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 Electronics Engineering)

B. Tech in Electronics Engineering

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

SoE No. 22EE-101

B.TECH SCHEME OF EXAMINATION 2022

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

(Department of Electronics Engineering)

B. Tech in Electronics Engineering

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	22EE101	Differential Equation, Complex Variables & Matrices	T	3	1	0	4	4	30	20	50	3 Hrs
2	1	BS	GE/PHY	22EE102	Engineering Physics	T	3	0	0	3	3	30	20	50	3 Hrs
3	1	BS	GE/PHY	22EE103	Lab: Engineering Physics	P	0	0	2	2	1		60	40	
4	1	HS	GE/HUM	22EE104	Social Science	T	3	0	0	3	3	30	20	50	3 Hrs
5	1	BES	ME/ME	22EE105	Engineering Graphics	T	1	0	0	1	1	30	20	50	3 Hrs
6	1	BES	ME/ME	22EE106	Lab: Engineering Graphics	P	0	0	4	4	2		60	40	
7	1	BES	CT/CT	22EE107	Elements of AIML	T	3	0	0	3	3	30	20	50	3 Hrs
8	1	BES	EL/EL	22EE108	Electrical workshop	P	0	0	2	2	1		60	40	
9	1	BES	EE/EE	22EE109	Digital Logic Design	T	3	0	0	3	3	30	20	50	3 Hrs
10	1	BES	EE/EE	22EE110	Lab: Digital Logic Design	P	0	0	2	2	1		60	40	
						TOTAL	**16**	**1**	**10**	**27**	**22**				
List of Mandatory Learning Course (MLC)															
1	1	HS	GE/T&P	MLC2121	YCAP1-Get Set Go	**A**	2	0	0	2	0				
2	1	BES	GE/CHE	GE2132	Environmental Science	**A**	2	0	0	2	0				

SECOND SEMESTER															
1	2	BS	GE/MTH	22EE201	Differential & Integral Calculus	T	3	1	0	4	4	30	20	50	3 Hrs
2	2	BS	GE/CHE	22EE202	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3 Hrs
3	2	BS	GE/CHE	22EE203	Lab: Engineering Chemistry	P	0	0	2	2	1		60	40	
4	2	HS	GE/HUM	22EE204	Professional Communication	T	3	0	0	3	3	30	20	50	3 Hrs
5	2	BES	CV/CV	22EE205	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3 Hrs
6	2	BES	CV/CV	22EE206	Lab: Engineering Mechanics	P	0	0	2	2	1		60	40	
7	2	BES	EE/EE	22EE207	Basic Electrical and Electronics Engineering	T	3	0	0	3	3	30	20	50	3 Hrs
8	2	BES	IT/IT	22EE208	Programming for Problem Solving	T	3	0	0	3	3	30	20	50	3 Hrs
9	2	BES	IT/IT	22EE209	**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	2	HS	GE/HUM	GE2131	Universal Human Value	**A**	2	0	0	2	0				
2	2	HS	GE/T&P	MLC2122	YCAP2 -Functional English	**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 Electronics Engineering)

B. Tech in Electronics Engineering

SoE No. 22EE-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	EE/EE	22EE301	Signal and Systems	T	3	0	0	3	3	30	20	50	3 Hrs
2	3	HS	GE/HUM	22EE302	Fundamentals of Management and Economics	T	3	0	0	3	3	30	20	50	3 Hrs
3	3	PC	EE/EE	22EE303	Electronic Devices and Circuits	T	3	1	0	3	3	30	20	50	3 Hrs
4	3	PC	EE/EE	22EE304	**Lab:**Electronic Devices and Circuits	P	0	0	2	2	1		60	40	
5	3	PC	EE/EE	22EE305	Microprocessor and Interfacing	T	3	0	0	3	3	30	20	50	3 Hrs
6	3	PC	EE/EE	22EE306	**Lab:**Microprocessor and Interfacing	P	0	0	2	2	1		60	40	
7	3	PC	EE/EE	22EE307	Network Analysis	T	3	0	0	2	3	30	20	50	3 Hrs
8	3	PC	EE/EE	22EE308	**Lab:**Network Analysis	P	0	0	2	2	1		60	40	
9	3	PC	EE/EE	22EE309	Switching Theory and Finite Automata	T	3	0	0	2	3	30	20	50	3 Hrs
10	3	PC	EE/EE	22EE310	**Lab:** Programming Language	P	0	0	2	2	1		60	40	
					TOTAL THIRD SEM		**18**	**1**	**8**	**24**	**22**				
List of Mandatory Learning Course (MLC)															
1	3	HS	T&P	MLC2123	YCCE Communication Aptitude Preparation (YCAP3)	A	3	0	0	3	0				
2	3	BES	EE	MLC107	Basics of MATLAB	A	2	0	0	2	0				
Fourth Semester															
1	4	BS	GE/HUM	22EE401	Probability and Statistical Theory	T	3	0	0	3	3	30	20	50	3 Hrs
2	4	PC	EE/EE	22EE402	Digital System Modelling	T	3	0	0	3	3	30	20	50	3 Hrs
3	4	PC	EE/EE	22EE403	Microcontroller and its Applications	T	3	0	0	3	3	30	20	50	3 Hrs
4	4	PC	EE/EE	22EE404	**Lab:** Microcontroller and its Applications	P	0	0	2	2	1		60	40	
5	4	PC	EE/EE	22EE405	Algorithm and Data Structure	T	3	0	0	3	3	30	20	50	3 Hrs
6	4	PC	EE/EE	22EE406	**Lab**: Algorithm and Data Structure	P	0	0	2	2	1		60	40	
7	4	PC	EE/EE	22EE407	Digital CMOS Circuits	T	3	0	0	3	3	30	20	50	3 Hrs
8	4	PC	EE/EE	22EE408	**Lab**:Digital CMOS Circuits	P	0	0	2	2	1		60	40	
9	4	PC	EE/EE	22EE409	Electromagnetic Fields	T	3	1	0	3	3	30	20	50	3 Hrs
10	4	PC	EE/EE	22EE410	**Lab**: Electronics Workshop	P	0	0	2	2	1		60	40	
11	4	PC	CV/EE	22EE411	Environmental Sustainability, Pollution and Management	T	3	0	0	3	3	30	20	50	3 Hrs
					TOTAL FOURTH SEM		**21**	**1**	**8**	**29**	**25**				
List of Mandatory Learning Course (MLC)															
1	4	HS	T&P	MLC2124	YCCE Communication Aptitude Preparation (YCAP4)	A	3	0	0	3	0				
2	4	BES	EE	MLC108	Basics of Arduino Programmimg	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

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SoE No. 22EE-101

B.TECH SCHEME OF EXAMINATION 2022

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

(Department of Electronics Engineering)

B. Tech in Electronics Engineering

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	EE	22EE501	Analog Communication	T	3	0	0	3	3	30	20	50	3 Hrs
2	5	PC	EE	22EE502	**Lab:** Analog Communication	P	0	0	2	2	1		60	40	
3	5	PC	EE	22EE503	Embedded System	T	3	0	0	3	3	30	20	50	3 Hrs
4	5	PC	EE	22EE504	**Lab:** Embedded System	P	0	0	2	2	1		60	40	
5	5	PC	EE	22EE505	Analog Integrated Circuits & Design	T	3	0	0	3	3	30	20	50	3 Hrs
6	5	PC	EE	22EE506	**Lab:** Analog Integrated Circuits & Design	T	0	0	2	2	1	30	20	50	3 Hrs
7	5	PE	EE		**Professional Elective-I**	T	3	0	0	3	3	30	20	50	3 Hrs
8	5	PE	EE		**Lab.**: Professional Elective-I	P	0	0	2	2	1		60	40	
9	5	STR	EE	22EE507	Industrial training, Seminar & Report	P	0	0	2	2	1		60	40	
10	5	OE-I	EE		**Open Elective - I**	T	3	0	0	3	3	30	20	50	3 Hrs
11	5	OE-II	EE		**Open Elective - II**	T	3	0	0	3	3	30	20	50	3 Hrs
TOTAL FOURTH SEM							**18**	**0**	**10**	**28**	**23**				

