Macros, Timing & delay loops. **(Contemporary Issues related to Topic)**	
Unit VI	**(6 Hrs.)**
Interfacing with 8086/8088: Memory interfacing, Programmable parallel ports, Intel 8255 PPI, Block diagram & interfacing, Modes & initialization. **(Contemporary Issues related to Topic)**	
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.	Charles Roth Fundamentals of Logic Design CENGAGE Learning 5th Edition
2.	Anand Kumar Fundamentals of Digital Circuits PHI 2nd Edition
3.	Malvino Digital Electronics Principles Career Education 6th edition,1998
4.	Douglas Hall Microprocessor & Interfacing, Programming & Hardware. Tata McGraw Hil 2nd Edition , 2006l
5.	A. Ray, K.M. Bhurchandi Advanced Microprocessors & Peripherals: Architecture, Programming & Interfacing Tata McGraw Hill,2006

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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=te5Xe3TgPC4
2.	https://www.youtube.com/watch?v=Uuxa90Xl4Rs
3.	https://www.youtube.com/watch?v=i5QjUVgY-XU

III SEMESTER

22IT308 : Lab. Digital Circuits and Microprocessors

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

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

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

III SEMESTER

22IT309 : Lab. : IT Workshop (Web Programming)

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

SN	**Experiments based on**
1	Program based on HTML Tags
2	Program based on Table Tag
3	Program based on HTML Forms
4	Program based on CSS
5	Program based on JavaScript
6	Program based on JavaScript (Advanced)
7	Program based on Node JS(Linear)
8	Program based on Node JS(Advanced)
9	Program based on Angular JS (Linear)
10	Program based on Angular JS (Advanced)

Audit Course
III SEMESTER
MLC123:

Audit Course

III SEMESTER

MLC113 : 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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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=TWRP_94eock
2.	https://www.youtube.com/watch?v=TyTx-BuLFh0

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

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

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

Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2022

4th Semester

(Department of Information Technology)

B. Tech in Information Technology

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

B.TECH SCHEME OF EXAMINATION 2022

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

(Department of Information Technology)

B. Tech in Information Technology

SoE No. 22IT-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	22IT301	Linear Algebra	**T**	3	0	0	3	3	30	20	50	3 Hrs
2	3	PC	IT	22IT302	Data Structure and Program Design-I	**T**	3	0	0	3	3	30	20	50	3 Hrs
3	3	PC	IT	22IT303	**Lab:** Data Structures and Program Design-I	P	0	0	2	2	1		60	40	
4	3	PC	IT	22IT304	Computer Architecture and Organization	**T**	3	0	0	3	3	30	20	50	3 Hrs
5	3	PC	IT	22IT305	Computer Networks	**T**	3	1	0	3	3	30	20	50	3 Hrs
6	3	PC	IT	22IT306	**Lab:** Computer Networks	p	0	0	2	2	1		60	40	
7	3	PC	IT	22IT307	Digital Circuits and Microprocessors	**T**	3	0	0	3	3	30	20	50	3 Hrs
8	3	PC	IT	22IT308	**Lab:** Digital Circuits and Microprocessors	p	0	0	2	2	1		60	40	
9	3	PC	IT	22IT309	**Lab:** IT Workshop (Web. Programming*)	p	0	0	2	2	1		60	40	
					TOTAL THIRD SEM		**15**	**1**	**8**	**23**	**19**				
List of Mandatory Learning Course (MLC)															
1	3	HS	T&P	MLC123	YCCE Communication Aptitude Preparation (YCAP3)	**A**	3	0	0	3	0				
2	3	BES	IT	MLC113	Technical Documentation	**A**	2	0	0	2	0				
Fourth Semester															
1	4	PC	IT	22IT401	Discrete Mathematics and Graph Theory	**T**	3	0	0	3	3	30	20	50	3 Hrs
2	4	PC	GE/HUM	22IT402	Fundamentals of Management and Economics	**T**	3	0	0	3	3	30	20	50	3 Hrs
3	4	PC	IT	22IT403	Data Structure and Program Design-II	**T**	3	0	0	3	3	30	20	50	3 Hrs
4	4	PC	IT	22IT404	**Lab:** Data Structures and Program Design-II	p	0	0	2	2	1		60	40	
5	4	PC	IT	22IT405	Formal Language and Automata Theory	**T**	3	0	0	3	3	30	20	50	3 Hrs
6	4	PC	IT	22IT406	Operating System	**T**	3	1	0	3	3	30	20	50	3 Hrs
7	4	PC	IT	22IT407	**Lab:** Operating System	p	0	0	2	2	1		60	40	
8	4	PC	IT	22IT408	Object Oriented Programming	**T**	3	0	0	3	3	30	20	50	3 Hrs
9	4	PC	IT	22IT409	**Lab:** Object Oriented Programming	p	0	0	2	2	1		60	40	
10	4	PC	CV/IT	22IT410	Environmental Sustainability, Pollution and Management	**T**	3	0	0	3	3	30	20	50	3 Hrs
					TOTAL FOURTH SEM		**21**	**1**	**6**	**27**	**24**				
List of Mandatory Learning Course (MLC)															
1	4	HS	T&P	MLC124	YCCE Communication Aptitude Prepartion (YCAP 4)	**A**	3	0	0	3	0				
2	4	BES	IT	MLC114	Cyber Laws	**A**	2	0	0	2	0				

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

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

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

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

Applicable for AY 2022-23 Onwards

IV SEMESTER

22IT401 : Discrete Mathematics and Graph Theory

Course Outcomes:

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

1. Explain the Functions of Management and identify tools and techniques of Marketing of goods and services
2. Analyze the role of Financial Accountancy and Management in the Organization
3. Develop perspective about the economy based on logical reasoning and estimate the economic outcomes.
4. Interprets comparative advantage of resources.

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

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

Textbooks	
1.	Principle of Management, 9th edition , Harold Koontz Ramchandra, Tata McGrow hills
2.	Marketing Management: Planning, Implementation and Control, 3rd Edition, Ramaswamy V.S. and Namakumari S, Macmillian
3.	Financial Services, 19th Edition, Khan M Y, Tata McGraw Hill, 19
4.	Modern Economics, 13th Edition, H. L. Ahuja, S. Chand Publisher, 2009
5.	Modern Economic Theory, 3rd edition, K. K. Devett, S. Chand Publisher,2007
6.	Principle of Economics, 7th edition, Mankiw N. Gregory, Thomson, 2013

Reference Books	
1.	Foundations of Financial Markets and Institutions, 3rd Edition, Fabozzi, Pretice Hall
2.	Fundamentals of Financial Instruments , 2nd Edition, Parameshwaran, Wiley Indi
3.	Marketing Management , 3rd Edition , RajanSaxena, Tata McGraw Hill
4.	Advance Economic Theory, 17th Edition, H. L. Ahuja**,** S. Chand Publisher, 2009
5.	International Trade, 12th edition, M. L. Zingan, Vindra Publication, 2007
6.	Macro Economics, 11th edition, M. L. Zingan, Vindra Publication, 2007
7.	Monitory Economics:, 1st Edition, M. L. Sheth, Himayalaya Publisher, 1995
8.	Economics of Development and Planning, 12th edition, S. K. Misra and V. K. Puri, Himalaya Publishing House, 2006.

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

MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.nptel.ac.in/noc22_mg104/preview
2	https://nptel.ac.in/
3	https://onlinecourses.nptel.ac.in/noc20_mg31/preview
4	https://onlinecourses.nptel.ac.in/noc21_hs52/preview
5	https://onlinecourses.nptel.ac.in/noc22_hs67/preview

IV SEMESTER

22IT402 : Fundamentals of Management and Economics

Course Outcomes :

Upon successful completion of the course the students will be

1. Explain the Legal provision and Functions of Management.
2. Analyze the role of Human Resource and Financial Management in the organization.
3. Analyze the project life cycles.
4. Identify tools and techniques for the marketing of goods and services.

Unit I: Principle of Management	**(8 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 **(Contemporary Issues related to Topic)**	
Unit II	**(8 Hrs.)**
The Indian Contract Act, 1872 – Formation of Valid Contract, Discharge of Contract, Quasi Contract, Indemnity and Guarantee. The Indian Partnership Act, 1932- Essentials of Partnership, The Companies Act – Nature and Definition of Company, Registration and Incorporation, Memorandum and Article of Association, Kinds of companies, Winding up of the Company **(Contemporary Issues related to Topic)**	
Unit III	**(7 Hrs.)**
Human Resource Management-Meaning and Scope, Principles of HRD, Job Analysis – Job Description and Job, Specification, Job Enrichment, Job Rotation, Training and Development – Purpose and Methods, Performance ,Appraisal- Purpose, Procedure and Techniques, Grievance Redressal Procedure **(Contemporary Issues related to Topic)**	
Unit IV	**(8 Hrs.)**
Concept, Classification and Characteristics of Project, Project Life Cycle, Project Proposal, Tools and Techniques of Project Management, Network techniques - Introduction and Use of CPM &PERT for planning, SWOT Analysis, Project Risk Analysis, Project Control. **(Contemporary Issues related to Topic)**	
Unit V	**(8 Hrs.)**
Marketing Management - Definition & scope, Selling & Modern Concepts of Marketing, Market Research, Customer Behaviors, Product Launching, Sales Promotion, Pricing, Channels of Distribution, Advertising, Market Segmentation, Marketing Mix, Positioning, Targeting **(Contemporary Issues related to Topic)**	
Unit VI	**(6 Hrs.)**
Definition & Functions of Finance department, Sources of finance, Types of capital, Profit maximization vs. Wealth Maximization, Functions of Finance Manager in Modern Age, Concept of Risk and Return , Break Even Analysis, Budgets & Budgetary Control, Make or Buy Analysis, Introduction to financial statement – profit and loss A/c and Balance Sheet **(Contemporary Issues related to Topic)**	
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.	Harold Koontz Ramchandra, Principles of Management, Tata McGrow hills
2.	Bare Acts – Indian Contract Act, Indian Partnership Act and Company Law
3.	.B.Mamoria and S.V.Gankar, A Text book of Human Resource Management

Reference books:	
1.	Fabozzi - Foundations of Financial Markets and Institutions (Pretice hall, 3rd Ed.)
2.	Bhole L M - Financial Institutions and Markets (Tata McGraw-Hill, 3rd edition, 2003)
3.	Khan M Y - Financial Services Tata Mc Graw Hill, 19

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
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MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=jnNHtCODRFw
2.	https://www.youtube.com/watch?v=W3MlrBDCrSs
3.	https://www.youtube.com/watch?v=OGBPxfhhB9k

IV SEMESTER

22IT403 : Data Structures and Program Design-II

Course Outcomes :
Upon successful completion of the course the students will be 1. Understand data structures like Tree, Graph, Set, Hash table. 2. Apply appropriate datastructures in problem solving. 3. Analyze the performance of operations performed on data structures 4. Design application by using data structures for real world problems.

Unit I	**(5 Hrs.)**
Trees, binary trees: representation and traversals, Binary search Trees (BSTs), Height-balanced trees **(Contemporary Issues related to Topic)**	
Unit II	**(7 Hrs.)**
Heap tree, Splay trees, B-trees, B+ trees. Applications of trees **(Contemporary Issues related to Topic)**	
Unit III	**(5 Hrs.)**
Graphs: representation & traversals. Spanning trees, shortest path algorithm, topological sort **(Contemporary Issues related to Topic)**	
Unit IV	**(6 Hrs.)**
Sets: Representation and Operations. Sorting and searching **(Contemporary Issues related to Topic)**	
Unit V	**(5 Hrs.)**
Pattern matching and Tries: Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries **(Contemporary Issues related to Topic)**	
Unit VI	**(5 Hrs.)**
Hash table, File Organization, external sort **(Contemporary Issues related to Topic)**	
Total Lecture	**33 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
4.	Robert Kruse, G. L. Tondo and B. Leung Data Structures & Program Design in C PHI-EEE
5.	Seymour Lipschutz Data Structures Tata McGraw-Hill
6.	Ellis Horowitz, Satraj Sahni and Susan Anderson-Freed Fundamentals of Data Structures in C W. H. Freeman and Company

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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/55.2015_Book_DataStructuresAndAlgorithmsWit.pdf
2	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology/32.Data%20Structures%20and%20Algorithms%20in%20Python%20(%20PDFDrive%20).pdf

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=5EwUbeUo0jg
2.	https://www.youtube.com/watch?v=WLvU5EQVZqY
3.	https://www.youtube.com/watch?v=pcKY4hjDrxk

IV SEMESTER

22IT404 : Lab. Data Structures and Program Design-II

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand data structures like Tree, Graph, Set, Hash table. 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	Program for displaying nodes of linked list in reverse order using recursion
2	Implement queue using linked list
3	Program to Print the Alternate Nodes in a Linked List using Recursion
4	Program based on Binary tree: creation, display
5	Program based on Binary tree: deletion and traversals
6	Program for Heap sort
7	Program for inserting a key and searching a key in tries
8	Program for printing BFS and DFS sequence of graph
9	Program for detecting presence of cycle in given graph G
10	Program for printing topological sort of given graph

IV SEMESTER

22IT405 : Formal Language and Automata Theory

Course Outcomes :
Upon successful completion of the course the students will be 1. Demonstrate the understanding of basic properties and concepts of formal languages, and Recursive Language, 2. Apply formal mathematical methods to prove properties of languages, grammars and automata. 3. Analyze and design finite automata, pushdown automata, Turing machines, formal languages, and grammars

Unit I: Principle of Management	**(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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2.	https://www.youtube.com/watch?v=9idnQ2C6HfA
3.	https://www.youtube.com/watch?v=G_mCqJakvYk

IV SEMESTER
22IT406 : Operating Systems

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

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: Process management	**(5 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: Inter-process communication	**(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: File systems	**(5 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: Memory management techniques	**(5 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: Virtual memory	**(7 Hrs.)**
Demand paging, page replacement algorithms, thrashing, working set model. **Deadlocks**: necessary conditions, deadlock detection, deadlock avoidance, deadlock prevention, recovery from deadlock. **(Contemporary Issues related to Topic)**	
Total Lecture	**34 Hours**

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

Textbooks:	
1.	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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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
22IT407 : Lab. Operating Systems

Course Outcomes
Upon successful completion of the course the students will be able to 1.Understand data structures like Tree, Graph, Set, Hash table. 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	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

22IT408 : Object Oriented Programming

Course Outcomes :

Upon successful completion of the course the students will be

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

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, exploring string class.

(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,

(Contemporary Issues related to Topic)

Unit IV	**(8 Hrs.)**

exception handling mechanism: Fundamentals exception types, uncaught exception, try-catch Block, displaying description of an exception, multiple catch clauses, nested try-catch statements, throw, throws, finally, built in exceptions, creating own exception subclasses

(Contemporary Issues related to Topic)

Unit V	**(7 Hrs.)**

Collection Vector and Framework: Introduction to collection framework, Vectors, Array List, Linked list, Hashset, Treeset, Hashmap

(Contemporary Issues related to Topic)

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Unit VI: Virtual memory	(8 Hrs.)
IO Steam, applets and Thread: Introduction to stream classes, use of stream classes, I/O stream, bytes stream, character stream, pre-defined stream, reading console input, reading character, reading string, writing console output, the print write class, reading & writing files, transient and volatile modifiers, Introduction to applets, applet lifecycle, creating and executing applets, Introduction to multithreading, life cycle of Thread, Runnable interface and Thread class. **(Contemporary Issues related to Topic)**	
Total Lecture	**45 Hours**

Textbooks:	
1.	Bruce Eckel Thinking in Java Prentice Hall
2.	William Staling Operating System 5th Edition

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	
1.	https://www.youtube.com/watch?v=O5hShUO6wxs
2.	https://www.youtube.com/watch?v=7q3zXRuctQ8&list=PLd3UqWTnYXOnT6p6dll1oiKsDu96QGANk
3.	https://www.youtube.com/watch?v=P5tFJ9umhvk

IV SEMESTER

22IT409 : 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

22IT410: 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
IV SEMESTER
MLC124: (YCAP 4)

Audit Course
IV SEMESTER
MLC114: Cyber Laws

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Classify Intellectual property like copyright, patents and trademark and understand cyber privacy 2. Understand and Identify cyber laws and regulatory. 3. learn conversant with the social and intellectual property issues emerging from cyberspace 4. Acquire deep knowledge of Information Technology act and legal framework of Right to privacy

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

Unit VI	(4 Hrs.)
Information Technology Act2000 : ,Information Technology Act-2000-1 (Sec 1 t0 13),Information Technology, Act-2000-2 (Sec 14 to 42),Certifying,Technology Rules), Information Technology Act -2003-3 (Sec 43 to 45 and Sec 65 to 78), Information Technology Act-2000-4(Sec 46 to Sec 64 to 78), Information Technology Act-2000-4(Sec 46 to Sec 64 and CRAT Rules), Information Technology Act-2000-5 (Sec 79 to 90), Information Technology Act-2005-6 (Sec 91-94) Amendments in 2008. partial differential equations.	
Total Lecture	**24 Hours**

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

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

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2.	https://www.youtube.com/watch?v=d2kSE3Vdkx0

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 Information Technology

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

B.TECH SCHEME OF EXAMINATION 2022

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

(Department of Information Technology)

B. Tech in Information Technology

SoE No. 22IT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
Fifth Semester															
1	5	PC	IT	22IT501	Database and Information System	**T**	3	0	0	3	4	30	20	50	3 Hrs
2	5	PC	IT	22IT502	**Lab.:** Database and Information System	p	0	0	2	2	1		60	40	
3	5	PC	IT	22IT503	Design & Analysis of Algorithm	**T**	3	0	0	3	3	30	20	50	3 Hrs
4	5	PC	IT	22IT504	**Lab.:**Design & Analysis of Algorithm	p	0	0	2	2	1		60	40	
5	5	PC	IT	22IT505	Software Engineering	**T**	3	0	0	3	3	30	20	50	3 Hrs
6	5	PE-I	IT		**Professional Elective -1**	**T**	3	0	0	3	3	30	20	50	3 Hrs
7	5	PE-I	IT		**Lab: Professional Elective -1**	P	0	0	2	2	1		60	40	
8	5	STR	IT	22IT506	Industrial training, Seminar & Report	P	0	0	1	1	1		60	40	
9	5	OE-I	IT		**Open Elective - I**	**T**	3	0	0	3	3	30	20	50	3 Hrs
10	5	OE-II	IT		**Open Elective - II**	**T**	3	0	0	3	3	30	20	50	3 Hrs
					TOTAL FOURTH SEM		**18**	**0**	**7**	**25**	**23**				

List of Lab. Professional Electives-I *

1	5	PE-I	PC	22IT511	Network Security & Cryptography
2	5	PE-I	PC	22IT512	**Lab.:** Network Security & Cryptography
3	5	PE-I	PC	22IT513	Data Science
4	5	PE-I	PC	22IT514	**Lab.:** Data Science
5	5	PE-I	PC	22IT515	Digital Image Processing
6	5	PE-I	PC	22IT516	**Lab.:** Digital Image Processing
7	5	PE-I	PC	22IT517	Customer Relationshiop Management
8	5	PE-I	PC	22IT518	**Lab.:** Customer Relationshiop Management

Open Elective-I

1	5	OE-I	PC	22IT531	Industry 5.0
2	5	OE-I	PC	22IT532	Core Java
3	5	OE-I	PC	22IT533	Introduction to Data Science

Open Elective-II

1	5	OE-II	PC	22IT551	Introduction to Machine Learning
2	5	OE-II	PC	22IT552	Network security and cryptography
3	5	OE-II	PC	22IT553	Concepts in Web Programming

List of Mandatory Learning Course (MLC)												
1	5	HS	T&P	MLC2125	YCAP5: YCCE Communication Aptitude Preparation	A	3	0	0	3	0	
2	5	HS	R&D	MLC125	Design thinking	A	2	0	0	2	0	

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

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

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

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

Applicable for AY 2022-23 Onwards

V SEMESTER

22IT501 : Database Information 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 concepts, its structures and query language. 2. Apply various techniques of SQL Query writing, Normalization techniques, query processing and techniques involved in query optimization useful in transaction. 3. To Analyse the given problem statement and give robust and cost effective solution. 4. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

Unit I:	**(5 Hrs.)**
Introduction to Database Management System: General File System vs. DBMS, Data Abstraction, Data Independence, Keys, Data Modelling using the Entity Relationship(ER) Model, The enhanced Entity Relationship(EER) model.	
Unit II:	**(5 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:	**(6 Hrs.)**
Database Design: Functional Dependency and Normalization for Relational Databases, De sirable properties of decomposition. Introduction to NoSQL , Types of NoSQL Databases: Key-Value (KV) Stores, Document Stores and Column Family Data stores.	
Unit IV:	**(8 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:	**(8 Hrs.)**
Concurrency control Techniques: Lock-Based Protocols, Deadlock Handling, Multiple Granularity, and Timestamp-Based Protocols. Data Control Language: GRANT, REVOKE; Concept of Triggers and Views.	

Total Lecture	**40 Hours**

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

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

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

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

V SEMESTER
22IT502 : Lab. Database Information 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 concepts, its structures and query language. 2. Apply various techniques of SQL Query writing, Normalization techniques, query processing and techniques involved in query optimization useful in transaction. 3. To Analyze the given problem statement and give robust and cost effective solution. 4. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

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

SN	**Experiments based on**
1	Database design using E-R Model, 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 Defination Language).
3	Modification of Database objects using DDL and DML.
4	Querying the Database based on various inbuilt functions,(Date Function, Numeric Function, Character Function, Conversion Function, Miscellaneous Function, etc.).
5	Querying the Database based on Set, Arithmetic and Logical operator
6	Implementation of Joins (all types).
7	Queries based on Data Grouping Restricting and sorting
8	To create and manipulate various database objects of the Table using Views
9	Querying the Database based on to create triggers for various events such as insertion, updating, etc.
10	Exploring NOSQL Database

V SEMESTER
22IT503 : Design & Analysis of Algorithms

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

Unit I	**(7 Hrs.)**
Mathematical foundations, summation of arithmetic and geometric series, recurrence relations, solutions of recurrence relations using technique of characteristic equation and generating functions.	
Unit II	**(7 Hrs.)**
Asymptotic notations of analysis of algorithms, analysing control structures, worst case and average case analysis, amortized analysis, External Sorting, lower bound proof.	
Unit III	**(6 Hrs.)**
Divide and conquer basic strategy, quick sort, merge sort etc. Greedy method – basic strategy, application to job sequencing with deadlines problem, Knapsack Problem, minimum cost spanning trees, single source shortest path etc.	
Unit IV	**(8 Hrs.)**
Dynamic Programming basic strategy, multistage graphs, all pair shortest path, optimal binary search trees, Matrix-chain Multiplication, traveling salesman problem.	
Unit V	**(7 Hrs.)**
Connected components, Branch and bound, Backtracking basic strategy, 8 – Queen's problem, graph coloring, Hamiltonian cycles etc.	
Unit VI	**(7 Hrs.)**
NP-hard and NP-complete problems, basic concepts, non-deterministic algorithms, NP-hard and NP-complete, Cook's Theorem, decision and optimization problems, polynomial reduction	
Total Lecture	**42 Hours**

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

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

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

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

VI Semester
22IT504 : Lab- Design & Analysis of Algorithms

List of Practical's

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

V SEMESTER
22IT505 : Software Engineering

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

Unit I	**(5 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, Data Modelling.	
Unit II	**(5 Hrs.)**
Design Engineering: Design Concept, Design Model, Pattern Based Software Design, Architectural Design: Software Architecture., Data Design, Architectural style, Architectural design , Mapping Data Flow into a Software Architecture ,Component Level Design , User Interface Analysis and Design ,Interface Analysis ,Interface Design steps, Design Evaluation	
Unit III	**(7 Hrs.)**
Testing Strategies: Strategic Approach, Strategic issues, Strategies for conventional Software, Validation Testing, Testing Tactics: White Box Testing, basic Path testing, Control Structure Testing, Black Box Testing, Object Oriented Testing Method, Testing Method applicable at class Level, Interclass Test Case Design. Metrics: Software Quality.	
Unit IV	**(7 Hrs.)**
Project Management, KPES for project management, Metrics for Process and Projects, Project Estimation, Project Scheduling, Risk Management, Quality Management and Change Management.	
Unit V	**(6 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	**(5 Hrs.)**
Advanced Topics in Software Engineering: Case studies based on recent Trends, Reengineering, and CASE tools, client server software Engineering. CORBA	
Total Lecture	**35 Hours**

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

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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

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

V SEMESTER

22IT511 : Network Security & Cryptography

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

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

SNMP, System security-intruders, viruses and related threats, firewall-design principles, trusted systems.

Textbooks:	
1.	Cryptography and Network security Principles and Practices, William Stallings, 4th, Pearson/PHI.
2.	Lethbridge and Pearson Object Oriented Software Engineering 2nd Edition,2005 Pearson Education

Reference Books:	
1.	Introduction to Cryptography with coding theory" Wade Trappe, Lawrence C Washington 3rd Pearson

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

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

V SEMESTER
22IT512 : Lab-Network Security & Cryptography

Sr. No.	Experiments based on
1	W.A.P. to implement Ceaser Cipher
2	W.A.P. to implement Playfair Cipher .
3	W.A.P. to implement Rail fence technique
4	W.A.P. to implement Simple Columnar Transposition technique
5	W.A.P. to implement Simple RSA Algorithm with small numbers
6	W.A.P. to implement Simple Diffe-Hellman algorithm with small numbers
7	Write a program that increases file size by 10.
8	Write a program that creates a shortcut of a file.(Virus program)

V SEMESTER

22IT513 : PE-I Data Science

Course Outcomes
Upon successful completion of the course the students will be able to 1. Identify and describe the methods and techniques commonly used in data science 2. Demonstrate proficiency with the methods and techniques for obtaining, organizing, exploring, and analyzing data. 3. Recognize how data analysis, inferential statistics, modelling, machine learning, and statistical computing can be utilized in an integrated capacity 4. Demonstrate the ability to clean and prepare data for analysis and assemble data from a variety of sources.

UNIT I	**[05 Hrs.]**
Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues.	
UNIT II	**[05 Hrs.]**
Data Collection and Data Pre-Processing Data Collection Strategies – Data Pre-Processing Overview – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization.	
UNIT III	**[06 Hrs.]**
Exploratory Data Analytics Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis – Box Plots – Pivot Table – Heat Map – Correlation Statistics – ANOVA.	
UNIT IV	**[08 Hrs.]**
Basic analysis techniques, Statistical hypothesis generation and testing, Chi-Square test, t-Test, Analysis of variance, Correlation analysis, Maximum likelihood test	
UNIT V	**[08 Hrs.]**
Model Development Simple and Multiple Regression – Model Evaluation using Visualization – Residual Plot – Distribution Plot – Polynomial Regression and Pipelines – Measures for In-sample Evaluation – Prediction and Decision Making.	
UNIT VI	**[08 Hrs.]**
Understanding business scenarios, Feature engineering and visualization, Scalable and parallel computing with Hadoop and Map-Reduce, Sensitivity Analysis	
Total	**40 Hrs.**

Textbooks:	
1.	The Intersection of IoT and "Data Science", PACKT, 2016, Jojo Moolayil, "Smarter Decisions

Reference Books:	
1.	"Data Science and Big data Analytics", David Dietrich, Barry Heller, Beibei Yang, EMC 2013

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

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

V SEMESTER
22IT514 : Lab.: PE-I Data Science

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand data preprocessing. 2. Apply different operations on Numpy, pandas. 3. Implement Variability, regression, correlation using Numpy and Panda.