List of Professional Electives-I *

1	5	PE-I	EE	22EE511	PE-I:Operating System
2	5	PE-I	EE	22EE512	PE-I: **Lab:** Operating System
3	5	PE-I	EE	22EE513	PE-I: Object Oriented Programming
4	5	PE-I	EE	22EE514	PE-I: **Lab:** Object Oriented Programming
5	5	PE-I	EE	22EE515	PE-I: Computer Communication Networks
6	5	PE-I	EE	22EE516	PE-I: **Lab:** Computer Communication Networks
7	5	PE-I	EE	22EE517	PE-I: Analog VLSI Design
8	5	PE-I	EE	22EE518	PE-I: **Lab:** Analog VLSI Design

Open Elective-I

1	5	OE-I	EE	22EE531	OE I : Fuzzy Logic & Neural Networks
2	5	OE-I	EE	22EE532	OE I : Basics of Analog and Digital
3	5	OE-I	EE	22EE533	OE I : Biomedical Instrumentation
4	5	OE-I	EE	22EE534	OE I : Digital Logic Design

Open Elective-II

1	5	OE-II	EE	22EE551	OE II : Sensors and Actuators
2	5	OE-II	EE	22EE552	OE II : Computer Architecture
3	5	OE-II	EE	22EE553	OE II : Consumer Electronics
4	5	OE-II	EE	22EE554	OE II : Industrial Automation

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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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

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

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SoE No. 22EE-101

B.TECH SCHEME OF EXAMINATION 2022

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

(Department of Electronics Engineering)

B. Tech in Electronics Engineering

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	EE	22EE701	Digital Communication	**T**	3	0	0	3	3	30	20	50	3 Hrs
2	7	PC	EE	22EE702	**Lab:** Digital Communication	**P**	0	0	2	2	1		60	40	
3	7	PC	EE	22EE703	Internet of Things	**T**	3	0	0	3	3	30	20	50	3 Hrs
4	7	PC	EE	22EE704	**Lab:** Internet of Things	**P**	0	0	2	2	1		60	40	
5	7	PE	EE		**Professional Elective-IV**	**T**	3	0	0	3	3	30	20	50	3 Hrs
6	7	PE	EE		**Professional Elective-V**	**T**	3	0	0	3	3	30	20	50	3 Hrs
7	7	PE	EE		**Professional Elective-VI**	**T**	3	0	0	3	3	30	20	50	3 Hrs
8	7	STR	EE	22EE705	Project Phase-II	**P**	0	0	10	10	5		60	40	
9	7	STR	EE	22EE706	Campus Recruitment Training (CRT)	**P**	0	0	0	0	2		100		
					TOTAL SEVENTH SEM		**15**	**0**	**14**	**29**	**24**				

List of Professional Electives-IV,V & VI

Professional Electives -IV

1	7	PE-IV	EE	22EE721	PE IV: Introduction to remote sensing and Image Analysis
2	7	PE-IV	EE	22EE722	PE IV: Wireless Sensor Networks
3	7	PE-IV	EE	22EE723	PE IV: System on Chip Design
3	7	PE-IV	EE	22EE724	PE IV: Deep learning

Professional Electives -V

1	7	PE-V	EE	22EE741	PE V: Biomedical Engineering
2	7	PE-V	EE	22EE742	PE V: Wireless Communication
3	7	PE-V	EE	22EE743	PE V: Cryptography and Network Security
4	7	PE-V	EE	22EE744	PE V: Nano Electronics
5	7	PE-V	EE	22EE745	PE V: VLSI Signal Processing

Professional Electives -VI

1	7	PE-VI	EE	22EE761	PE-VI: Design Verification and Test of Digital VLSI Circuits
2	7	PE-V	EE	22EE762	PE-VI: Micro Electro Mechanical Systems (MEMS)
3	7	PE-V	EE	22EE763	PE-VI: Mechatronics
4	7	PE-V	EE	22EE764	PE-VI: Computer Vision

Eighth Semester															
1	**8**	**STR**	EE	22EE801	Industrial Internship	**P**	0	0	12	12	3		60	40	
2	**8**	**STR**	EE	22EE802	Extra Curricular Activity Evaluation	**P**	0	0	0	0	2		100		
					TOTAL EIGHTH SEM		**0**	**0**	**12**	**12**	**5**				
GRAND TOTAL							**124**	**4**	**78**	**204**	**166**				

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
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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B.TECH SCHEME OF EXAMINATION 2022

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(Department of Electronics Engineering)

B. Tech in Electronics Engineering

SoE No. 22EE-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	EE	22EE601	Control System Engineering	**T**	3	0	0	3	3	30	20	50	3 Hrs
2	6	PC	EE	22EE602	Digital Signal Processing	**T**	3	0	0	3	3	30	20	50	3 Hrs
3	6	PC	EE	22EE603	**Lab:** Digital Signal Processing	P	0	0	2	2	1		60	40	
4	6	PC	EE	22EE604	**Lab:** Electronics Design Automation	P	0	0	2	2	1		60	40	
5	6	PE	EE		**Professional Elective-II**	**T**	0	0	2	2	3	30	20	50	3 Hrs
6	6	PE	EE		**Lab.: Professional Elective-II**	P	3	0	0	3	1		60	40	
7	6	PE	EE		**Professional Elective-III**	**T**	3	0	0	3	3	30	20	50	3 Hrs
8	6	OE-III	EE		**Open Elective - III**	**T**	3	0	0	3	3	30	20	50	3 Hrs
9	6	OE-IV	EE		**Open Elective - IV**	**T**	3	0	0	3	3	30	20	50	3 Hrs
10	6	PR	EE	22EE605	Project Phase -I	P	0	0	4	4	2		60	40	
					TOTAL SIXTH SEM		**18**	**0**	**10**	**28**	**23**				

List of Professional Electives- II & III

Professional Electives-II

1	6	PE-II	EE	22EE611	PE II:Digital Image Processing
2	6	PE-II	EE	22EE612	**Lab:** PE II: Digital Image Processing
3	6	PE-II	EE	22EE613	PE II:Machine Learning
4	6	PE-II	EE	22EE614	**Lab:** PE II: Machine Learning
5	6	PE-II	EE	22EE615	CMOS Subsystem Design
6	6	PE-II	EE	22EE616	**Lab:**CMOS Subsystem Design
7	6	PE-II	EE	22EE617	PE II: Soft Computing & OptimizationTechniques
8	6	PE-II	EE	22EE618	**Lab**:PE II: Soft Computing & Optimization Techniques
9	6	PE-II	EE	22EE619	PE II: RF and Microwave
10	6	PE-II	EE	22EE620	**Lab:** PE II: RF and Microwave

Professional Electives-III

1	6	PE-III	EE	22EE631	PE III: Industrial Automation
2	6	PE-III	EE	22EE632	PE III :Power Electronics
3	6	PE-III	EE	22EE633	PE III: Optical Communication
4	6	PE-III	EE	22EE634	PE III: Computer Orgnization
5	6	PE-III	EE	22EE635	PE III:Transmission line and wave Guide