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

SN	Experiments based on
1	Working with Numpy arrays: Write a python Program to Perform Array Slicing
2	To work with Pandas data frames: Create a data frame using a list of elements.
3	Basic plots using Matplotlib: To draw basic plots in Python program using Matplotlib
4	Write a python Program To Count the frequency of occurrence of a word in a body of text is often needed during text processing.
5	To compute weighted averages in Python either defining your own functions or using Numpy
6	Write a python program to calculate the variance
7	To create a normal curve using python program
8	To write a python program for correlation with scatter plot
9	To write a python program to compute correlation coefficient
10	To write a python program for Simple Linear Regression

V SEMESTER

22IT515 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	**(7 Hrs.)**
Introduction: Fundamental Steps in Image Processing, Elements of DIP systems, Elements of Visual Perception. Fundamentals of Image processing: A Simple Image Model, Sampling and Quantization, Basic Image operations: Subtraction, Averaging, multiplication, etc., Basic Relationships between Pixels	
Unit II	**(7 Hrs.)**
Image Enhancement in the Spatial Domain: Introduction to Spatial and Frequency methods, Basic Gray Level Transformations, Histogram Equalization, Histogram Processing, Local Enhancement, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters.	
Unit III	**(6 Hrs.)**
Image Enhancement in the Frequency Domain: Introduction to the Fourier Transform, Discrete Fourier Transformation, Properties of DFT, Filtering in the Frequency Domain, Correspondence between Filtering in the Spatial and Frequency Domain, Smoothing Frequency-Domain Filters, Sharpening Frequency-Domain Filters, Homomorphic Filtering	
Unit IV	**(8 Hrs.)**
Image Segmentation: Point Detection, Line Detection, Edge Detection, Gradient Operator, Edge Linking and Boundary Detection, Hough transform, Thresholding Region-oriented Segmentation.	
Unit V	**(7 Hrs.)**
Image Representation and description: Chain Codes, Polygonal Approximations, Signatures, Boundary Segments, Skeleton of a Region, Description: Boundary Descriptors, Shape Numbers, Fourier Descriptors, Regional Descriptors, Simple Descriptors, Topological Descriptors	
Unit VI	**(7 Hrs.)**
Basics of morphological Image Processing, Introduction to colour image processing: colour models, pseudo colour image processing, introduction to image file formats: TIFF, JPEG, BMP, etc.	
Total Lecture	**42 Hours**

Textbooks:	
1.	Digital Image Processing Rafael C. Gonzalez and Richard E. Woods Prentice Hall, 2007, 3rd edition

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

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

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

V SEMESTER

22IT516 : 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

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

SN	Experiments based on
1	Implementation of Relationships between Pixels
2	Implementation of Transformations of an Image
3	Contrast stretching of a low contrast image, Histogram, and Histogram Equalization
4	Display of bit planes of an Image
5	Display of FFT(1-D & 2-D) of an image
6	Computation of Mean, Standard Deviation, Correlation coefficient of the given Image
7	Implementation of Image Smoothening Filters(Mean and Median filtering of an Image)
8.	Implementation of image restoring techniques
9.	Canny edge detection Algorithm

V SEMESTER

22IT517 : PE-I Customer Relationship Management

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

Unit I	**(7 Hrs.)**
Introduction to the Force.com Platform. The Basics of an App's User Interface. The Benefits of a Force.com Data-Centric, Collaborative Apps, The Technologies Behind a Force.com Platform App, Multitenant Architecture, A Metadata-Driven Development Model, Apex . Custom User Interface Mobile, AppExchange.	
Unit II	**(7 Hrs.)**
Introduction to Objects ,The Position Custom Object, Introducing Tabs , Setup Detail Pages and Related Lists ,Introduction to Fields , Advanced Fields, Data Validation, and Page Layouts , Adding Advanced Fields , Introduction to Picklists , Field Dependencies , Dependent Picklist ,Custom Formula Fields , Dynamic Default Values , Validation Rules ,Page Layouts , Page Layout Editor Group Fields Edit Field Properties , Page Layouts , Compact Layouts.	
Unit III	**(6 Hrs.)**
Introduction to Relationship Custom Fields, Page Layout Properties, Record Highlights, Introduction to Search Layouts, Additional Search Layouts Managing Review Assessments, Introduction to Roll-Up Summary Fields, Many-to-Many Relationship, Customizing Related Lists in a Many-to-Many Relationship.	
Unit IV	**(8 Hrs.)**
Controlling Access to Data in App, Data Access Concepts. Controlling Access to Objects, Introduction to Profiles ,Standard Profiles ,Introduction to Permission Sets ,Profiles and Permission Sets ,Introduction to Field-Level Security ,Controlling Access to Records, , Set Org-Wide Defaults, Introduction to Hierarchies ,Comparing Roles, Profiles, and Permission Sets ,Role, Introduction of Sharing Rules , Define a Public Group ,Define Sharing Rules ,Introduction to Manual Sharing , Manual Sharing Rule ,Displaying Field Values and Page Layouts According to Profile ,Overriding Sharing with Object Permissions ,Delegated Administration Groups	
Unit V	**(7 Hrs.)**
Introduction to Process Builder, Process Builder: A Closer Look Creating a Process That Updates Field Values, Introduction to Queues, Introduction to Scheduled Actions, Email Alerts, Introduction to Email Templates, Introduction to Approvals, Planning for Approval Processes. Analyzing Data with Reports and Dashboards, Introduction to Reports, Report Formats.	
Unit VI	**(7 Hrs.)**
Introduction to Apex, Collections, SOQL and SOSL, DML Operations, Controllers In APEX Using Apex Class and Triggers, Asynchronous APEX, Batch APEX, Introduction to Aura component, attributes handling in Aura component.	
Total Lecture	**42 Hours**

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

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

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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/110/105/110105145/
2.	https://www.youtube.com/watch?v=-JlLoxEc2tk

V SEMESTER

22IT518 : Lab. : PE-I Customer Relationship Management

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand and Apply the Security Features of Salesforce CRM 2. Analyze and Evaluate the Automated Business Process and Approval Process in CRM

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

SN	Experiments based on
1	Demonstrate the Standard and Custom Objects
2	Demonstrate the Page Layout Model
3	Demonstrate the Master Detail and Lookup Relationship
4	Demonstrate the OWD, Object and Record Level Securities
5	Demonstrate the Profiles, Roles and Permission Sets
6	Demonstrate the Sharing and Manual Sharing Rules
7	Demonstrate Field Level Securities
8	Demonstrate the Approval Process and Process Builder
9	Demonstrate the Reports and Dashboard
10	Demonstrate the Standard and Custom Controller
11	Write a Program to Demonstrate the Apex Triger
12.	Demonstrate the Lighting Component.
13.	Demonstrate the Standard and Custom Objects

V SEMESTER
22IT531 : OE-I Industry 5.0

Course Outcomes :

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

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

Unit I	**(6 Hrs.)**
Introduction,Benefits, Downside Technologies, How will Industry 4.0 help the Supply Chain? ,How Will the Industry 4.0 Affect the Future of Work?,Which Jobs Are Most Likely to Be Affected? ,Jobs that are Less Likely to be Affected ,Recognizing the Impact of Industry 4.0 on Society and Individuals	
Unit II	**(5 Hrs.)**
Human-Robot Interaction, What would Industry 5.0 mean for Human Workforce, How Industry 5.0 Will Affect Manufacturing Systems	
Unit III	**(6 Hrs.)**
Concept of Industry 4.0 and 5.0, Literature review, Relation with the concept of Society 5.0, Research and Investigation evidence base, Defining Industry 5.0, How to Get Ready for Industry 5.0	
Unit IV	**(8 Hrs.)**
The (R)evolutionary Foundations of Industry 5.0, Human-centric approach, New role for the industry worker, Safe and inclusive work environment, Skills, up-skilling and re-skilling	
Unit V	**(8 Hrs.)**
A More Human-Centric Approach to Emerging Technologies ,Attracting and retaining talents, Resource efficiency for sustainability and competitiveness, Increased resilience, advantages and disadvantages of industry 5.0	
Unit VI	**(8 Hrs.)**
The Evolution of More Beneficial Outcomes , Human-centricity, Sustainability, Resilience, Next steps, Mapping Of Past And On-Going Projects, case study	
Total Lecture	**40 Hours**

Textbooks:

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

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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.digimat.in/nptel/courses/video/106105195/L01.html

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V SEMESTER
22IT532 : OE-I Core JAVA

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

Unit I	**(7 Hrs.)**
Introduction to Programming Methodologies, Introduction to Object oriented programming, Objects and Classes, Characteristics of OOP, Encapsulation and data Abstraction, Inheritance, Polymorphism, Dynamic Binding, Structured Versus Object oriented programming, Merits and demerits of object oriented methodology, introduction to Java as OOP language	
Unit II	**(7 Hrs.)**
Building blocks of java, Data types, Variable declarations, operators and Assignments, control structures, Identifying objects and classes, Declaring Classes and objects, Creating Classes and objects, methods, argument passing, Recursion, this keyword, constructors ,Visibility control	
Unit III	**(6 Hrs.)**
Java as OOP language, Other Class Modifiers: static, final, Abstract, Method overloading, Super keyword, Overriding (polymorphism), nested inner classes, packages (encapsulation), Interfaces (multiple Inheritances)	
Unit IV	**(6 Hrs.)**
Arrays and Strings: Arrays, One Dimensional Arrays, Two Dimensional Arrays, variable size arrays, Strings and String Buffer classes, Wrapper Classes	
Unit V	**(7 Hrs.)**
Exception handling mechanism: Fundamentals exception types, uncaught exception, try-catch Block, displaying description of an exception, multiple catch clauses, nested try-catch statements, throw, throws, finally, built in exceptions, creating own exception subclasses	
Unit VI	**(7 Hrs.)**
I/O Streams: Introduction to stream classes, use of stream classes, I/O stream, bytes stream, character stream, pre-defined stream, reading console input, reading character, reading string, writing console output, the print write class, reading & writing files ,transient and volatile modifiers	
Total Lecture	**40 Hours**

Textbooks:	
1.	Bruce Eckel Thinking in Java Prentice Hall

Reference Books:	
1.	E Balagurusamy Programming with Java TATA Mc Graw-Hill
2.	Herbert Schildt Java2CompleteReference Mc Graw-Hill

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

MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/106/105/106105191
2.	https://www.youtube.com/playlist?list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho

V SEMESTER

22IT533 : OE-I Introduction to Data Science

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Identify and describe the methods and techniques commonly used in data science 2. Demonstrate proficiency with the methods and techniques for obtaining, organizing, exploring, and analyzing data. 3. Recognize how data analysis, inferential statistics, modeling, machine learning, and statistical computing can be utilized in an integrated capacity 4. Demonstrate the ability to clean and prepare data for analysis and assemble data from a variety of

UNIT I	**[05 Hrs.]**
Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues.	
UNIT II	**[05 Hrs.]**
Data Collection and Data Pre-Processing Data Collection Strategies – Data Pre-Processing Overview – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization.	
UNIT III	**[06 Hrs.]**
Exploratory Data Analytics Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis – Box Plots – Pivot Table – Heat Map – Correlation Statistics – ANOVA.	
UNIT IV	**[078Hrs.]**
Model Development Simple and Multiple Regression – Model Evaluation using Visualization – Residual Plot – Distribution Plot – Polynomial Regression and Pipelines – Measures for In-sample Evaluation – Prediction and Decision Making.	
UNIT V	**[08 Hrs.]**
Model Evaluation Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Overfitting – Under Fitting and Model Selection – Prediction by using Ridge Regression – Testing Multiple Parameters by using Grid Sear	
UNIT VI	**[08 Hrs.]**
Case study based on data analytics Tool(R Language,Tabelue,Python)	
TOTAL	**40 Hrs.**

Textbooks:	
1.	The Intersection of IoT and Data Science", PACKT, 2016 , Jojo Moolayil, "Smarter Decisions
2.	Doing Data Science, Cathy O'Neil and Rachel Schutt, O'Reilly, 2015.

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Reference Books:	
1.	"Data Science and Big data Analytics", David Dietrich, Barry Heller, Beibei Yang, EMC 2013

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2.	https://www.youtube.com/watch?v=fC7V8QsPBec

V SEMESTER
22IT551 : OE-II Introduction to Machine Learning

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Explain and compare supervised and unsupervised learning. 2. explain various machine learning algorithms 3. Identify appropriate machine learning algorithm to solve the given problem. 4. Construct a machine learning model to meet desired outcomes and apply identified machine learning algorithm to solve the problem. 5. Implement the machine learning algorithms for solving the given problem

Unit I	**(5 Hrs.)**
Introduction to machine learning. What Is Machine Learning, Examples of Machine Learning Applications, Learning Associations, Classification, Regression, Supervised and Unsupervised Learning, Reinforcement Learning, Generalization, Overfitting, and Underfitting	
Unit II	**(5 Hrs.)**
Supervised Learning-1: k-Nearest Neighbors, linear Models, Naive Bayes Classifiers, Decision Trees	
Unit III	**(7 Hrs.)**
upervised Learning-2: Kernelized Support Vector Machines, Uncertainty Estimates from Classifiers, The Decision Function, predicting Probabilities, Uncertainty in Multiclass Classification	
Unit IV	**(9 Hrs.)**
Unsupervised Learning: k-Means Clustering , Expectation-Maximization Algorithm, Supervised Learning after Clustering , Hierarchical Clustering, Choosing the Number of Clusters	
Unit V	**(8 Hrs.)**
Design and Analysis of Machine Learning Experiments: Factors, Response, and Strategy of Experimentation, Randomization, Replication, and Blocking, Guidelines for Machine Learning Experiments , Cross-Validation and Resampling Methods, K-Fold Cross-Validation, Comparing Two Classification Algorithms.	
Unit VI	**(6 Hrs.)**
Advances in Machine Learning: Introduction to learning using Neural networks, shallow and deep networks.	
Total Lecture	**40 Hours**

Textbooks:	
1.	Ethem Alpaydın Introduction to Machine Learning, Second Edition The MIT Press
2.	Andreas C. Müller and Sarah Guido Introductionto Machine Learning with Python, A Guid for Data Scientists ORIELLY

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Reference Books:	
1.	Tom M. Mitchel Machine Learning McGraw Hill

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2.	https://www.youtube.com/watch?v=fC7V8QsPBec

V SEMESTER
22IT552 : Network Security & Cryptography

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand how to provide security of the data over the network. 2. Do research in the emerging areas of cryptography and network security 3. Understand how to Implement various networking protocols 4. Understand how to protect any network from the various threats in the world.

Unit I	**(6 Hrs.)**
Introduction to security attacks - services and mechanism - introduction to cryptography - Conventional Encryption: Conventional encryption model - classical encryption techniques - substitution ciphers and transposition ciphers – cryptanalysis – steganography - stream and block ciphers.	
Unit II	**(6 Hrs.)**
Modern Block Ciphers: Block ciphers principals - Shannon's theory of confusion and diffusion - fiestal structure - data encryption standard(DES) - strength of DES - differential and linear crypt analysis of DES - block cipher modes of operations - triple DES – AES.	
Unit III	**(6 Hrs.)**
Confidentiality using conventional encryption - traffic confidentiality - key distribution - random number generation - Introduction to graph - ring and field - prime and relative prime numbers - modular arithmetic - Fermat's and Euler's theorem - primality testing - Euclid's Algorithm - Chinese Remainder theorem - discrete algorithms.	
Unit IV	**(6 Hrs.)**
Principles of public key crypto systems - RSA algorithm - security of RSA - key management – Diffle-Hellman key exchange algorithm - introductory idea of Elliptic curve cryptography – Elgamel encryption - Message Authentication and Hash Function: Authentication requirements - authentication functions - message authentication code - hash functions - birthday attacks – security of hash functions and MACS.	
Unit V	**(6 Hrs.)**
MD5 message digest algorithm - Secure hash algorithm (SHA) Digital Signatures: Digital Signatures - authentication protocols - digital signature standards (DSS) - proof of digital signature algorithm - Authentication Applications: Kerberos and X.509 - directory authentication service - electronic mail security-pretty good privacy (PGP) - S/MIME	
Unit VI	**(6 Hrs.)**
IP Security: Architecture - Authentication header - Encapsulating security payloads - combining security associations - key management. Web Security: Secure socket layer and transport layer security - secure electronic transaction (SET) - System Security: Intruders - Viruses and related threads - firewall design principals – trusted systems.	
Total Lecture	**36 Hours**

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Textbooks:	
1.	Cryptography and Network security Principles and Practices, William Stallings, 4th, Pearson/PHI.
2.	Lethbridge and Pearson Object Oriented Software Engineering 2nd Edition,2005 Pearson Education

Reference Books:	
1.	Introduction to Cryptography with coding theory" Wade Trappe, Lawrence C Washington 3rd Pearson

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

V SEMESTER
22IT553 : OE-II Concepts in Web Programming

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand the internet communication technologies & Web browser tools, XML application and ASP.NET 2. Apply all the above concepts of web programming for creating a dynamic web site. 3. Design & develop of web sites by using html and dynamic web sites by using DHTML and design JavaScript Webpages through HTML. 4. Design interactive websites & promote it online