Open Electives-III

1	6	OE-III	EE	22EE651	OE III : Fuzzy Logic & Neural Networks
2	6	OE-III	EE	22EE652	OE III : Basics of Analog and Digital Communication
3	6	OE-III	EE	22EE653	OE III : Biomedical Instrumentation
4	6	OE-III	EE	22EE654	OE III : Digital Logic Design

Open Electives-IV

1	6	OE-IV	EE	22EE671	OE IV : Sensors and Actuators
2	6	OE-IV	EE	22EE672	OE IV : Computer Architecture
3	6	OE-IV	EE	22EE673	OE IV : Consumer Electronics
4	6	OE-IV	EE	22EE674	OE IV : Industrial Automation

List of Mandatory Learning Course (MLC)

1	6	HS		MLC2126	YCCE Communication Aptitude Preparation (YCAP6)		**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**

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

Applicable for AY 2022-23 Onwards

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

Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2022

1st Semester

(Department of Electronics Engineering)

B. Tech in Electronics Engineering

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 Electronics Engineering)

B. Tech in Electronics Engineering

SoE No. 22EE-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	22EE101	Differential Equation, Complex Variables & Matrices	T	3	1	0	4	4	30	20	50	3 Hrs
2	1	BS	GE/PHY	22EE102	Engineering Physics	T	3	0	0	3	3	30	20	50	3 Hrs
3	1	BS	GE/PHY	22EE103	Lab: Engineering Physics	P	0	0	2	2	1		60	40	
4	1	HS	GE/HUM	22EE104	Social Science	T	3	0	0	3	3	30	20	50	3 Hrs
5	1	BES	ME/ME	22EE105	Engineering Graphics	T	1	0	0	1	1	30	20	50	3 Hrs
6	1	BES	ME/ME	22EE106	Lab: Engineering Graphics	P	0	0	4	4	2		60	40	
7	1	BES	CT/CT	22EE107	Elements of AIML	T	3	0	0	3	3	30	20	50	3 Hrs
8	1	BES	EL/EL	22EE108	Electrical workshop	P	0	0	2	2	1		60	40	
9	1	BES	EE/EE	22EE109	Digital Logic Design	T	3	0	0	3	3	30	20	50	3 Hrs
10	1	BES	EE/EE	22EE110	Lab: Digital Logic Design	P	0	0	2	2	1		60	40	
						TOTAL	**16**	**1**	**10**	**27**	**22**				
List of Mandetory Learning Course (MLC)															
1	1	HS	GE/T&P	MLC2121	YCAP1-Get Set Go	**A**	2	0	0	2	0				
2	1	BES	GE/CHE	GE2132	Environmental Science	**A**	2	0	0	2	0				

SECOND SEMESTER															
1	2	BS	GE/MTH	22EE201	Differential & Integral Calculus	T	3	1	0	4	4	30	20	50	3 Hrs
2	2	BS	GE/CHE	22EE202	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3 Hrs
3	2	BS	GE/CHE	22EE203	Lab: Engineering Chemistry	P	0	0	2	2	1		60	40	
4	2	HS	GE/HUM	22EE204	Professional Communication	T	3	0	0	3	3	30	20	50	3 Hrs
5	2	BES	CV/CV	22EE205	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3 Hrs
6	2	BES	CV/CV	22EE206	Lab: Engineering Mechanics	P	0	0	2	2	1		60	40	
7	2	BES	EE/EE	22EE207	Basic Electrical and Electronics Engineering	T	3	0	0	3	3	30	20	50	3 Hrs
8	2	BES	IT/IT	22EE208	Programming for Problem Solving	T	3	0	0	3	3	30	20	50	3 Hrs
9	2	BES	IT/IT	22EE209	**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	2	HS	GE/HUM	GE2131	Universal Human Value	**A**	2	0	0	2	0				
2	2	HS	GE/T&P	MLC2122	YCAP2 -Functional English	**A**	2	0	0	2	0				

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

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

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

		June 2022	1.00	Applicable for AY 2022-23 Onwards
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I SEMESTER

22EE101: Differential Equation, Complex Variables & Matrices

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. Determine the various functions of complex numbers. 3. Evaluate the integration of function of complex variables. 4. Use Matrix method to solve system of linear equations, evaluate eigen values - eigen vectors and its applications.

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: Matrices	**(6 Hrs.)**
Rank of a matrix,Consistency of system of equations using rank, Characteristics equations, Eigen values and Eigen vectors, Cayley Hamilton Theorem (without proof) statement and verification, Sylvester's theorem- statement and its application. **(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, 42th edition, Khanna Publishers.
5.	P.N.Wartikar and J.N.Wartikar, Applied Mathematics, 4th Edition, Vidyarthi GrihaPrakashan.

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

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

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

I SEMESTER

22EE102: 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. Assess the characteristics of semiconductor materials in terms of crystal structures, charge carriers and energy bands.
3. Examine the intensity variation of light due to interference, diffraction, laser and its applications.
4. Analyze the motion of charged particle in electric and magnetic field and its applications to electron optic devices.
5. Illustrate the nature and characterization of magnetic materials and superconductors for engineering applications.

Unit I: Quantum Physics	**(7 Hrs.)**
Wave-particle duality, de-Broglie hypothesis, Wavepacket, Heisenberg uncertainty principle: Significance, Applications. Wavefunction and its probability interpretation, Schrodinger Equation, Particle in infinite potential well, quantum tunnelling. **(Contemporary Issues related to Topic)**	
Unit II: Band Theory of Solids	**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, Fermi function, Fermi level in intrinsic and extrinsic semiconductors, Dependence of Fermi level on impurity concentration and temperature, Hall effect. **(Contemporary Issues related to Topic)**	
Unit III: Geometrical Optics	**(7 Hrs.)**
Interference: Interference in thin films, Wedge shaped film, Newton's rings, Applications of interference Diffraction: Fraunhofer diffraction from a single slit. **(Contemporary Issues related to Topic)**	
Unit IV: Laser	**(6 Hrs.)**
Interaction of radiation with matter/ quantum processes, Population Inversion and Optical resonance cavity, Three and four level laser, Ruby laser, Semiconductor diode laser, Properties and engineering applications of laser. **(Contemporary Issues related to Topic)**	
Unit V: Electron Ballistics	**(7 Hrs.)**
Motion of a charged particle in uniform electric and magnetic field, Cross field configuration; Electron refraction, Electron lens, CRO and its applications. **(Contemporary Issues related to Topic)**	
Unit VI: Magnetic Materials & Superconductors	**(6 Hrs.)**
Introduction to magnetic materials, interpretation of Hysteresis curves, Superconductors: Type-I and Type-II, Meissner effect, Applications. **(Contemporary Issues related to Topic)**	
Total Lecture	**40 Hours**

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

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

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

MOOCs Links and additional reading, learning, video material	
1.	https://youtu.be/jaXiOXnJd8s
2.	https://youtu.be/v2zpSFEdvZo
3.	https://youtu.be/tjUUU9f2Wpc
4.	https://youtu.be/qcE2Wcpm05k

I SEMESTER

22EE103: 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. Assess the characteristics of semiconductor materials in terms of crystal structures, charge carriers and energy bands. 3. Examine the intensity variation of light due to interference, diffraction, laser and its applications. 4. Analyze the motion of charged particle in electric and magnetic field and its applications to electron optic devices. 5. Illustrate the nature and characterization of magnetic materials and superconductors for engineering 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	Determination of Band gap in a semiconductor by four probe method.
6	Determination of Band gap in a semiconductor using reverse biased p-n diode.
7	Determination of radius of curvature of Plano convex lens using Newton's rings.
8	Determination of thickness of thin paper using air wedge.
9	Determination of wavelength of sodium light using diffraction grating
10	Determination of wavelength of laser using diffraction grating.
11	Determination of divergence of laser beam.
12.	Determination of amplitude and frequency of sinusoidal signal using C.R.O.
13.	To measure the phase shift introduced by a phase shift network using Dual beam CRO.

I SEMESTER

22EE104: 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

I SEMESTER

22EE105: 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

I SEMESTER

22EE106 : 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**

I SEMESTER
22EE107: 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 John Wiley & Sons ,"Artificial Intelligence for Dummies" First, 2018
2.	Steven W. Knox,Wiley" Machine Learning A Concise Introduction" First, 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

I SEMESTER
22EE108: Electrical workshop

Course Outcomes:
Upon successful completion of the course the students will be able
1. To choose the electrical and electronics components/equipment for various application
2. To select various sensors and measuring instruments for different applications.
3. To build the various electrical wiring for different application

Sr. No.	Experiments based on
1	Introduction of Tools, Electrical Materials and Electrical Drawing Symbols
2	Introduction to basic Electrical Components (R,L,C) with its number and color coding.
3	Introduction to Different types of Measuring Instruments and its demonstration.
4	One Lamp Controlled by One Switch and Distribution Board Connection
5	Staircase Wiring, Hospital Wiring and Godown Wiring
6	Master Switch Control Wiring and Intermediate Switch Wiring
7	Design of House Wiring
8	Introduction to Different sensor devices and its demonstration.
9	To Study different protection devices and Importance of Earthing.
10	To Study Circuit and Working of Home Inverter, UPS.

I SEMESTER

22EE109: Digital Logic Design

Course Outcomes:
Upon successful completion of the course the students will be able to 1. Apply the laws of Boolean algebrato simplify logical equations and combination logic circuits. 2. Understand and demonstrate the various codes and illustrate their addition substraction. 3. Solve logical functions using K- map to implement combinational logic circuits. 4. Design and analyze Synchronous and Asynchronous sequential Circuits.

Unit:1	**Number system and codes**	**7 Hours**
Binary, Octal, hexadecimal and decimal Number systems andtheir inter conversion, BCD numbers (8421-2421), Gray code, ASCII codes. Binary addition and subtraction, signed and unsigned binary numbers, 1's and 2'scomplement representation. **(Contemporary Issues related to Topic)**		
Unit:2	**Boolean Algebra**	**7 Hours**
Basic logic circuits: Logic gates(AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR and their truth tables),Universal Gates, Laws of Boolean algebra, De-Morgan's theorem. **(Contemporary Issues related to Topic)**		
Unit:3	**Minimization Techniques**	**7 Hours**
Minterm, Maxterm, POS, SOP, K-Map, Simplification by Boolean theorems, don't care condition. **(Contemporary Issues related to Topic)**		
Unit:4	**Combinational Logic**	**7 Hours**
Half adder, Full adder, Subtractor circuit. Multiplxer demultiplexer, decorder, BCD to seven segment Decoder, encoders, code converters. **(Contemporary Issues related to Topic)**		
Unit:5	**Sequential Circuits**	**7 Hours**
Flipflop, set-reset laches, R-S flip-flop, D-flipflop, J-KFlip-flop, Master slave Flipflop, T flip-flop, excitation table of flip-flops. Flip-Flop to flip-flop conversion **(Contemporary Issues related to Topic)**		
Unit :6	**Registers & Counters**	**7 Hours**
Serial in/Serial out shift register, Serial in/parallel out shift register, parallel in/parallel out shift register, parallel in/Serial out shift register, Bi-directional register, Synchronous/Asynchronous counter: Ring Counter, Ripple Counter Johnson's Counter operation,Up/downsynchronous counter, application of counter. **(Contemporary Issues related to Topic)**		
Total Lecture Hours		**42 Hours**

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Textbooks	
1	Modern Digital Electronics , RP Jain, Tata McGraw Hill, 3rd Edition
2	M. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd., 2003 Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
3	Donald P.Leach and Albert Paul Malvino, Digital Principles and Applications, 6thEdition, TMH, 2003.
4	Anandkumar- fundamental of digital circuit. 3rd edition. PHI
Reference Books	
1	Fundamentals of Logic Design, C.H.Roth, Public Work & Services, 3rd edition 2007.
2	Engg Approach to Digital Design, Fletcher, Prentice Hall of India 1993.
3	Digital Circuits & Microprocessors, Hebert Taub, Mc Graw Hill, 1988.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
1	https://www.digimat.in/nptel/courses/video/108105132/L01.html
2	https://www.digimat.in/nptel/courses/video/108105113/L01.html
3	https://www.coursera.org/learn/digital-systems

I SEMESTER

22EE110: Lab: Digital Logic Design

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Apply the laws of Boolean algebra to simplify logical equations and combination logic circuits.
2. Understand and demonstrate the various codes and illustrate their addition substraction.
3. Design and exhibit the methods to solve logical functions using K- map to implement combinational logic circuits.
4. Design and analyze Synchronous and Asynchronous sequential Circuits.

Sr. No.	Experiments based on
1	Basic logic circuits: Logic gates verification using kit.
2	Introduction to Bread Board and Verify Truth Tables of basic Logic gates using BreadBoard.
3	Construction of half/full adder using XOR and NAND gates and verification of its operation.
4	Verify Binary to Gray and Gray to Binary conversion using NAND gates only.
5	Implementation of 4x1 multiplexer and 1x4 demultiplexer using logic gates.
6	Verify the truth table of D-flip-flops and JK- flip-flops.
7	Design and verify the 4-Bit Synchronous Counter.
8	Introduction to SPICE Digital model and commands. Verify Truth Tables of basic Logic gates & Universal Gates using **using SPICE.**
9	Design & verify Truth Table of Half adder & Full adder circuits **Logic simulator.**
10	Design & verify Truth Table of 4:1 Multiplexer & 1:4 Demultiplexer circuits **using SPICE.**

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

I SEMESTER
Audit Course
GE2132: Environmental Science

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

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

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

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

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

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

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

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

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

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 Electronics Engineering)

B. Tech in Electronics Engineering

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 Electronics Engineering)

B. Tech in Electronics Engineering

SoE No. 22EE-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	22EE101	Differential Equation, Complex Variables & Matrices	T	3	1	0	4	4	30	20	50	3 Hrs
2	1	BS	GE/PHY	22EE102	Engineering Physics	T	3	0	0	3	3	30	20	50	3 Hrs
3	1	BS	GE/PHY	22EE103	Lab: Engineering Physics	P	0	0	2	2	1		60	40	
4	1	HS	GE/HUM	22EE104	Social Science	T	3	0	0	3	3	30	20	50	3 Hrs
5	1	BES	ME/ME	22EE105	Engineering Graphics	T	1	0	0	1	1	30	20	50	3 Hrs
6	1	BES	ME/ME	22EE106	Lab: Engineering Graphics	P	0	0	4	4	2		60	40	
7	1	BES	CT/CT	22EE107	Elements of AIML	T	3	0	0	3	3	30	20	50	3 Hrs
8	1	BES	EL/EL	22EE108	Electrical workshop	P	0	0	2	2	1		60	40	
9	1	BES	EE/EE	22EE109	Digital Logic Design	T	3	0	0	3	3	30	20	50	3 Hrs
10	1	BES	EE/EE	22EE110	Lab: Digital Logic Design	P	0	0	2	2	1		60	40	
						TOTAL	**16**	**1**	**10**	**27**	**22**				
List of Mandetory Learning Course (MLC)															
1	1	HS	GE/T&P	MLC2121	YCAP1-Get Set Go	**A**	2	0	0	2	0				
2	1	BES	GE/CHE	GE2132	Environmental Science	**A**	2	0	0	2	0				