Unit I	**(5 Hrs.)**
Creation of web pages: HTML tags, special characters, images, tables, forms, the hyperlinks, Frames	
Unit II	**(5 Hrs.)**
Dynamic HTML (DHTML):Introduction, Cascading Style Sheets (CSS), DHTML Document Object Model and Collections	
Unit III	**(7 Hrs.)**
Scripting Languages:- Java Script objects and forms, server side and client side scripting languages	
Unit IV	**(9 Hrs.)**
XML: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	**(8 Hrs.)**
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 VI	**(6 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, ng- pending. Data Binding: Synchronization between model and view. AngularJS Controllers: ng-controller, Controller Methods, External Files.Scope: $scope, understanding the scope, $rootScope	
Total Lecture	**40 Hours**

Text Books:	
1.	Thomas A. Powell TheComplete Reference HTML and XHTML McGraw Hill Pub
2.	Dayley, Brad Dayley Learning angular JS

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Reference Books:	
1.	Robin Nixon Learning PHP, MySQL ,Java Script, and CSS: A Step-by-Step Guide to Creating Dynamic Websites

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

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 Information Technology

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

B.TECH SCHEME OF EXAMINATION 2022

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

(Department of Information Technology)

B. Tech in Information Technology

SoE No. 22IT-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
Sixth Semester															
1	6	PC	IT	22IT601	Machine Learning	**T**	3	0	0	3	3	30	20	50	3 Hrs
2	6	PC	IT	22IT602	**Lab.:** Machine Learning	p	0	0	2	2	1		60	40	
3	6	PC	IT	22IT603	Principles of Compiler Design	**T**	3	0	0	3	3	30	20	50	3 Hrs
4	6	PC	IT	22IT604	**Lab.:** Principles of Compiler Design	p	0	0	2	2	1		60	40	
5	6	PE-II	IT		**Professional Electives -II**	**T**	3	0	0	3	3	30	20	50	3 Hrs
6	6	PE-III	IT		**Professional Electives -III**	**T**	3	0	0	3	3	30	20	50	3 Hrs
7	6	PE-III	IT		**Lab.:Professional Electives -III**	p	0	0	2	2	1		60	40	
8	6	PR	IT	22IT605	Project Phase I	P	0	0	4	4	2		60	40	
9	6	OE-I	IT		**Open Elective - III**	**T**	3	0	0	3	3	30	20	50	3 Hrs
10	6	OE-II	IT		**Open Elective - IV**	**T**	3	0	0	3	3	30	20	50	3 Hrs
					TOTAL SIXTH SEM		**18**	**0**	**10**	**28**	**23**				

List of Professional Electives- II & III

Professional Electives-II

1	6	PE-II	IT	22IT611	Cloud Computing
2	6	PE-II	IT	22IT612	Real Time Systems
3	6	PE-II	IT	22IT613	Mobile Communication
4	6	PE-II	IT	22IT614	UX and UI Design

Professional Electives-III

1	6	PE-III	IT	22IT631	Blockchain Technology
2	6	PE-III	IT	22IT632	**Lab.:** Blockchain Technology
3	6	PE-III	IT	22IT633	Business Intellegience
4	6	PE-III	IT	22IT634	**Lab.:** Business Intellegience
5	6	PE-III	IT	22IT635	Internet of Things
6	6	PE-III	IT	22IT636	**Lab.:** Internet of Things
7	6	PE-III	IT	22IT637	Mobile Operating Systems
8	6	PE-III	IT	22IT638	**Lab.:** Mobile Operating Systems

Open Elective-III

1	6	OE-III	IT	22IT651	Industry 5.0
2	6	OE-III	IT	22IT652	Core Java
3	6	OE-III	IT	22IT653	Introduction to Data Science

Open Elective-IV

1	6	OE-IV	IT	22IT671	Introduction to Machine Learning
2	6	OE-IV	IT	22IT672	Network security and cryptography
3	6	OE-IV	IT	22IT673	Concepts in Web Programming

List of Mandatory Learning Course (MLC)

1	6	HS		MLC126	**YCAP6:** YCCE Communication Aptitude Preparation	**A**	3	0	0	3	0

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

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

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

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VI SEMESTER
22IT601 : 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

Unit I	(5 Hrs.)
Introduction to machine learning. 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	**(5 Hrs.)**
Supervised Learning-1: k-Nearest Neighbors, linear Models, Naive Bayes Classifiers, Decision Trees	
Unit III	**(7 Hrs.)**
Supervised Learning-2: Kernelized Support Vector Machines, Uncertainty Estimates from Classifiers, The Decision Function, predicting Probabilities, Uncertainty in Multiclass Classification	
Unit IV	**(9 Hrs.)**
Unsupervised Learning: k-Means Clustering, Expectation-Maximization Algorithm, Supervised Learning after Clustering, Hierarchical Clustering, Choosing the Number of Clusters	
Unit V	**(8 Hrs.)**
Design and Analysis of Machine Learning Experiments: Factors, Response, and Strategy of Experimentation, Randomization, Replication, and Blocking, Guidelines for Machine Learning Experiments, Cross-Validation and Resampling Methods, K-Fold Cross-Validation, Comparing Two Classification Algorithms.	
Unit VI	**(6 Hrs.)**
Advances in Machine Learning: Introduction to learning using Neural networks, shallow and deep networks.	
Total Lecture	**40 Hours**

Textbooks:	
1.	Ethem Alpaydın Introduction to Machine Learning, Second Edition The MIT Press
2.	Andreas C. Müller and Sarah Guido Introductionto Machine Learning with Python, A Guid for Data Scientists ORIELLY

Reference Books:	
1.	Tom M. Mitchel Machine Learning McGraw Hill

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2.	https://www.youtube.com/watch?v=fC7V8QsPBec

VI SEMESTER
22IT602 : Lab. : Machine Learning

Course Outcomes
Upon successful completion of the course the students will be able to 1. Implement the Machine learning algorithms to solve the given problem

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

SN	Experiments based on
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 backpropagation algorithm
10	Experiment on deep neural networks

VI SEMESTER

22IT603 : 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 and lexical analyzer tool "Lex" OR "Flex" 2. Apply parsing techniques to design and implement parsers using YACC /Bison tool 3. Apply syntax directed translation scheme to programming language constructs and analyze errors in lexical and syntactic phase of compiler 4. Apply different optimization techniques in the design of compiler and generate target code

Unit I	**(6 Hrs.)**
Introduction to Abstract Model & Grammar , Introduction to Compilation Process, Compilers & Translators, Phase structure of Compiler, Role of Lex, Design of Lexical Analysis.	
Unit II	**(8 Hrs.)**
Specifying Syntactic Structure of Programming Language using Context Free Grammars, The role of Parser, Top-down Parsing, and Bottom up Parsing, Predictive Parsers, and Recursive Decent Parser	
Unit III	**(7 Hrs.)**
Construction of efficient LR Parsers (SLR, CLR & LALR), Canonical Collection of set of items and construction of Parsing table, Implementation of LR Parsing table	
Unit IV	**(8 Hrs.)**
Syntax Directed Translation: Intermediate Code, Postfix notation, Parse tree and Syntax Trees, Three address codes, quadruples, triples, Translation of Arithmetic Expression, Boolean expressions, Control Statements. Array references, Procedure Calls, Declarations, Case Statements, Use of Compiler writing tools (Lex/Flex, Yacc /Biason).	
Unit V	**(6 Hrs.)**
Symbol Tables: Contents, Representing scope information. Error detection and Recovery: Error handling, Lexical-phase, Syntactic phase and semantic phase	
Unit VI	**(8 Hrs.)**
Introduction to Code Optimization, The principle sources of optimization, Loop optimization, The DAG representation, Introductory Data Flow analysis, Introduction to Code Generation: Object programs, Problems in Code Generation, Register allocation and assignment, Code generation from DAG, Peephole optimization.	
Total Lecture	**43 Hours**

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

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

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2.	https://www.youtube.com/watch?v=fC7V8QsPBec

VI Semester
22IT604 : Lab - Principles of Compiler Design

Course Outcomes
Upon successful completion of the course the students will be able to 1. Students will be able to understand and apply Lex Tool for the development of program. 2. Students will be able to understand and apply YACC Tool for the development of program.

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

List of Practical's

Sr. No	Experiments Base On
1	LEX TOOL
2	YACC TOOL

VI SEMESTER

22IT611 : PE-II - Cloud Computing

Course Outcomes
Upon successful completion of the course the students will be able to 1. To provide students with the fundamentals and essentials of Cloud Computing. 2. To provide students a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios. 3. To enable students exploring some important cloud computing driven commercial systems and applications. 4. To expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research.

Unit I	**(7 Hrs.)**
Overview of Computing Paradigm, Recent trends in Computing, Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing, Evolution of cloud computing, Business driver for adopting cloud computing, Introduction to Cloud Computing, Cloud Computing (NIST Model), History of Cloud Computing, Cloud service providers, Properties, Characteristics & Disadvantages of Cloud Computing, Benefits of Cloud Computing, Role of Open Standards.	
Unit II	**(8 Hrs.)**
Cloud Computing Architecture, Cloud computing stack, Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services, Service Models (XaaS), Infrastructure as a Service(IaaS), Platform as a Service(PaaS), Software as a Service(SaaS). Deployment Models, Public cloud Private cloud, Hybrid cloud, Community cloud.	
Unit III	**(7 Hrs.)**
Virtualization Technology: Fundamental concepts of compute, storage, networking, desktop and Application virtualization. Types of Virtualization, Virtualization benefits, server virtualization, Block and file level storage virtualization, Hypervisors, Hypervisor management software, Infrastructure Requirements, Virtual LAN (VLAN) and Virtual SAN (VSAN) and their benefits.	
Unit IV	**(7 Hrs.)**
Service Management in Cloud Computing, Service Level Agreements(SLAs), Billing & Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling: Benefitting enormously, Managing Data: Looking at Data, Scalability & Cloud Services, Database & Data Stores in Cloud, Large Scale Data Processing	
Unit V	**(7 Hrs.)**
Cloud Security, Infrastructure Security: Network level security, Host level security, Application level security, Data security and Storage: Data privacy and security Issues, Jurisdictional issues raised by Data location, Identity & Access Management, Access Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations	

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Unit VI	(6 Hrs.)
Cloud Security, Infrastructure Security: Network level security, Host level security, Application level security, Data security and Storage: Data privacy and security Issues, Jurisdictional issues raised by Data location, Identity & Access Management, Access Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations	
Total Lecture	**42 Hours**

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

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

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2.	https://www.youtube.com/watch?v=4nEr2Z2tItg
3.	https://www.youtube.com/watch?v=-Bwiv5EGucs

VI SEMESTER

22IT612 : PE-II - Real Time Systems

Course Outcomes :

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

1. Understand the basics and importance of real-time systems and explain & address the fundamental problems of real-time systems
2. Compare different scheduling algorithms and the schedulability criteria and Determine schedulability of a set of periodic tasks given a scheduling algorithm.
3. Develop algorithms to decide the admission criterion of sporadic jobs and the schedule of aperiodic jobs
4. Integrate resource access mechanisms with the scheduling techniques and develop integrated schedulaibility criteria.

Unit I	**(6 Hrs.)**
Introduction to real time systems: The Concepts of Real-Time Systems, real time applications according to timing attributes. Hard and soft real time system: The Concept of Real-Time Tasks, Jobs & processors, release times, deadlines, timing constraint, Hard & Soft timing constraint, Hard real time systems, soft real time systems. Modeling of real time systems: Processors and Resources, Temporal Parameters of Real Time Work load, Periodic task Model, Precedence Constraints and Data Dependency	
Unit II	**(7 Hrs.)**
Approach to real time scheduling: Clock-driven approach, weighted round-robin approach, priority-driven approach, dynamic versus static systems, effective release times and deadlines, optimality of EDF & LST algorithms, Non-optimality of the EDF & LST, challenges in validating timing constraints in priority-driven systems, off line versus on-line scheduling.	
Unit III	**(6 Hrs.)**
Clock driven scheduling: Notations & assumptions, static timer-driven scheduler, general structure of cyclic schedules, cyclic executives, improving the average response time of a periodic jobs, scheduling sporadic jobs, practical consideration and generalizations, algorithms for constructing static schedules, pros-cons of clock-driven scheduling.	
Unit IV	**(7 Hrs.)**
Priority-driven scheduling: Static assumptions, fixed-priority versus dynamics priority algorithms, maximum schedulable utilization, optimality of the RM & DM algorithms, a schedulability test for fixed priority tasks with short response times & with arbitrary response times, sufficient schedulability conditions for the RM & DM algorithms.	
Unit V	**(8 Hrs.)**
Scheduling aperiodic & sporadic jobs in priority-driven systems: Assumptions & approaches, deferrable servers, sporadic servers, constant utilization, total bandwidth and weighted fair-queuing servers, slack stealing in dead-line driven systems, slack stealing in fixed-priority systems, scheduling of sporadic jobs.	
Unit VI	**(8 Hrs.)**
Resources and resource access control: Assumption on resources and their usage, effects of resource contention & resource access control, non-preemptive critical sections, basic priority-inheritance protocol, basic priority-ceiling protocol, stack-based priority –ceiling protocol, use of priority-ceiling protocol in dynamic-priority systems,	

preemption-ceiling protocol, controlling accesses to multiple-unit resources, controlling concurrent accesses to data object	
Total Lecture	**42 Hours**

Textbooks:	
1.	Jane W. S. Liu Real Time Systems Pearson education

Reference Books:	
1.	C.M. Krishna & Kang G. Shin Real Time Systems McGraw Pub.

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

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

VI SEMESTER

22IT613 : PE II-Mobile Communication

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

Unit I	**(6 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.	
Unit II	**(6 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	(**6** Hrs.)
3G Systems & beyond : Evolution towards 3G systems based on GSM & CDMA networks. Radio interface, system internal functioning, handover scenarios, security,	
Unit IV	**(5 Hrs.)**
Wireless LAN systems : Medium access control mechanism in 802.11 networks. Radio interface, protocol architecture.	
Unit V	**(6 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	**(5 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 Lecture	**34 Hours**

Text Books	
1	Mobile Communications, By J. Schiller, Pearson Education
2	Mobile and Personal Communication Systems & Services,Raj Pandya,Prentice Hall

Reference Books	
1	Mobile Ad Hoc Networking by Stefano Basagni,Marco ,Wiley India Edition

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

VI SEMESTER

22IT614 : PE II- UX and UI Design

Course Outcomes :
Upon successful completion of the course the students will be 1. Understand the definition and principles of UI/UX Design in order to design with intention. 2. Achieve a deep understanding of the entire life-cycle of design—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	**(6 Hrs.)**
INTRODUCTION :Human–Computer Interface – Characteristics Of Graphics Interface –Direct Manipulation Graphical System – Web User Interface –Popularity –Characteristic & Principles.	
Unit II	**(6 Hrs.)**
HUMAN COMPUTER INTERACTION: User Interface Design Process – Obstacles –Usability –Human Characteristics In Design – Human Interaction Speed –Business Functions –Requirement Analysis – Direct – Indirect Methods – Basic Business Functions – Design Standards – System Timings – Human Consideration In Screen Design – Structures Of Menus – Functions Of Menus– Contents Of Menu– Formatting – Phrasing The Menu – Selecting Menu Choice– Navigating Menus– Graphical Menus.	
Unit III	**(6 Hrs.)**
WINDOWS Characteristics– Components– Presentation Styles– Types– Managements– Organizations– Operations– Web Systems– Device– Based Controls Characteristics– Screen – Based Controls – Operate Control – Text Boxes– Selection Control– Combination Control– Custom Control– Presentation Control.	
Unit IV	**(5 Hrs.)**
MULTIMEDIA Text For Web Pages – Effective Feedback– Guidance & Assistance– Internationalization– Accessibility– Icons– Image– Multimedia – Coloring.	
Unit V	**(6 Hrs.)**
WINDOWS LAYOUT– TEST Prototypes – Kinds Of Tests – Retest – Information Search – Visualization – Hypermedia – WWW– Software Tools.	
Unit VI	**(5 Hrs.)**
INTRODUCTION TO ACTIVE ELEMENTS OF INTERFACE DESIGN: Static to Active, Functionality, Speed and Style, Composition and Structure, Buttons, Not Buttons, States and Changes	
Total Lecture	**34 Hours**

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

Reference Books:	
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

22IT631 : PE II Blockchain Technology

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

Unit I: Introduction to Block chain.	**(6 Hrs.)**
History, Definition, Distributed Ledger, Blockchain Categories – Public, Private, Consortium, Blockchain Network and Nodes, Peer-to-Peer Network, Mining Mechanism, Generic elements of Blockchain, Features of Blockchain, and Types of Blockchain	
Unit II: Operation of Bitcoin	**(7 Hrs.)**
Blockchain, Blockchain Architecture – Block, Hash, Distributer P2P, Structure of Blockchain- Consensus mechanism: Proof of Work (PoW), Proof of Stake (PoS), Byzantine Fault Tolerance (BFT), Proof of Authority (PoA) and Proof of Elapsed Time (PoET)	
Unit III: Introduction to cryptography & Cryptocurrencies	**(7 Hrs.)**
Introduction to cryptography-Encryption and Decryption-Ciphers- -hashing algorithms-SHA-256 algorithm-Application of SHA algorithm, Hash Pointers and Data Structures, Digital Signatures.	
Unit IV: How Bitcoin Achieves Decentralization	**(6 Hrs.)**
Centralization vs. Decentralization, Distributed consensus, Distributed consensus protocol, Byzantine Generals Problem, Consensus without identity using a block chain, Bitcoin consensus algorithm , Incentives and proof of work.	
Unit V: How to Store and Use Bitcoins	**(6 Hrs.)**
Simple Local Storage, Hot and Cold Storage, Splitting and Sharing Keys, Online Wallets and Exchanges, Payment Services, Transaction Fees, Currency Exchange Markets.	
Unit VI: Ethereum: a Programmable Blockchain	**(7 Hrs.)**
Introduction, Ether, Smart Contracts: State, History, Solidity and a Sample Smart Contract. Current and Potential Uses.	
Total Lecture	**39 Hours**

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

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

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

VI SEMESTER
22IT632 : Lab. PE II Blockchain Technology

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

VI SEMESTER

22IT633 : PE III- Business Intelligence

Course Outcomes :

Upon successful completion of the course the students will be

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

Unit I	**(6 Hrs.)**
Introduction to Business Intelligence What is business intelligence, why do we need BI, EIS,MIS,DSS& BI, information pyramid-data, information, Knowledge & intelligence. Basis For operational, tactical & strategic decision making , OLTP vs. OLAP, Requirement gathering in BI through business question BI in various domains and functional area.	
Unit II	**(7 Hrs.)**
SQL the universal language for Business Intelligence Introduction to RDBMS, Language for retrieving data from a database, various clauses in a SQL retrieving data from multiple tables- joins filtering, sorting & grouping datasets, Introduction to DDL & DML statements, various built- in functions in SQL, Use of sub- queries, data dictionary and dynamic SQL.	
Unit III	(**6** Hrs.)
Principles of Dimensional modeling Foundation for fact based decision making, star and snowflake schema, Pros& cons of the star/snowflake schema dimensional model, Slowly changing dimension tables, Fact-less fact strategy, Time dimension.	
Unit IV	**(7 Hrs.)**
Business Intelligence system architecture Need for enterprise class business intelligence infrastructure, The BI ecosystem, Building blocks of a n- tier BI system-servers & communication protocols, The central repository-metadata, Information consumption user interfaces-desktop vs. web vs. Mobile. Open architecture, Scalability, performance in BI-in memory analytics.	
Unit V	**(7 Hrs.)**
BI Project Lifecycle Typical BI project lifecycle, Requirements gathering & analysis-functional & non- functional requirements, reports and dashboards design- mock – up and storyboarding, Testing in a BI project, BI project deployment, Post production support, Applications of BI, BI best practices	
Unit VI	**(7 Hrs.)**
Self-service Analytics What is Self-service Analytics, What are the use cases of self-service analytics, Business Paradigm vs IT paradigm and the Paradigm Shift with self-service analytics, Challenges of Self-service Analytics, Introduction to MicroStrategy Desktop – Overview	
Total Lecture	**40 Hours**

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

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

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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

22IT634 : Lab. PE III- Business Intelligence

Course Outcomes
Upon successful completion of the course the students will be able to 1. Students will be able to apply SQL as a universal language for BI. 2. Students will able to obtain hands on experience with some popular BI software And demonstrate the ability to use BI tool for analysis, designing schema, reporting, visualization of results

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

Sr. No	Problem Statements
1	Exploring HR schema of Oracle, Implementation of queries based on range, relational operators, sorting, concatenation.
2	Implementation of queries based on character matching, aggregate functions, set operations
3	Implementation of queries based on Joins (joining 2 or more tables), sub queries.
4	Design a multidimensional data cube for given data Using EXCEL Perform OLAP- slicing operation on it
5	Creation Of Dashboard Using EXCEL
6	Exploring MICROSTRATEGY ANALYTIC DESKTOP (MSTR) : Installation Of Microstrategy Analytic Desktop And Importing Data from file, Data Wrangling (Editing Data).
7	Visualization Of Data Using different visualizations in MSTR analytic desktop, Filtering data, and delivering Insights from data
8	Create reports and Dashboard with defined insights /requirements in MSTR analytic desktop. (Sample Data to be provided)

VI SEMESTER

22IT635 : PE III- Internet of Things

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

Unit I	**(6 Hrs.)**
Introduction to IoT: History of IOT, Concepts, Products and Examples. IOT Paradigm, The Layering concepts of IOT, IOT Communication Model, IOT Architecture, The 6LoWPAN,Domains of IOT, M2M vs IOT, Management of IOT, IOT Platforms, IOT Languages, IOT Physical Systems, Tools for IOT	
Unit II	**(6 Hrs.)**
IoT Communication Protocols: Protocol Standardization for IOT, Issues with IOT Standardization, M2M and WSN Protocols, SCADA and RFID Protocols, IEEE 802.15.4, BACNet Protocol, Modbus, KNX, Zigbee Architecture, Unified Data Standards.	
Unit III	(**6** Hrs.)
Web of Things: Web of Things versus Internet of Things, The Two Pillars of the Web, Architecture Standardization for Web of Things, Platform Middleware for Web of Things, Unified Multitier Web of Things Architecture, Web of Things Portals and Business Intelligence	
Unit IV	**(5 Hrs.)**
Cloud of Things: Grid/SOA and Cloud Computing, Cloud Middleware, Cloud Standards, Cloud Providers & Systems, Mobile Cloud Computing, Cloud of Things Architecture. Models of Implementation, Service Level Agreement (SLA), Examples of Applications.	
Unit V	**(6 Hrs.)**
Security Aspects: Security in IOT: Introduction, Purpose, Issues, Challenges. IOT Threats to Individual and Organizations, Challenges to Secure IOT Development, Recommended Security Controls. Cybersecurity and IOT. Layered Security Protections to Defend IOT Assets	
Unit VI	**(5 Hrs.)**
IoT Applications: IOT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IOT electronic equipment. Use of Big Data and Visualization in IOT. Role of IOT for Increased Autonomy and Agility in Collaborative Production Environments, Resource Management in the IOT.	
Total Lecture	**34 Hours**

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

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VI SEMESTER

22IT636 : PE-III: LAB. : Internet of Things

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

Sr. N.	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

VI SEMESTER
22IT637 : PE-III Mobile Operating System

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

Unit I	**(7 Hrs.)**
Mobility Technology Trends, Mobile Ecosystem Overview, Mobile Devices Overview, Mobile Development, Methodology, Wireless Networks Overview, Proximity Technologies	
Unit II	**(7 Hrs.)**
Introduction to Android: Android Overview, Introduction to activities/Fragments, Introduction to services, broadcast receivers and content providers, Android Application Structure, Source Files, Resources, Assets and Manifest. IDE Usage: Basic IDE Operation (Eclipse), Project Creation and Handling (App Creation through Wizard), Running App on AVD and Device, DDMS and Debugging. User Interface Designing-1: Layout Overview, Linear Layout, Relative Layout, Frame Layout, Widgets (UI Controls) Overview and Text View, Image View, Button	
Unit III	**(6 Hrs.)**
User Interface Designing-2: Notification Bar, Toast and DSialog, Listview, and Adapter, View Reusability, Spinner and Comples View. Broadcast Receivers: Broadcast receivers overview, Manifest Registration vs Component Registration, Unregistration, SMS Event Receiver, Boot Event Receiver and NetworkEvent Receiver. Service: Service Overview, Service Lifecycle, Service Usage Applicability and Message Binder, Action Bar and Context Menu.	
Unit IV	**(8 Hrs.)**
Data Management: Data Storage Overview, Persistent v/s Local, Shared Preferences, Internal Storage and SQLite Database, Threads and Processes: Thread, Process overview, Async Task, Loaders, Handlers, Intent: Intent, Intent Filters and Intent Resolution, Component Activations: Activity Stack, Launch Modes and Activity Flags	
Unit V	**(7 Hrs.)**
Inter Application Communication: Inter app Communication requirement overview and Intents Based. Communication with Native application: Gallery, Camera, SMS App and Contacts, Content Providers: Content Provider Overview, Need and Usage, Content Provider Structure. Network Communication: Network Communication basics and Connecting to server/request creation, Response Formats XML/JSON and Rest/Web Services. URI Permissions, Views, Triggers	
Unit VI	(7 Hrs.)
User Interface Designing-3: Style and Themes, View and Layout animation Application Configuration: Localization, Orientation and Config Change Handling, Handling multiple resolution devices, Device and Tablet consideration, Support Library. Application Publishing: Application Signing, Application Distribution, Application Publishing, Google Play	
Total Lecture	**42 Hours**

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

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VI SEMESTER

22IT638 : Lab:-PE-III Mobile Operating System

Sr. No.	Practical List
1	Create a dialog box having login functionality.
2	Create an application which has following features: • Show list of numbers on screen along with the type. • Bottom of the screen there should be a row that contains three elements: i. Spinner (Show the predefined phone number type like home, office, mobile, etc) ii. Text box to enter actual number iii. Button saying "Add" - Clicking on this should take the input from the first two items and add a new row item to the list. • On pressing back key (exiting from the application), it should show a confirmation dialog with appropriate title, message and two action buttons "OK" and "Cancel"
3	Create an application which has following features: • Clicking on "Cancel" should show a toast message "We are happy to be with you." and close the dialog. • Clicking on "OK" should close the dialog, exit from the application and generate a notification that says "Press me to go back to application". Then clicking on the notification should restart the application.
4	Create an application which has following features: • Launch phone contacts, display the selected contact in your application. • Try to launch Camera, Gallery & SMS application.
5	Create an application using Listview, Services, Navigation drawer & tab view
6	Create an application for changing background color based on selection from list view
7	Create an application for applying different themes on text views.
8	Create an application using Launch Modes.
9	Create an application displaying any animation.

VI SEMESTER
22IT651 : OE-III Industry 5.0

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

Unit I	**(6 Hrs.)**
Introduction,Benefits, Downside Technologies, How will Industry 4.0 help the Supply Chain? ,How Will the Industry 4.0 Affect the Future of Work?,Which Jobs Are Most Likely to Be Affected? ,Jobs that are Less Likely to be Affected ,Recognizing the Impact of Industry 4.0 on Society and Individuals	
Unit II	**(5 Hrs.)**
Human-Robot Interaction, What would Industry 5.0 mean for Human Workforce, How Industry 5.0 Will Affect Manufacturing Systems	
Unit III	**(6 Hrs.)**
Concept of Industry 4.0 and 5.0, Literature review, Relation with the concept of Society 5.0, Research and Investigation evidence base, Defining Industry 5.0, How to Get Ready for Industry 5.0	
Unit IV	**(8 Hrs.)**
The (R)evolutionary Foundations of Industry 5.0, Human-centric approach, New role for the industry worker, Safe and inclusive work environment, Skills, up-skilling and re-skilling	
Unit V	**(8 Hrs.)**
A More Human-Centric Approach to Emerging Technologies ,Attracting and retaining talents, Resource efficiency for sustainability and competitiveness, Increased resilience, advantages and disadvantages of industry 5.0	
Unit VI	**(8 Hrs.)**
The Evolution of More Beneficial Outcomes , Human-centricity, Sustainability, Resilience, Next steps, Mapping Of Past And On-Going Projects, case study	
Total Lecture	**40 Hours**

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

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

VI SEMESTER
22IT652 : OE-III Core JAVA

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

Unit I	**(7 Hrs.)**
Introduction to Programming Methodologies, Introduction to Object oriented programming, Objects and Classes, Characteristics of OOP, Encapsulation and data Abstraction, Inheritance, Polymorphism, Dynamic Binding, Structured Versus Object oriented programming, Merits and demerits of object oriented methodology, introduction to Java as OOP language	
Unit II	**(7 Hrs.)**
Building blocks of java, Data types, Variable declarations, operators and Assignments, control structures, Identifying objects and classes, Declaring Classes and objects, Creating Classes and objects, methods, argument passing, Recursion, this keyword, constructors ,Visibility control	
Unit III	**(6 Hrs.)**
Java as OOP language, Other Class Modifiers: static, final, Abstract, Method overloading, Super keyword, Overriding (polymorphism), nested inner classes, packages (encapsulation), Interfaces (multiple Inheritances)	
Unit IV	**(6 Hrs.)**
Arrays and Strings: Arrays, One Dimensional Arrays, Two Dimensional Arrays, variable size arrays, Strings and String Buffer classes, Wrapper Classes	
Unit V	**(7 Hrs.)**
Exception handling mechanism: Fundamentals exception types, uncaught exception, try-catch Block, displaying description of an exception, multiple catch clauses, nested try-catch statements, throw, throws, finally, built in exceptions, creating own exception subclasses	
Unit VI	**(7 Hrs.)**
I/O Streams: Introduction to stream classes, use of stream classes, I/O stream, bytes stream, character stream, pre-defined stream, reading console input, reading character, reading string, writing console output, the print write class, reading & writing files ,transient and volatile modifiers	
Total Lecture	**40 Hours**

Textbooks:	
1.	Bruce Eckel Thinking in Java Prentice Hall

Reference Books:	
1.	E Balagurusamy Programming with Java TATA Mc Graw-Hill
2.	Herbert Schildt Java2CompleteReference Mc Graw-Hill

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MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/106/105/106105191
2.	https://www.youtube.com/playlist?list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho

VI SEMESTER
22IT653 : OE-III Introduction to Data Science

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Identify and describe the methods and techniques commonly used in data science 2. Demonstrate proficiency with the methods and techniques for obtaining, organizing, exploring, and analyzing data. 3. Recognize how data analysis, inferential statistics, modeling, machine learning, and statistical computing can be utilized in an integrated capacity 4. Demonstrate the ability to clean and prepare data for analysis and assemble data from a variety of

UNIT I	**[05 Hrs.]**
Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues.	
UNIT II	**[05 Hrs.]**
Data Collection and Data Pre-Processing Data Collection Strategies – Data Pre-Processing Overview – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization.	
UNIT III	**[06 Hrs.]**
Exploratory Data Analytics Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis – Box Plots – Pivot Table – Heat Map – Correlation Statistics – ANOVA.	
UNIT IV	**[08 Hrs.]**
Model Development Simple and Multiple Regression – Model Evaluation using Visualization – Residual Plot – Distribution Plot – Polynomial Regression and Pipelines – Measures for In-sample Evaluation – Prediction and Decision Making.	
UNIT V	**[08 Hrs.]**
Model Evaluation Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Overfitting – Under Fitting and Model Selection – Prediction by using Ridge Regression – Testing Multiple Parameters by using Grid Sear	
UNIT VI	**[08 Hrs.]**
Case study based on data analytics Tool(R Language,Tabelue,Python)	
Total	**40 Hrs.**

Textbooks:	
1.	The Intersection of IoT and Data Science", PACKT, 2016 , Jojo Moolayil, "Smarter Decisions
2.	Doing Data Science, Cathy O'Neil and Rachel Schutt, O'Reilly, 2015.