SECOND SEMESTER															
1	2	BS	GE/MTH	22EE201	Differential & Integral Calculus	T	3	1	0	4	4	30	20	50	3 Hrs
2	2	BS	GE/CHE	22EE202	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3 Hrs
3	2	BS	GE/CHE	22EE203	Lab: Engineering Chemistry	P	0	0	2	2	1		60	40	
4	2	HS	GE/HUM	22EE204	Professional Communication	T	3	0	0	3	3	30	20	50	3 Hrs
5	2	BES	CV/CV	22EE205	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3 Hrs
6	2	BES	CV/CV	22EE206	Lab: Engineering Mechanics	P	0	0	2	2	1		60	40	
7	2	BES	EE/EE	22EE207	Basic Electrical and Electronics Engineering	T	3	0	0	3	3	30	20	50	3 Hrs
8	2	BES	IT/IT	22EE208	Programming for Problem Solving	T	3	0	0	3	3	30	20	50	3 Hrs
9	2	BES	IT/IT	22EE209	**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	2	HS	GE/HUM	GE2131	Universal Human Value	**A**	2	0	0	2	0				
2	2	HS	GE/T&P	MLC2122	YCAP2 -Functional English	**A**	2	0	0	2	0				

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

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

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

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

II SEMESTER

22EE201 : Differential and Integral Calculus

Course Outcomes :

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

1. Apply the knowledge of differentiation to solve the Engineering problems.
2. Determine the derivatives of functions of several variables and develop the 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: Differential Calculus I	**(6 Hrs.)**
Successive differentiation, n^{th} derivative of rational function, Trigonometrical transformations, n^{th} derivative of the product of two functions (Leibnitz's theorem), Taylor's theorem, Use of Maclaurin's theorem for one variable, standard expansions, Examples on Taylor's Theorem. **(Contemporary Issues related to Topic)**	
Unit II: Differential Calculus II	**(6 Hrs.)**
Definitions of Curvature, Radius of curvature for cartesian curves, Centre of curvature, Circle of curvature, Procedure for tracing the cartesian curve, Important points (singular points, Multiple points, Double points, Node, Cusp), Problems on tracing of curve. **(Contemporary Issues related to Topic)**	
Unit III: Partial Differentiation	**(7 Hrs.)**
Functions of several variables, First and higher order derivatives, Homogeneous functions, Euler's theorem on homogeneous function, Chain rule and total differential coefficient of composite functions. **(Contemporary Issues related to Topic)**	
Unit IV: Integral Calculus	**(6 Hrs.)**
Gamma function, Reduction formula, Transformation of **G**amma function, Beta function, Properties of Beta function, Transformation of Beta function, Relation between Beta and Gamma functions, Differentiation under the integral sign. **(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	**(7 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
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

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

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

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

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

II SEMESTER

22EE202 : Engineering Chemistry

Course Outcomes :

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

1. Illustrate qualitative and quantitative aspects of water for industrial and domestic applications. (L2)
2. Apply concepts of electrochemistry for energy storage devices. (L3)
3. Identify corrosion and discuss its prevention. (L2)
4. Establish insight into engineering materials. (L3)

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

Introduction, Hardness, Types of hardness, softening of water by lime-soda process, Zeolite process, (principle, advantages, and limitations). Numerical based on lime-soda and Zeolite process. Boiler troubles (Scale and sludge, caustic embrittlement), sequestration (carbonate, phosphate) Sterilization of drinking water by chlorination **(Contemporary Issues related to Topic)**

Unit II: Electrochemistry	**(6 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 Numericals. Industrial applications: Electroforming, Electrowinning, Electrolytic refining. **(Contemporary Issues related to Topic)**

Unit III: Energy Storage Devices Basic concepts	**(6 Hrs.)**

Unit III 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: Corrosion	**(7 Hrs.)**

Introduction to corrosion, electrochemical and galvanic series,
Types of corrosion: Chemical and electrochemical corrosion. Mechanisms of electrochemical corrosion, Factors influencing corrosion. Differential aeration theory of corrosion,
Forms of corrosion: Pitting corrosion, Intergranular corrosion, Stress corrosion, Waterline. **Corrosion prevention:** Design and material selection, Cathodic and anodic protection. **(Contemporary Issues related to Topic)**

Unit V: Lubricants	**(6 Hrs.)**

Introduction, Classification of lubricants, Mechanism of lubrication.
Liquid lubricants, Properties of liquid lubricants & significance–Viscosity and viscosity index., Flash and fire point, Cloud and pour point, Aniline point, acid value, saponification number, Steam Emulsion Number.
Solid lubricant-Graphite.
Greases as Semisolid lubricants - Consistency test and drop point test. Synthetic lubricants- silicones.
Criteria for selection of lubricants: IC engines, gears, refrigeration, transformer, steam turbines, delicate instruments. **(Contemporary Issues related to Topic)**

Unit VI: Polymeric Materials	(7 Hrs.)
Nanomaterials: Definition, Carbon Nanotubes and types. Applications of nanomaterials in electronics. 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. Polymers in electronic industries: Piezo, pyroelectric, Ferroelectric polymers. Smart materials: Properties and applications of shape memory alloys, chromoactive, 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 .

Reference Books:	
1.	Eskel Nordell , Water treatment for industrial and other use ,Rein hold Publishing Corporation, New York.
2.	Lloyd A.Munro ,Chemistry in Engineering ,Prentice-hall, Inc Nj,2nd Edition.
3.	Robert B Leighou Mc Graw ,Chemistry of Engineering Materials ,Hill Book Company, Inc New York.
4.	B.K.Sharma Krishna , Engineering Chemistry ,Prakashan media private LTD. 1st Edition, 2014.
5.	R.V.Gadag, A.Nityananda Shetty ,Engineering Chemistry ,I K International Publishing House New Delhi , First Edition.
6	Fred. Billmeyer Jr. ,A textbook of polymer science, Wiley India ,Third Edition.

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

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=dCimAH5IRSA
2.	https://www.youtube.com/watch?v=XTt3gXB0a84
3.	https://www.youtube.com/watch?v=5OxdXq91TV0
4.	https://www.youtube.com/watch?v=aoWBUhlN3-0
5.	https://www.youtube.com/watch?v=JfJ7MlP9Dco

II SEMESTER

22EE203 : Lab : Engineering Chemistry

Course Outcomes
Upon successful completion of the course the students will be able to
1. Illustrate qualitative and quantitative aspects of water for industrial and domestic applications. (L2)
2. Apply concepts of electrochemistry for energy storage devices. (L3)
3. Identify corrosion and discuss its prevention. (L2)
4. Establish insight into engineering materials. (L3)

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 Fe2+ 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.

II SEMESTER
22EE204 : 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**

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

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

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

II SEMESTER
22EE205 : Engineering Mechanics

Course Outcomes :

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

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

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

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

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

II SEMESTER
22EE206 : Lab : Engineering Mechanics

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

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

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

II SEMESTER
22EE207 : 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**

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

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

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

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

II SEMESTER
22EE208 : Programming for Problem Solving

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

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

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

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/

II SEMESTER
22EE209 : 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.

II SEMESTER
Audit Course
GE2131: Universal Human Value

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

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

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

Textbooks:	
1.	**The primary resource material for teaching this course consists of text book** A foundation course in Human Values and professional Ethics, Excel books, 1st Edition 2011, R.R Gaur, R Sangal, G P Bagaria
2.	