Reference Books:	
1.	"Data Science and Big data Analytics", David Dietrich, Barry Heller, Beibei Yang, EMC 2013

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2.	https://www.youtube.com/watch?v=fC7V8QsPBec

VI SEMESTER
22IT671 : OE-IV Introduction to Machine Learning

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Explain and compare supervised and unsupervised learning. 2. explain various machine learning algorithms 3. Identify appropriate machine learning algorithm to solve the given problem. 4. Construct a machine learning model to meet desired outcomes and apply identified machine learning algorithm to solve the problem. 5. Implement the machine learning algorithms for solving the given problem

Unit I	**(5 Hrs.)**
Introduction to machine learning.What Is Machine Learning, Examples of Machine Learning,Applications, Learning Associations, Classification, Regression, Supervised and Unsupervised Learning, Reinforcement Learning, Generalization, Overfitting, and Underfitting	
Unit II	**(5 Hrs.)**
Supervised Learning-1: k-Nearest Neighbors, linear Models, Naive Bayes Classifiers, Decision Trees	
Unit III	**(7 Hrs.)**
supervised Learning-2: Kernelized Support Vector Machines, Uncertainty Estimates from Classifiers,The Decision Function, predicting Probabilities, Uncertainty in Multiclass Classification	
Unit IV	**(9 Hrs.)**
Unsupervised Learning: k-Means Clustering ,Expectation-Maximization Algorithm, Supervised Learning after Clustering , Hierarchical Clustering, Choosing the Number of Clusters	
Unit V	**(8 Hrs.)**
Design and Analysis of Machine Learning Experiments: Factors, Response, and Strategy of Experimentation, Randomization, Replication, and Blocking, Guidelines for Machine Learning Experiments , Cross-Validation and Resampling Methods, K-Fold Cross-Validation, Comparing Two Classification Algorithms.	
Unit VI	**(6 Hrs.)**
Advances in Machine Learning: Introduction to learning using Neural networks, shallow and deep networks.	
Total Lecture	**40 Hours**

Textbooks:	
1.	Ethem Alpaydın Introduction to Machine Learning, Second Edition The MIT Press
2.	Andreas C. Müller and Sarah Guido Introductionto Machine Learning with Python, A Guid for Data Scientists ORIELLY

Reference Books:	
1.	Tom M. Mitchel Machine Learning McGraw Hill

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

VI SEMESTER

22IT672 : OE-IV Network Security & Cryptography

Course Outcomes :

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

1. Understand how to provide security of the data over the network.
2. Do research in the emerging areas of cryptography and network security
3. Understand how to Implement various networking protocols
4. Understand how to protect any network from the various threats in the world.

Unit I	**(6 Hrs.)**
Introduction to security attacks - services and mechanism - introduction to cryptography - Conventional Encryption: Conventional encryption model - classical encryption techniques - substitution ciphers and transposition ciphers – cryptanalysis – steganography - stream and block ciphers.	
Unit II	**(6 Hrs.)**
Modern Block Ciphers: Block ciphers principals - Shannon's theory of confusion and diffusion - fiestal structure - data encryption standard(DES) - strength of DES - differential and linear crypt analysis of DES - block cipher modes of operations - triple DES – AES.	
Unit III	**(6 Hrs.)**
Confidentiality using conventional encryption - traffic confidentiality - key distribution - random number generation - Introduction to graph - ring and field - prime and relative prime numbers - modular arithmetic - Fermat's and Euler's theorem - primality testing - Euclid's Algorithm - Chinese Remainder theorem - discrete algorithms.	
Unit IV	**(6 Hrs.)**
Principles of public key crypto systems - RSA algorithm - security of RSA - key management – Diffle-Hellman key exchange algorithm - introductory idea of Elliptic curve cryptography – Elgamel encryption - Message Authentication and Hash Function: Authentication requirements - authentication functions - message authentication code - hash functions - birthday attacks – security of hash functions and MACS.	
Unit V	**(6 Hrs.)**
MD5 message digest algorithm - Secure hash algorithm (SHA) Digital Signatures: Digital Signatures - authentication protocols - digital signature standards (DSS) - proof of digital signature algorithm - Authentication Applications: Kerberos and X.509 - directory authentication service - electronic mail security-pretty good privacy (PGP) - S/MIME	
Unit VI	**(6 Hrs.)**
IP Security: Architecture - Authentication header - Encapsulating security payloads - combining security associations - key management. Web Security: Secure socket layer and transport layer security - secure electronic transaction (SET) - System Security: Intruders - Viruses and related threads - firewall design principals – trusted systems.	
Total Lecture	**36 Hours**

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Textbooks:	
1.	Cryptography and Network security Principles and Practices, William Stallings, 4th, Pearson/PHI.
2.	Lethbridge and Pearson Object Oriented Software Engineering 2nd Edition,2005 Pearson Education

Reference Books:	
1.	Introduction to Cryptography with coding theory" Wade Trappe, Lawrence C Washington 3rd Pearson

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

VI SEMESTER

22IT673 : OE-IV Concepts in Web Programming

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand the internet communication technologies & Web browser tools, XML application and ASP.NET 2. Apply all the above concepts of web programming for creating a dynamic web site. 3. Design & develop of web sites by using html and dynamic web sites by using DHTML and design JavaScript Webpages through HTML. 4. Design interactive websites & promote it online

Unit I	**(5 Hrs.)**
Creation of web pages: HTML tags, special characters, images, tables, forms, the hyperlinks, Frames	
Unit II	**(5 Hrs.)**
Dynamic HTML (DHTML):Introduction, Cascading Style Sheets (CSS), DHTML Document Object Model and Collections	
Unit III	**(7 Hrs.)**
Scripting Languages:- Java Script objects and forms, server side and client side scripting languages	
Unit IV	**(9 Hrs.)**
XML: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	**(8 Hrs.)**
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 VI	**(6 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, ng- pending. Data Binding: Synchronization between model and view. AngularJS Controllers: ng-controller, Controller Methods, External Files.Scope: $scope, understanding the scope, $rootScope	
Total Lecture	**40 Hours**

Text Books:	
1.	Thomas A.Powell TheComplete Reference HTML and XHTML McGraw Hill Pub
2.	Dayley, Brad Dayley Learning angular JS

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Reference Books:	
1.	Robin Nixon Learning PHP, MySQL ,Java Script, and CSS: A Step-by-Step Guide to Creating Dynamic Websites

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

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

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Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2022

7th & 8th Semester

(Department of Information Technology)

B. Tech in Information Technology

VII SEMESTER

22IT701 : Data Mining

Course Outcomes :

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

1. Apply basic concepts in data mining, Identify the scope and necessity of Data Mining for the society and for business applications.
2. Apply different data mining algorithms on given data set.
3. Analyze about appropriate data preprocessing tasks, data mining technique applicable for different type of data like web data, text data.
4. Use popular data mining tool and apply the principle algorithms and techniques used in data mining, on different types of dataset, analyze their results, interpret the results using different visualization techniques.

Unit I:	**(5 Hrs.)**
Introduction to data mining: Data mining definitions & task, data mining on what kind of data ,Knowledge Discovery vs. Data mining, DBMS vs. Data Mining, Data mining functionalities, data mining task primitives , Major issues in data mining , applications of data mining.	
Unit II:	**(5 Hrs.)**
Association Rule Mining: what is Frequent item sets, closed item sets, and association rules, frequent pattern mining, applications of Association Rule mining, The Apriority algorithm for finding frequent item set using candidate generation, generating association rules from frequent item sets .Improving efficiency of Apriority, FP-growth algorithm.	
Unit III:	**(7 Hrs.)**
Classification and prediction: What is classification , prediction., Issues regarding Classification and prediction, Decision tree construction principle, Decision tree construction algorithms ID3, C4.5, Classification using decision tree Induction , naive Bayes algorithm, KNN algorithm ,prediction using Linear regression.	
Unit IV:	**(7 Hrs.)**
Cluster Analysis : What is cluster analysis, its applications, clustering paradigms, Partioning algorithms: K-means, K-medoids, Hierarchical clustering: Agglomerative and Divisive hierarchical clustering, Density based clustering -DBSCAN	
Unit V:	**(6 Hrs.)**
Web Mining: Introduction, web content mining, web structure mining, web usage mining, mining multimedia data on web, page rank algorithm , web crawlers	
Unit VI:	**(6 Hrs.)**
Text mining: Text data analysis and Information retrieval, Unstructured texts, text mining approaches, text pre-processing, episode rule discovery for texts, Hierarchy of categories, text clustering. Introduction to NLP	
Total Lecture	**36 Hours**

Textbooks:	
1.	Jiawei Han, Micheline Kamber and Jian Pei Data Mining: Concepts and Techniques, 3rd ed. Morgan Kaufmann Publishers

Reference Books:	
1.	Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining First impression Pearson Addison Wesley
2.	Daniel T. Larose Discovering Knowledge in Data An Introduction to Data Mining Wiley
3.	Chapman and Hall Data mining with R 2nd CRC press

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MOOCs Links and additional reading, learning, video material	
1.	httpshttps://www.youtube.com/watch?v=_mSkA-wA2Wk

VII SEMESTER
22IT702 : Lab.: Data Mining

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

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

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

VII SEMESTER
22IT703 : Artificial Intelligence

Course Outcomes :
Upon successful completion of the course the students 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	**(8 Hrs.)**
Introduction: -: What is AI?, History, Overview, Intelligent Agents, Performance Measure, Rationality, structure of agents, problem solving agents, Problem Formulation, searching for solutions – uniformed search.	
Unit II	**(9 Hrs.)**
Informed (Heuristic) Search and Exploration, Greedy best first search, A* search, Memory bounded heuristic search, Heuristic functions, inventing admissible heuristic functions, Local Search algorithms, Hill-climbing, Simulated Annealing, Genetic Algorithms, Online search.	
Unit III	**(9 Hrs.)**
Constraint Satisfaction Problems, Backtracking Search, variable and value ordering, constraint propagation, intelligent backtracking, local search for CSPs, Adversarial Search, Games, The minimax algorithm, Alpha-Beta pruning, Imperfect Real-Time Decisions, Games that include an Element of Chance.	
Unit IV	**(8 Hrs.)**
Knowledge Based Agents: Logic, Propositional Logic, Inference, Equivalence, Validity and Satisfiability, Resolution, Forward and Backward Chaining, Local search algorithms, First Order Logic, Models for first order logic, Symbols and Interpretations, Terms, Atomic sentences, complex sentences, Quantifiers, Inference in FOL, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.	
Unit V	**(7 Hrs.)**
Planning, Language of planning problems, 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	**(8 Hrs.)**
Uncertainty, Handing uncertain knowledge, 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	
Total Lecture	**48 Hours**

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

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

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MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/112/103/112103280/
2.	https://onlinecourses.nptel.ac.in/noc21_ge20/preview

VII SEMESTER

22IT704: Lab: Artificial Intelligence

Course Outcomes :

Upon successful completion of the course the students 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).

VII SEMESTER

22IT721 : PE-IV - PARALLEL COMPUTING

Course Outcomes

Upon successful completion of the course the students 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. Design and develop parallel algorithms suited for Shared and Distributed memory models using Open-MP & MPI.
4. Write code using accelerator technologies of GPGPUs with CUDA for heterogeneous parallel programming environments.

Unit I	**(7 Hrs.)**
Introduction to parallel computing: Need of ever increasing performance, building parallel systems, need to write parallel programs, Parallel hardware, Parallel Software, Coordinating the processes/threads, Shared-memory, Distributed-memory, Programming hybrid systems. Parallel Programming Platforms: Implicit parallelism, Limitation of Memory system performance, Dichotomy of parallel computing platforms, physical organization of parallel platforms, communication cost in parallel machines.	
Unit II	**(8 Hrs.)**
Principles of Parallel Algorithm Design: Preliminaries, Decomposition Techniques, Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing. Methods for Containing Interaction Overheads Parallel Algorithm Models.	
Unit III	**(7 Hrs.)**
Dependence Concepts: Basic introduction of dependence in single loop and double loop, index and iteration spaces and perfect loop nest, loop unrolling, test for dependences, GCD test, Bound test.	
Unit IV	**(7 Hrs.)**
Shared-Memory Programming with OpenMP: What is OpenMP, creating team of threads, OpenMP Memory model, thread synchronization, Directives, Sharing the Work among Threads in an OpenMP Program : Loop Construct, The Sections Construct , The Single Construct , Workshare Construct, Combined Parallel Work-Sharing Constructs ,Clauses to Control Parallel and Work-Sharing Constructs, OpenMP Synchronization Constructs ,Interaction with the Execution Environment, OpenMP Clauses : If Clause , Num threads Clause, Ordered Clause, Reduction Clause, Copyin Clause ,Copyprivate Clause ,Advanced OpenMP Constructs: Nested Parallelism , Flush Directive , Thread private Directive.	
Unit V	**(7 Hrs.)**
Distributed-Memory Programming with MPI : Compilation and execution, MPI programs ,MPI_Init and MPI_Finalize, Communicators: MPI_Comm_ size and MPI_ Comm_rank, MPI_Send ,MPI_Recv, Message matching, Semantics of MPI_Send and MPI_Recv, Dealing with I/O, Collective communication, MPI derived data types.	
Unit VI	**(6 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	**42 Hours**

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Text Books	
1	Introduction to Parallel Computing Second edition,AnanthGrama, Anshul Gupta, George Karypis, Vipin Kumar,AnanthGrama, Anshul Gupta, George Karypis, Vipin Kumar
2	Dependence Concept ,(Intel Corporation) by Utpal Banerjee Publishersby Ut pal Banerjee Publishers
3	CUDA by Example: An IntroductIon to General- Purpose GPU Programming by Jason Sanders, Edward Kandrot,by Jason Sanders, Edward Kandrot

Reference Books	
1	Using OpenMP By Barbara Chapman, Gabriele Jost, Ruud van der Pas (MIT Press)
2	An Introduction to Parallel Programming Peter S. Pacheco , Morgan Kaufmann,MORGAN, KAUFMANN,ELSEVIER

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

VII SEMESTER

22IT722 : Lab: Parallel Computing

Course Outcomes :

Upon successful completion of the course the students will be

1. Design and develop parallel algorithms suited for Shared and Distributed memory models using Open-MP & MPI.
2. Write code using accelerator technologies of GPGPUs with CUDA for heterogeneous parallel programming environments.