Reference Books:	
1.	**The teacher's manual** A foundation course in Human Values and professional Ethics, Excel books,1st Edition 2011, R.R Gaur, R Sangal, G P Bagaria
2.	

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

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 Electronics Engineering)

B. Tech in Electronics Engineering

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 Electronics Engineering)

B. Tech in Electronics Engineering

SoE No. 22EE-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	EE/EE	22EE301	Signal and Systems	T	3	0	0	3	3	30	20	50	3 Hrs
2	3	HS	GE/HUM	22EE302	Fundamentals of Management and Economics	T	3	0	0	3	3	30	20	50	3 Hrs
3	3	PC	EE/EE	22EE303	Electronic Devices and Circuits	T	3	1	0	3	3	30	20	50	3 Hrs
4	3	PC	EE/EE	22EE304	**Lab:**Electronic Devices and Circuits	P	0	0	2	2	1		60	40	
5	3	PC	EE/EE	22EE305	Microprocessor and Interfacing	T	3	0	0	3	3	30	20	50	3 Hrs
6	3	PC	EE/EE	22EE306	**Lab:**Microprocessor and Interfacing	P	0	0	2	2	1		60	40	
7	3	PC	EE/EE	22EE307	Network Analysis	T	3	0	0	2	3	30	20	50	3 Hrs
8	3	PC	EE/EE	22EE308	**Lab:**Network Analysis	P	0	0	2	2	1		60	40	
9	3	PC	EE/EE	22EE309	Switching Theory and Finite Automata	T	3	0	0	2	3	30	20	50	3 Hrs
10	3	PC	EE/EE	22EE310	**Lab:** Programming Language	P	0	0	2	2	1		60	40	
					TOTAL THIRD SEM		**18**	**1**	**8**	**24**	**22**				
List of Mandatory Learning Course (MLC)															
1	3	HS	T&P	MLC2123	YCCE Communication Aptitude Preparation (YCAP3)	A	3	0	0	3	0				
2	3	BES	EE	MLC107	Basics of MATLAB	A	2	0	0	2	0				
Fourth Semester															
1	4	BS	GE/HUM	22EE401	Probability and Statistical Theory	T	3	0	0	3	3	30	20	50	3 Hrs
2	4	PC	EE/EE	22EE402	Digital System Modelling	T	3	0	0	3	3	30	20	50	3 Hrs
3	4	PC	EE/EE	22EE403	Microcontroller and its Applications	T	3	0	0	3	3	30	20	50	3 Hrs
4	4	PC	EE/EE	22EE404	**Lab:** Microcontroller and its Applications	P	0	0	2	2	1		60	40	
5	4	PC	EE/EE	22EE405	Algorithm and Data Structure	T	3	0	0	3	3	30	20	50	3 Hrs
6	4	PC	EE/EE	22EE406	**Lab**: Algorithm and Data Structure	P	0	0	2	2	1		60	40	
7	4	PC	EE/EE	22EE407	Digital CMOS Circuits	T	3	0	0	3	3	30	20	50	3 Hrs
8	4	PC	EE/EE	22EE408	**Lab**:Digital CMOS Circuits	P	0	0	2	2	1		60	40	
9	4	PC	EE/EE	22EE409	Electromagnetic Fields	T	3	1	0	3	3	30	20	50	3 Hrs
10	4	PC	EE/EE	22EE410	**Lab**: Electronics Workshop	P	0	0	2	2	1		60	40	
11	4	PC	CV/EE	22EE411	Environmental Sustainability, Pollution and Management	T	3	0	0	3	3	30	20	50	3 Hrs
					TOTAL FOURTH SEM		**21**	**1**	**8**	**29**	**25**				
List of Mandatory Learning Course (MLC)															
1	4	HS	T&P	MLC2124	YCCE Communication Aptitude Preparation (YCAP4)	A	3	0	0	3	0				
2	4	BES	EE	MLC108	Basics of Arduino Programmimg	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

22EE301 : Signal and Systems

Course Outcomes:
Upon successful completion of the course the students will be able to 1. Understand and apply mathematical knowledge for Continuous & Discrete time signals 2. Apply mathematical knowledge for problem analysis in Continuous & discrete time systems 3. Apply and analyze various properties of transform techniques to solve the continuous and discrete Time Systems 4. Analyze various methods to categorize the LTI Systems and identify solutions and apply for mathematical representation of systems

Unit:1	**Continuous and Discrete time signals**	**7 Hours**
Signal representation, Transformation of the independent variable, classification of signals, Signal Energy and Power, Periodic, Even & Odd, Real and Exponential Signals **Contemporary Issues related to Topic**		
Unit:2	**Continuous and Discrete time System**	**7 Hours**
Continuous-Time Systems, system properties: linearity: additivity and homogeneity, shift-invariance, causality, stability, convolution. **Contemporary Issues related to Topic**		
Unit:3	**Fourier Series Representation of Periodic Signals**	**7 Hours**
Fourier Series Representation of Continuous-Time Periodic Signals, convergence of the Fourier Series. **Contemporary Issues related to Topic**		
Unit:4	**Fourier Transform**	**6 Hours**
Convergence of Fourier Transform and its Properties, Representation of A periodic Signals, The Fourier Transform for Periodic Signals. Analysis and Characterization of LTI Systems using the Fourier Transform. **Contemporary Issues related to Topic**		
Unit:5	**The Laplace Transform**	**7 Hours**
The Region of Convergence for Laplace Transforms. The Inverse Laplace Transform. Properties of the Laplace Transform. Analysis and Characterization of LTI Systems Using the Laplace Transform. The Unilateral Laplace Transform. **Contemporary Issues related to Topic**		
Unit :6	**Z transform**	**7 Hours**
The Z Transform. The Region of Convergence for Z Transforms. The Inverse Z Transform. Properties of the Z Transform. Analysis and Characterization of LTI Systems Using the Z Transform. **Contemporary Issues related to Topic**		
Total Lecture Hours		**41 Hours**

Textbooks	
1	Signals and Systems Alan V. Oppenheim, Alan S. Willsky, with S. Hamid 2nd Edition, 1996 Prentice Hall
2	Digital signal processing –Principles, algorithms and applications J. G. Proakis, D. G. Manolakis 3rd Edition, 1996 PHI

Reference Books	
1	Outline of Signals and Systems HweiHsu,Schaum's 1st Ed 1995 McGraw-Hill
2	Signals & Systems Simon Haykin and Van Veen 2nd Edition, 2002 Wiley

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

MOOCs Links and additional reading, learning, video material	
1	https://www.digimat.in/nptel/courses/video/108104100/L52.html
2	https://nptel.ac.in/courses/108105159
3	https://www.youtube.com/watch?v=pAmmL9ms2iU

III SEMESTER
22EE302 : Fundamentals of Management and Economics

Course Outcomes :

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

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

Unit:1	Principles of Management	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 India
3.	Marketing Management , 3rd Edition , RajanSaxena, Tata McGraw Hill
4.	Advance Economic Theory, 17th Edition, H. L. Ahuja, S. Chand Publisher, 2009
5.	International Trade, 12th edition, M. L. Zingan, Vindra Publication, 2007
6.	Macro Economics, 11th edition, M. L. Zingan, Vindra Publication, 2007
7.	Monitory Economics:, 1st Edition, M. L. Sheth, Himayalaya Publisher, 1995
8.	Economics of Development and Planning, 12th edition, S. K. Misra and V. K. Puri, Himalaya Publishing House, 2006.