Sr. No.	Problem Statements
1	Open-MP program based on Loop Constructs
2	Open-MP program based on Work Sharing Constructs (shared & Private clause)
3	Open-MP program based on Synchronization Constructs
4	Open-MP program based on Nested Parallelism
5	MPI Program based on basic MPI calls to exchange the data
6	MPI Program based on collective MPI calls
7	CUDA program based on threads and kernel
8	CUDA program based on shared memory synchronization & thread cooperation
9	CUDA program based on Constant Memory & Texture Memory
10	CUDA program based on Nested parallelism

VII SEMESTER

22IT723 : PE IV- Neural Network and Fuzzy Logic

Course Outcomes :

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

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

Unit I	**(8 Hrs.)**
Neural Networks: History, overview of biological neuro-system, mathematical models of neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, Learning Tasks, Applications of Artificial Neural Networks	
Unit II	**(7 Hrs.)**
Feed forward and feedback networks, Single-layer perceptron classifiers, Discriminant functions, linear machine and minimum distance classification, training and classification using the discrete perception - ANN training Algorithms-Single layer perceptron, multi-layer perceptron, RDPTA algorithm	
Unit III	**(8 Hrs.)**
Multilayer feed forward networks, linearly non-separable pattern classification, delta learning rule, Feed forward recall and error back-propagation training, Hopfield learning algorithm, Self-organizing Map, Deep Learning	
Unit IV	**(7 Hrs.)**
Fuzzy Logic: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation. Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.	
Unit V	**(6 Hrs.)**
Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations. Application of Fuzzy Logic: Medicine, Economics etc.	
Unit VI	**(6 Hrs.)**
Implementing fuzzy IF-THEN rules, Introduction of Neuro-Fuzzy Systems, Architecture of Neuro Fuzzy Networks, Hybrid neural network	
Total Lecture	**42 Hours**

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

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

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

VII SEMESTER

22IT724 : Lab.: PE IV- Neural Network and Fuzzy Logic

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

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

Sr. No..	Problem Statements
1	Design and Implement n-input NAND and NOR gates using Mc-Culloch Pits Model of a neuron
2	Implement A-Z character recognition using Feed-forward Neural Network.
3	Implement clustering algorithm.
4	Design and Implement a linear classifier using SDPTA algorithm for a 3 input logical NAND Problem
5	Implement Back Propagation training algorithm, for any non-linear complex problem
6	Implement SOM algorithm, for any clustering problem
7	Implement i. T-norms and S-norms. ii. fuzzy system for dilation and concentration
8	Implement following relation of composition Min-max Max-product Max-average
9	Implement classical relationship between Fuzzy set.
10	For a given linguistic variable, write a program that fuzzify the crisp input and return its membership in different fuzzy partitions corresponding to its linguistic values

VII SEMESTER
22IT725 : PE-IV Big Data Analytics

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand Concept, characteristics, types of big data and its application. 2. Build and maintain reliable, scalable, distributed systems with Apache Hadoop. 3. Apply Hadoop ecosystem components to solve real world problems. 4. Apply machine learning algorithm for big data analysis.

UNIT I	**(05 Hrs.)**
Introduction to Big Data: Data, Characteristics of data and Types of digital data: Unstructured, Semi-structured and Structured, Sources of data, working with unstructured data, Evolution and Definition of big data, Characteristics and Need of big data, Challenges of big data, Data environment versus big data environment, Big Data Analysis Life Cycle.	
UNIT II	**(05 Hrs.)**
Big data analytics tools and Technologies: Overview of business intelligence, Characteristics and need of big data analytics, Classification of analytics, Challenges to big data analytics. Analytical operations: Associations rules, classifications, clustering, Mahout ML, etc.	
UNIT III	**(06 Hrs.)**
Hadoop foundation for analytics: Features, Hadoop ecosystems, Evolution of Hadoop architectures Hadoop 1.0, Hadoop 2.0, Hadoop3.0, Key aspects and Components of Hadoop 3.0. Hadoop Technology Stack: Hive, Pig, Zookeeper, Swoop, oozie, flume, etc.	
UNIT IV	**(08 Hrs.)**
MapReduce and YARN framework: Introduction to MapReduce, Processing data with MapReduce, Introduction to YARN, Components YARN, Data serialization and Working with common serialization formats, Big data serialization formats	
UNIT V	**(08 Hrs.)**
NoSQL Databases: Schema-less Models, Increasing Flexibility for Data ManipulationKey Value Stores- Document Stores – Tabular Stores – Object Data Stores Hive – Sharding –-Hbase – Analyzing big data NoSQL Database Architectures.	
UNIT VI	**(08 Hrs.)**
Introduction to MongoDB key features, Core Server tools, MongoDB through the JavaScript's Shell, Creating and Querying through Indexes, Document-Oriented, principles of schema design, Constructing queries on Databases, collections and Documents, MongoDB Query Language.	
Total Lecture	**40 Hours**

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Textbooks:	
1.	Seema Acharya, Big Data and Analytics, Wiley Publication,
2.	lublinsky, Kevin t. Smith, AlexeyYakubovich, Professional Hadoop Solutions, Wiley

Reference Books:	
1.	Kyle Banker,Piter Bakkum, Shaun Verch, MongoDB in Action, Dream tech Press
2.	Vignesh Prajapati, Big Data Analytics with R and Hadoop, Packet Publishing
3.	Holden Karau,Learning Spark: Lightning-Fast Big Data Analysis Paperback,

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1.	https://archive.nptel.ac.in/courses/106/104/106104189/
2.	https://archive.nptel.ac.in/courses/106/104/106104189/

VII SEMESTER

22IT726 : Lab.: PE IV- Big Data Analytics

Course Outcomes
Upon successful completion of the course the students will be able to 5. Understand Concept, characteristics, types of big data and its application. 6. Build and maintain reliable, scalable, distributed systems with Apache Hadoop. 7. Apply Hadoop ecosystem components to solve real world problems. 8. Apply machine learning algorithm for big data analysis.

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

Sr. No..	Problem Statements
1	Introduction to Big Data and Big Data Platform, characteristics, feature
2	Data pre-processing operations that can be performed using WEKA-Explorer. The sample dataset used for this example is the student data available in arff format.
3	(a)Create an Employee Table with the help of Data Mining Tool WEKA (b)Apply Pre-Processing techniques to the training data set of Employee Table pre-processing techniques they are: 1. Add 2. Remove 3. Normalization
4	Import the legacy data from different sources such as (Excel, SqlServer, Oracle etc.) and load in the target system.
5	Write steps for installing the HADOOP in Linux.
6	Implementing the basic Hadoop HDFS Commands – File/Directory creation, deletion, update operations.
7	(a)Run a basic Word Count Map Reduce Program to understand Map Reduce Paradigm (b)Write a program in Map Reduce for Matrix Multiplication
8	(a)Write steps for installing the pig in windows 10. (b)Working with pig commands.
9	(a)Oracle NoSQL Database instance and access data from Formatter classes (b)Run Formatter classes to display the NoSQL data.

VII SEMESTER

22IT727 : PE IV- Deep Learning

Course Outcomes
Upon successful completion of the course the students 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. Identify the deep feed forward, convolution and recurrent neural networks which are more appropriate for various types of learning tasks in various domains. 3. Recognize the characteristics of deep learning models that are useful to solve real-world problems. 4. Identify and apply appropriate deep learning algorithms for analyzing the data for variety of problems.

Unit I	**(6 Hrs.)**
Introduction to Deep Learning, Overview of linear algebra and probability: Vector, Matrix, Rank, Norm, Determinant, Eigen value and Eigen vectors, Determinants. Statistics: Probability , Random variable, probability distribution, Numerical Computation :,Overflow and Underflow, Poor Conditioning ,Gradient-Based Optimization, Constrained Optimization, Example: Linear Least Squares.	
Unit II	**(6 Hrs.)**
Machine Learning Basics : Learning Algorithms, Capacity, Overfitting and Underfitting, Hyperparameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood ,Bayesian Statistics, Supervised Learning ,Unsupervised Learning ,Stochastic Gradient Descent, Challenges Motivating Deep Learning Massive parallelism • Distributed representation and computation • Learning ability • Generalization ability • Adaptability • Inherent contextual information processing • Fault tolerance • Low energy consumption	
Unit III	**(8 Hrs.)**
feedforward neural network or multilayer perceptron, Issues with linear FFN, Design issues of feedforward network, Example: Simple feedforward network with hidden layer,Regularization in DL: Norm penalties, Early stopping, Bagging, Dropout.	
Unit IV	**(6 Hrs.)**
Optimization for Training Deep Models: Challenges in Neural Network Optimization, Basic Algorithms , Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms.	
Unit V	**(6 Hrs.)**
Convolutional Neural Networks, The Basic Structure of a Convolutional Network, Training a Convolutional Network, Applications of Convolutional Networks Deep Reinforcement Learning, Stateless Algorithms, The Basic Framework of Reinforcement Learning, Policy Gradient Methods.	
Unit VI	**(8 Hrs.)**
Recurrent Neural Networks, The Architecture of Recurrent Neural Networks, The Challenges of Training Recurrent N Restricted Boltzmann Machines, Hopfield Networks, The Boltzmann Machine, Restricted Boltzmann Machines, Applications of Restricted Boltzmann Machines networks, Applications of Recurrent Neural Networks.	
Total Lecture	**40 Hours**

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Textbooks:	
1.	Deep Learning by Ian Goodfellow,Yoshua Bengio,Aaron Courville MIT Press
2.	Neural Network and Deep Learning Charu C Agarwal Springer

Reference Books:	
1.	Neural Networks and Learning Simon Haykin , Pearson, Prentice Hall

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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=W3_yaf3HvHU
2.	https://www.youtube.com/watch?v=aPfkYu_qiF4

VII SEMESTER
22IT728 : Lab.: PE IV- Deep Learning

Course Outcomes
Upon successful completion of the course the students 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. Identify the deep feed forward, convolution and recurrent neural networks which are more appropriate for various types of learning tasks in various domains. 3. Recognize the characteristics of deep learning models that are useful to solve real-world problems. 4. Identify and apply appropriate deep learning algorithms for analyzing the data for variety of problems.

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

Sr. No.	Problem Statements
1	Implementation of Single layer Perceptron Learning Algorithm
2	Implement unsupervised learning algorithm by tacking appropriate input dataset
3	Implement unsupervised learning algorithm by tacking appropriate input dataset.
4	Implement character recognition neural network for recognizing English alphabets using Back Propagation training algorithm.
5	Write steps for Implement a neural network for handwritten character recognition and classification.
6	Implement a neural network for Optical character recognition in python.
7	Implement RBF network for input dataset and perform testing and training.
8	Implement Hopfield Networks in python by tacking appropriate input dataset.
9	Implement Convolutional neural network for pattern classification.

VII SEMESTER

22IT729: PE IV Dot Net Full Stack Development

Course Outcomes
Upon successful completion of the course the students will be able to
1. Understand the concept of .NET full stack development using C# ,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

Reference Books:	
1.	C# 6.0 and the .NET 4.6 Frameworkby Andrew Troelsen and Philip Japikse
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1	http://103.152.199.179/YCCE/e-copies%20of%20books/7.Information%20Technology

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VII SEMESTER

22IT730 : PE IV 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

22IT731 : PE IV: 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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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

22IT732 : Lab : PE IV 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

22IT741 : 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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MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=kNkCfaH2rxc&list=PLaZQkZp6WhWwoDuD6pQCmgVyDbUWl_ZUi

VII SEMESTER

22IT742 : PE-V - : Basics of Bio-Informatics

Course Outcomes :

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

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

UNIT I	**[06Hrs.]**
Need for Bioinformatics technologies – Overview of Bioinformatics technologies – Structural bioinformatics – Data format and processing – secondary resources and applications – Role of Structural bioinformatics - Biological Data Integration System.	
UNIT II	**[05Hrs.]**
Bioinformatics data – Datawarehousing architecture – data quality – Biomedical data analysis – DNA data analysis – Protein data analysis – Machine learning – Neural network architecture and applications in bioinformatics	
UNIT III	**[06Hrs.]**
Need for tools, Knowledge discovery, Industry trends and data mining tools; Data submission tools, Data analysis tools, Prediction tools and modeling tools.	
UNIT IV	**[08Hrs.]**
Hidden markov modeling for biological data analysis – Sequence identification – Sequence classification – multiple alignment generation – Comparative modeling – Protein modeling – genomic modeling – Probabilistic modeling – Bayesian networks – Boolean networks - Molecular modeling – Computer programs for molecular modelling	
UNIT V	**[08Hrs.]**
Gene regulation – motif recognition – motif detection – strategies for motif detection – Visualization – Fractal analysis – DNA walk models – one dimension – two dimension – higher dimension – Game representation of Biological sequences – DNA, Protein, Amino acid sequences.	