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

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

III SEMESTER

22EE303: Electronic Devices and Circuits

Course Outcomes :

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

1. Analyze different types of semiconductor devices, their operation and characteristics.
2. Design and analyze the DC bias circuitry of BJT and FET.
3. Analyze and model BJT for small signal and high frequency.
4. Apply concept of feedback to improve the stability of circuits.
5. Design circuits using the transistors and oscillators.

Unit:1	**Transistors**	**8 Hours**

BJT - structure, operation, characteristics and Biasing BJT structure, Symbol, Basic operation. Input and Output Characteristics in CE, CB and CC configuration, BJT biasing, Stability factor.

(Contemporary Issues related to Topic)

Unit:2	**JFET & MOSFET**	**7 Hours**

JFET:-Symbol, Structure, operation, characteristics, Drain and Transfer Characteristics, JFET Biasing.

MOSFET: -Structure, Symbol, Basic operation, Drain and Transfer Characteristics, MOSFET Biasing.

(Contemporary Issues related to Topic)

Unit:3	**Low frequency BJT**	**6 Hours**

Single Stage Amplifiers BJT small signal model – Analysis of CE, CB, CC amplifiers, Miller's theorem.

(Contemporary Issues related to Topic)

Unit:4	**Low frequency FET & MOSFET**	**6 Hours**

Small signal model– Analysis of CS, CG and CD amplifiers.

(Contemporary Issues related to Topic)

Unit:5	**Power Amplifiers**	**6 Hours**

Classes of power amplifiers – Class A, Class B amplifiers, Analysis of Class A, Class B, Distortions in amplifiers.

(Contemporary Issues related to Topic)

Unit :6	**Feedback Amplifiers and Oscillators**	**8 Hours**

Feedback Amplifiers: - Feedback Concept, Classification of amplifiers based on feedback topology, (Voltage, Current, Transconductance and Transresistance amplifiers), Effect of negative feedback on various performance parameters of an amplifier

Oscillators: - Condition for oscillations, phase shift – Wien bridge, Hartley, Colpitts and Crystal oscillator. **(Contemporary Issues related to Topic)**	
Total Lecture Hours	**41 Hours**

Textbooks	
1	Millman&Halkies, "Electronic Device and Circuits", Second Edition, Tata McGraw Hill.
2	Boylestead&Nashelsky, "Electronic devices and Circuits Theory" Eighth edition, PHI

Reference Books	
1	MillmanHalkies, "Integrated Electronics", Tata McGraw Hill.
2	David A. Bell," Electronic Device and Circuits", Fourth Edition, PHI.· Floyd," Electronic Devices", Seventh Edition, Pearson

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

MOOCs Links and additional reading, learning, video material	
1	http://nptel.iitm.ac.in/video.php?subjectId=117103063
2	NPTEL Video: mod07lec29: BJT
3	NPTEL Video: mod07lec30

III SEMESTER
22EE304: Lab.: Electronic Devices and Circuits

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Analyze different types of semiconductor devices, their operation and characteristics.
2. Design and analyze the DC bias circuitry of BJT and FET.
3. Analyze and model BJT for small signal and high frequency.
4. Apply concept of feedback to improve the stability of circuits.
5. Design circuits using the transistors and oscillators.

Sr. No.	Experiments based on
1	To plot I/P & O/P Characteristics of Common Base Transistor Configuration. Find I/P& O/P Resistance and Current Gain.
2	To plot I/P & O/P Characteristics of Common Emitter Transistor Configuration. Find I/P& O/P Resistance and Current Gain.
3	To perform the Fixed Bias circuit of the transistor.
4	To perform the Self Bias circuit of transistor.
5	To perform the Drain and Transfer characteristics of Field Effect Transistor (FET).
6	To Plot the Frequency Response of a single stage RC coupled CE amplifier.
7	N-Channel MOSFET amplifier in common source configuration with and without feedback.
8	To determine the efficiency of Class A power amplifier.
9	To determine the efficiency of Class B push pull power amplifier and to study cross over distortion.
10	To determine the phase shift in RC phase shift oscillator.

III SEMESTER

22EE305: Microprocessor and Interfacing

Course Outcomes :

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

1. Describe the architecture of Microprocessor
2. Write Program for an assigned task.
3. Apply different address decoding techniques while interfacing Memory to Microprocessor
4. Analyze and Design interfacing of Peripheral devices to Microprocessor

Unit:1	**Microprocessor organization**	**6 Hours**
Introduction to Microprocessor based systems, Register Organization and Architecture and Signal Description of 8086 **(Contemporary Issues related to Topic)**		
Unit:2	**8086 Instruction set and Programming Concepts**	**7 Hours**
Machine Language Instruction formats for 8086, addressing modes and assembler directives, Basic programming **(Contemporary Issues related to Topic)**		
Unit:3	**8086: Special Processor activities**	**7 Hours**
Processor RESET and Initialization, HALT, TEST and synchronization with External signals, Subroutine instructions like CALL, PUSH, POP, Programs based on instructions. **(Contemporary Issues related to Topic)**		
Unit:4	**Concepts of Memory & IO Interfacing**	**6 Hours**
Basics of Memory and I/O Interfacing with 8086, Types of decoding techniques. **(Contemporary Issues related to Topic)**		
Unit:5	**Interfacing of basic Peripherals**	**6 Hours**
Programmable peripheral Interface 8255- Block Diagram, Pin functions, Different Modes of operation & Interfacing with 8086 **(Contemporary Issues related to Topic)**		
Unit :6	**Special Purpose Programmable Peripheral devices and their interfacing**	**7 Hours**
Interfacing of Programmable Interval Timer 8253 and Programmable Communication Interface 8251 USART with 8086 **(Contemporary Issues related to Topic)**		
Total Lecture Hours		**38 Hours**

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

Textbooks	
1	'Advanced Microprocessors and Peripherals' A K Ray, K. M. Bhurchandi, Tata McGraw Hill Publishing.

Reference Books	
1	Microprocessors & interfacing,2'nd Edition, D. V. Hall, Tata Mc-Graw Hill
2	Microprocessor 8086: Architecture, Programming and Interfacing, Sunil Mathur, pHI publications

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

MOOCs Links and additional reading, learning, video material	
1	Nptel Video : https://www.youtube.com/watch?v=0t4LROuEVnw&list=PLwdnzlV3ogoXgNjr_oe5cWQIbf72ZY4Zf
2	https://www.youtube.com/watch?v=oRPluYsxF28&list=PLuv3GM6-gsE01L9yDO0e5UhQapkCPGnY3&index=7
3	https://www.electronicwings.com/

III SEMESTER
22EE306: Lab.: Microprocessor and Interfacing

Course Outcomes:

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

1. Describe the architecture of Microprocessor
2. Write Program for an assigned task.
3. Apply different address decoding techniques while interfacing Memory to Microprocessor
4. Analyze and Design interfacing of Peripheral devices to Microprocessor
5. Create software & Hardware solutions for complex problems