UNIT VI	[08Hrs.]
Microarray technology for genome expression study – image analysis for data extraction – preprocessing – segmentation – gridding – spot extraction – normalization, filtering – cluster analysis – gene network analysis – Compared Evaluation of Scientific Data Management Systems – Cost Matrix – Evaluation model - Benchmark - Tradeoffs	
Total Lecture Hours	**39 Hours**

Text books
Harshawardhan P.Bal, "Bioinformatics principles and applications", TataMcGraw Hill Publishing Company Ltd, 2007, New Delhi
Kenneth Baclawski, Tianhua Niu, "Bioinformatics", Jaico Publishing House, 2007, Delhi.
Lukas K. Beehler and Hooman H. Rashidi, "Bioinformatics basics Applications in biological science and medicine", Taylor and Francis Group, 2005,
Reference Books
Yi-Ping Phoebe Chen (Ed), "BioInformatics Technologies", First Indian Reprint, Springer Verlag, 2007
Zoe lacroix and Terence Critchlow, "BioInformatics – Managing Scientific data", First Indian Reprint, Elsevier, 2004
Arthur M Lesk, "Introduction to Bioinformatics", Second Edition, Oxford University Press, 2005

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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/
2.	https://onlinecourses.nptel.ac.in/

VII SEMESTER

22IT743 : PE V- Ethical Hacking and Cyber Forensics

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand, appreciate, employ, design and implement appropriate security technologies and policies to protect computers and digital information. 2. Identify & Evaluate Information Security threats and vulnerabilities in Information Systems and apply security measures to real time scenarios 3. Identify common trade-offs and compromises that are made in the design and development process of Information Systems 4. Demonstrate the use of standards and cyber laws to enhance information security in the development process and infrastructure protection.

Unit I	**(7 Hrs.)**
Hacking windows – Network hacking – Web hacking – Password hacking. A study on various attacks – Input validation attacks – SQL injection attacks – Buffer overflow attacks - Privacy attacks.	
Unit II	(**7** Hrs.)
TCP / IP – Checksums – IP Spoofing port scanning, DNS Spoofing. Dos attacks – SYN attacks, Smurf attacks, UDP flooding, DDOS – Models. Firewalls – Packet filter firewalls, Packet Inspection firewalls – Application Proxy Firewalls. Batch File Programming.	
Unit III	**(6 Hrs.)**
Fundamentals of Computer Fraud – Threat concepts – Framework for predicting inside attacks – Managing the threat – Strategic Planning Process.	
Unit IV	**(7 Hrs.)**
Understanding the Cyberspace Environment and DesignCyberspace environment and its characteristics, Developing a design approach, Planning for cyberspace operation Cyberspace Operational Approaches.	
Unit V	**(7 Hrs.)**
Foundational approaches that utilize cyberspace capabilities to support organizational missions, The pros and cons of the different approaches.	
Unit VI	**(6 Hrs.)**
Cyberspace Operations Network Operations (NETOPS), Defensive Cyberspace Operations (DCO), Offensive Cyberspace Operations (OCO), Defense and Diversity of Depth network design, Operation al methodologies to conduct cyberspace operations.	
Total Lecture	**40 Hours**

Textbooks:	
1.	Paulo Shakarian et al "Introduction of Cyber Warfare: A Multidisciplinary Approach," 2 Edition Elsevier 2013.
2.	Jeffery carr et al Inside Cyber Warfare: Mapping the Cyber Underworld," 1 Edition O'Reilly Publication December 2012
3.	Jason Andress et al. "Cyber Warfare: Techniques, Tactics and Tools for Security Practitioners" Syngress, Elsevier 2013.
4.	Kenneth C.Brancik Insider Computer Fraud" 1 Edition Publications Taylor & Francis Group 2008
5.	Ankit Fadia Ethical Hacking second edition Ma cmillan India Ltd, 2006

Reference Books:	
1.	Bernard Menezes, Cengage Learning Cryptography, Network Security and Cyber Laws 1 Edition Oxford universitypress

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MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=t8nwQ6At0CU&list=PL7AT7LU4byRKMBCEWpeZ4QOd2VWvdIHXU
2.	https://www.youtube.com/watch?v=LQUocnZlBgQ&list=PL7AT7LU4byRKMBCEWpeZ4QOd2VWvdIHXU&index=5

VII SEMESTER

22IT744 : PE V: E-Commerce

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand of contemporary ecommerce concepts and terminology, and the processes and management decisions that are involved in launching, operating and managing business activity on the World Wide Web. 2. Analyze and understand the human, technological and business environment associated with e-commerce. 3. Define and analyze the concept of electronic data interchange and its legal, social and technical aspects. 4. Define and analyze the security issues over the web, the available solutions, future aspects of e-commerce security, concept of E-commerce and electronic payment system.

Unit I	**(6 Hrs.)**
Internet &Introduction to Electronic Commerce: The basics of internet access, email, FTP, TELNET, Introduction to WWW: The basics of WWW & browsing working of Web Browser & Web Server, Web Browser architecture. Introduction to Electronic Commerce: The scope of Electronic Commerce, Definition of Electronic Commerce, Electronic Commerce and the Trade.	
Unit II	**(6 Hrs.)**
Business Strategy in an Electronic Age: The Value Chain System, Competitive Advantage, Business Strategy, Introduction to Stock-Keeping Unit (SK).	
Unit III	(**6** Hrs.)
Business to Business Electronic Commerce: Inter-organisational Transactions, Electronic Markets, Electronic Data Interchange, EDI: EDI Technology, EDI Standards, EDI, Communication, EDI Implementation, EDI Security, EDI and Business, Inter-organisational e-Commerce.	
Unit IV	**(5 Hrs.)**
Business to Consumer Electronic Commerce: Consumer Trade transactions, What you want, when you want it, internet e-commerce, Internet Shopping and the Trade cycle, Advantage and Disadvantage of Consumer e-commerce.	
Unit V	**(6 Hrs.)**
The Elements of e-Commerce & e-Business: Elements, e-Visibility, The e-shop, Online Payments, Delivering the Goods, After-Sales Service. e-Business: Introduction, Internet Bookshops, Software Supplies and support, Electronic Newspapers, Internet Banking, Virtual Auctions, Online Share Dealing, Gambling on the Net.	
Unit VI	**(5 Hrs.)**
Security Threats to E-Commerce, Electronic Payment Systems (EPS).	
Total Lecture	**34 Hours**

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Textbooks:	
1.	E-Commerce, David Whiteley, McGrew Hill Pub
2.	Electronic Commerce, Gary P. Schneider & James T. Perry, Course Technology

Reference Books:	
1.	E-commerce An Indian Perspective by P. T. Joseph Publisher: PHI Learning.

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MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=xKJjyn8DaAw
2.	https://www.youtube.com/watch?v=8mNy6HyTV5E

VII SEMESTER

22IT745 : PE V: Advanced Computer Architecture

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

Unit I	**(10 Hrs.)**
Introduction to parallel processing : memories and IO subsystem : Evolution of computer system, parallelism in uniprocessor system, parallel computer structure, architecture classification schemes, parallel processing application, Hierarchical memory structure, virtual memory system, memory allocation and , management, I/O subsystem.	
Unit II	**(8 Hrs.)**
Pipelining and vector processing : Pipeline, overlapped pipelining, instruction and arithmetic pipelining, pipelined processor, vector processing, vector processor, architecture of cray-1, parallel memory organization	
Unit III	(**8** Hrs.)
Array Processor : SIMD array processor, (organization and inter connection networks), Parallel algorithms for array processor, SIMD matrix multiplication, parallel sorting on array processor, associative array processing, associative memory organization associative processors.	
Unit IV	**(8 Hrs.)**
SIMD Computer and Multiprocessor Architecture : III IAC-IV System architecture and its applications, performance enhancement methods, parallel memory allocation, array processing, languages, multiprocessors, loosely and tightly coupled multiprocessor, time shared and crossbar interconnection networks, parallel memory organization, interleaved memory configuration.	
Unit V	**(8 Hrs.)**
Multiprocessing control and Data Flow Computers: Intercrosses communication mechanisms system deadlocks and protection parallel algorithms for multiprocessors, classifications of parallel algorithms data driven computing, data flow computer architecture.	
Unit VI	**(5 Hrs.)**
Techniques for Extraction of parallelism.	
Total Lecture	**47 Hours**

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

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

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MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=4TzMyXmzL8M
2.	https://www.youtube.com/watch?v=msqxkEKFg8I

VII SEMESTER

22IT761 : PE VI- Wireless Sensor Network

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

Unit I:	**(9 Hrs.)**
OVERVIEW OF WIRELESS SENSOR NETWORKS : SingleNode Architecture Hardware Components Network Characteristics unique constraints and challenges, Enabling Technologies for Wireless Sensor Networks Types of wireless sensor networks.	
Unit II	**(6 Hrs.)**
ARCHITECTURES: Network Architecture Sensor NetworksScenarios Design Principle, Physical Layer and Transceiver Design Considerations, Optimization Goals and Figures of Merit, Gateway Concepts, Operating Systems and Execution Environments introduction to Tiny OS and nesC Internet to WSN Communication.	
Unit III	**(8 Hrs.)**
NETWORKING SENSORS : MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts – SMAC, BMAC Protocol, IEEE 802.15.4 standard and ZigBee, the Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols EnergyEfficient Routing, Geographic Routing.	
Unit IV	**(6 Hrs.)**
INFRASTRUCTURE ESTABLISHMENT : Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control	
Unit V	**(6 Hrs.)**
SENSOR NETWORK PLATFORMS AND TOOLS : Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node level software platforms, Node level Simulators, State centric programming.	
Unit VI	**(8 Hrs.)**
Naming and addressing : Fundamentals, address and name management, Assignment of MAC address,Distributed assignment of locally unique addresses, content based and geographic addressing. Naming and addressing :Fundamentals, address and name management, Assignment of MAC address, Distributed assignment of locally unique addresses, content based and geographic addressing.	
Total Lecture	**41 Hours**

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

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

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

VII SEMESTER

22IT762 : PE VI: Natural Language Processing

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

Unit I	**(6 Hrs.)**
Introduction: What is Natural Language Processing, Brief history of the NLP, Applications of NLP, Challenges for NLP, introduction to word tokenization, sentence segmentation, stemming, word normalization.	
Unit II	**(6 Hrs.)**
Language Models: The role of language models. Simple N-gram models. Estimating parameters and smoothing. Evaluating language models.	
Unit III	(**6** Hrs.)
Part Of Speech Tagging and Sequence Labeling: Lexical syntax. Hidden Markov Models.	
Unit IV	**(5 Hrs.)**
Word sense Disambiguation: Supervised and unsupervised methods.	
Unit V	**(6 Hrs.)**
NLP and Information retrieval and ranked information retrieval, word net and other corpus for NLP.	
Unit VI	**(5 Hrs.)**
Machine translation and automatic text summarization.	
Total Lecture	**34 Hours**

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

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

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

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

VII SEMESTER

22IT763 : PE VI: Computer Vision

Course Outcomes
Upon successful completion of the course the students will be able to 1. Learn fundamentals of computer vision and its applications 2. Understand the basic image processing operations to enhance, segment the images. 3. Understand the analyzing and extraction of relevant features of the concerned domain problem. 4. Understand and apply the motion concepts and its relevance in real time applications

Unit I	**7hrs**
Overview of computer vision and its applications: Image Formation and,Representation: Imaging geometry, radiometry, digitization, cameras and Projections, rigid and affine transformation	
Unit II	**7hrs**
Image Processing: Pixel transforms, color transforms, histogram processing, histogram equalization, filtering, convolution, Fourier transformation and its,applications in sharpening, blurring and noise removal	
Unit III	**6hrs**
Feature detection: edge detection, corner detection, line and curve detection, active,contours, SIFT and HOG descriptors, shape context descriptors, Morphological operations	
Unit IV	**6hrs**
Segmentation: Active contours, split & merge, watershed, region splitting, region merging, graph-based segmentation, mean shift and model finding, Normalized cut.	
Unit V	**6hrs**
Camera calibration: camera models; intrinsic and extrinsic parameters; radial lens distortion; direct parameter calibration; camera parameters from projection matrices; orthographic, weak perspective, affine, and perspective camera models.	
Unit VI	**7 hrs**
Motion representation: the motion field of rigid objects; motion parallax; optical,flow, the image brightness constancy equation, affine flow; differential techniques; feature-based techniques; regularization and robust estimation, Motion tracking	
Total	**40Hrs**

Textbooks:	
1.	A. K. Jain, Fundamentals of Digital Image processing, Pearson Education, 2009.
2.	D. A. Forsyth and J. Ponce, Computer Vision, A Modern Approach, Pearson Education, 2003.

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Reference Books:	
1.	R. O. Duda and P. E. Hart, Pattern Classification and Scene Analysis, John Wiley, 2006.

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

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=6ul8uChKMBc

VII SEMESTER

22IT764 : PE VI- Distributed Systems

Course Outcomes :

Upon successful completion of the course the students will be

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

Unit I	**(6 Hrs.)**
Architecture of Distributed Systems: Characteristics of Distributed System, Motivation, challenges /Issues in the design & development of Distributed System. System Models: Architecture Model, System Architecture, Types of Architectural Model: Client server model, Search engine,Proxy server & caches, Variation on client server model: mobile code, mobile agents. Fundamental Models: Interaction model, failure model, Security model.	
Unit II	**(6 Hrs.)**
Distributed Objects & Distributed file system :Inter-process communication, Sockets, middle ware, Group communication, and Remote procedure calls. CORBA, RMI, Distributed file system, Name services, Directory services, File Service types, download/upload model, File sharing semantics, session semantics, Server design: stateless & stateful server, Cache update policies. Case studies on Distributed file system: NFS, AFS.	
Unit III	**(6 Hrs.)**
Theoretical Foundations:Inherent limitations of distributed systems, Timing issues, clock synchronization, Network time protocol, Lamport's logical clocks, Vector clocks, Casual ordering of messages, Global state, Cuts of Distributed computation, Termination detection.	
Unit IV	**(8 Hrs.)**
Distributed Mutual Exclusion:Leader election: Chang Robert Ring based leader election algorithm, Bully algorithm.Classification of mutual exclusion algorithms, Requirements and performance measures of mutual exclusion algorithms, Non Token Based Algorithms: Lamport's Algorithm, The Ricart-Agrawala Algorithm, Maekawa's Algorithm.Token Based Algorithms: Suzuki-Kasami's Algorithm, Raymond's Algorithm, Comparative performance analysis	
Unit V	**(8 Hrs.)**
Distributed Deadlock Detection & Agreement Protocols:Resource vs Communication deadlocks, graph theoretic model, deadlock prevention, avoidance, detection, Issues in deadlock detection and resolution, Centralized deadlock detection algorithms, distributed deadlock detection algorithms Agreement Protocols:Synchronous vs. asynchronous computations, model of process failures, authenticated vs. non-authenticated messages. A classification of Agreement problems, Solutions to Byzantine Agreement problem, Applicatons of Agreement algorithms.	

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Unit VI	(7 Hrs.)
Failure recovery and Fault Tolerance:Classification of failures. Backward and forward error recovery, Basic approaches of backward error recovery, recovery in concurrent systems, consistent set of checkpoints, synchronous check pointing and recovery, asynchronous check pointing and recovery. Fault Tolerance: Atomic actions and committing, commit protocols, non-blocking commit protocols, Voting protocols, Dynamic voting protocols, Dynamic Vote Reassignment Protocols.	
Total Lecture	**41 Hours**

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

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

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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.digimat.in/nptel/courses/video/106104182/L01.html
2.	https://archive.nptel.ac.in/courses/106/102/106102237/

VII SEMESTER
22IT765: PE:VI 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

VIII- Semester

22IT801: 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

22IT802- 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.