Sr. No.	Experiments based on
1	Study of Intel 8085 Microprocessor (Pin Diagram and Architecture)
2	Determine OPCODE, No. of bytes and addressing modes of 8085 instructions.
3	Arithmetic and Logical Operations Problem Statement: Write assembly language Program for Addition, Subtraction, Anding, Oring, Ex-Oring over two eight bit data. First 8-bit data present in accumulator and Second 8 bit data present in Register.
4	Addition of series of data bytes. Problem Statement: A series of 5 data bytes is stored in memory locations, starting at CC00H. WAP to add the data bytes and store the result in memory locations C008H and C009H respectively.
5	Block Transfer from Source Memory Location to Destination Memory Location. Problem Statement: A block of 5 data bytes is stored in memory locations, starting at C000H. WAP to transfer block of data to new memory locations staring at D000H.
6	To Count no of Positive data bytes from string Problem Statement: A series of 05 data bytes is stored in memory locations, starting at C001H. Length of block is stored at C000H. WAP to count the number of positive data bytes and transfer the count value at C008H.
7	To find Largest /Smallest data byte from string. Problem Statement: A series of 5 data bytes is stored in memory locations, starting at C001H. Length of block is stored at C000H. WAP to find the largest/ Smallest data byte in the series and store the result at C008H.
8	Compare the data bytes from 2 strings Problem Statement: Two sets of 05 temperature readings are stored at memory locations starting at CA00 and CB00H. It is expected that readings from the first set is higher than corresponding reading from the second set. WAP to display 01H at memory location C008H, indicating that the system is OK. If any reading from the first set goes low, memory location C008 should display 00H indicating the problem arising in system

9	Programming for interfacing through PPI 8255. Problem Statement: For a microprocessor 8085 based trainer board (MICROFRIEND DYNA-85L), Programmable Peripheral interface 8255 has been interfaced with 8085 at an address 13H (CWR address), with A1 and A0 lines of 8255 connected to A1 and A0 address pins of 8085. a) Write a program to place the data bytes 44H, 55H, and 66H in ports A, B and C of PPI 8255 and copy contents of ports A, B and C to memory locations CC00, 01 and 02 respectively. b) Interface 8 LED's with 8085 through 8255 PPI at Port A. WAP to display content 55H of Memory location CC00H at Port A.
10	Square Wave Generation using PTC 8253 Problem Statement: Write a program to Generate square waveform of 2ms using Timer IC 8253
11	Data Transfer through USART 8251 Problem Statement: For the hardware interface for 8251 with 8085, set 8251 in asynchronous mode to transmit and receive 8 bit data.
12	Mini Project

III SEMESTER
22EE307: Network Analysis

Course Outcomes:

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

1. Apply and analyze nodal and mesh analysis on engineering circuits.
2. Apply network theorems, initial and final conditions to analyze electrical circuits.
3. Understand, apply and analyze electrical circuits in the transform domain.
4. Apply the concept of two – port networks to find different two-port parameters.
5. Analyze network concepts using the EDA Tool.

Unit:1	Nodal Analysis of Electric Circuits	7 Hours

Basics of electric circuits, circuit elements and their voltage – current relationship, classification of circuit elements, sources -their types and characteristics, concept of equivalent sources, source transformation and duality, concept of supernode and V– shift, nodal analysis of circuits containing resistors, inductors, capacitors, transformers, and both independent and dependent sources to determine current, voltage, power, and energy.

(Contemporary Issues related to Topic)

Unit:2	Mesh Analysis of Electric Circuits	7 Hours

Concept of super mesh and I – shift, mutual inductance, coefficient of coupling, dot convention, dot marking in coupled coils, mesh analysis of circuits containing resistors, inductors, capacitors, transformers, and both independent and dependent sources to determine current, voltage, power, and energy.

(Contemporary Issues related to Topic)

Unit:3	Network Theorem	7 Hours

Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem.

(Contemporary Issues related to Topic)

Unit:4	Initial and Final Conditions, Impedance Functions and Circuit Analysis with Laplace Transform	6 Hours

Concept of initial and final conditions, behaviour of resistor, inductor and capacitor at t = 0- and at t = 0+, procedure for evaluating initial and final conditions, analytical treatment. Reviews of Laplace Transform, concept of complex frequency, transform impedance and admittance, s – domain impedance and admittance models for resistor, inductor and capacitor, series and parallel combinations of elements. Transformed network on loop and mesh basis, mesh and node equations for transformed networks, time response of electrical network with and without initial conditions by Laplace transform.

(Contemporary Issues related to Topic)

Unit:5	Transforms of other Signal Waveforms, Network Functions, Poles and Zeros of network functions	7 Hours

Unit step, ramp and impulse functions with and without time delay, their Laplace transform, waveform synthesis and its application to electrical networks. Terminal pairs or ports, network functions for one port and two port networks, definition and physical interpretation of poles and zeros, pole-zero plot for network functions, restrictions on pole and zero locations for driving point and transfer functions, time domain behaviour from the pole – zero plot, network synthesis using pole – zero plot.

(Contemporary Issues related to Topic)

Unit :6	Two Port Parameters	7 Hours

Standard reference directions for the voltages and currents of a two – port network, defining equations for open circuit impedance, transmission, inverse transmission, hybrid and inverse hybrid parameters, relationships between parameter sets, conditions for reciprocity and electrical symmetry in terms of two – port parameters, interconnections of two - port networks.

(Contemporary Issues related to Topic)

Total Lecture Hours	41 Hours

Textbooks	
1	M.E.VanValkenburg, Network Analysis, 3rd Edition, PHI Learning Private Limited.

Reference Books	
1	Sudhakar,A.,Shyammohan,S.P., Circuits and Network, Tata McGraw-Hill New Delhi
2	A William Hayt ,Engineering Circuit Analysis‖,8th Edition, McGraw-Hill Education.

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

MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/108105159
2	https://archive.nptel.ac.in/courses/108/105/108105159/

III SEMESTER

22EE308: Lab. : Network Analysis

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Apply and analyze nodal and mesh analysis on engineering circuits.
2. Apply network theorems, initial and final conditions to analyze electrical circuits.
3. Understand, apply and analyze electrical circuits in the transform domain.
4. Apply the concept of two – port networks to find different two-port parameters.
5. Analyze network concepts using the EDA Tool.

Sr. No.	Experiments based on
1	Introduction To PSPICE Software and Verification of Kirchhoff's Voltage law.
2	Perform nodal analysis on electrical circuits with dependent sources.
3	Perform nodal analysis on complex electrical circuits.
4	Verification of Kirchhoff's Current law.
5	Perform mesh analysis on electrical circuits with dependent sources.
6	Perform mesh analysis on complex electrical circuits.
7	Verification of Superposition Theorem.
8	Verification of Thevenin's Theorem
9	Verification of Norton's theorem
10	Verification of Maximum power transfer theorem

III SEMESTER
22EE309: Switching Theory and Finite Automata

Course Outcomes:
Upon successful completion of the course the students will be able to 1. Design and Analyze multilevel logic Network and Threshold logic for nanotechnologies. 2. Analyze testing of combinational circuits, Fault Models 3. Design and analyze the synchronous and asynchronous sequential circuits. 4. Identify and test the sequential machines with experiments.

Unit:1	Minimization of switching functions	7 Hours
The map method, Minimal functions and their properties, The tabulation procedure for the determination of prime implicants, The prime implicant chart, Map-entered variables, Heuristic two-level circuit minimization, Multi-output two-level circuit minimization. **(Contemporary Issues related to Topic)**		
Unit:2	**Multi-level logic synthesis**	**7 Hours**
Multi-level logic synthesis, Technology-independent synthesis: Factoring, Decomposition, Extraction, Substitution, and Technology mapping: steps in technology mapping. **(Contemporary Issues related to Topic)**		
Unit:3	**Testing of combinational circuits**	**7 Hours**
Testing of combinational circuits, Fault models, Structural testing, IDDQ testing, Delay fault testing, Synthesis for testability, Testing for nanotechnologies **(Contemporary Issues related to Topic)**		
Unit:4	**Synchronous sequential circuits**	**7 Hours**
Synchronous sequential circuits and iterative networks, memory elements and their excitation functions, synthesis of synchronous sequential circuits, Moore and Mealy machines, finite state machine flow charts, tables **(Contemporary Issues related to Topic)**		
Unit:5	**Asynchronous sequential circuits**	**7 Hours**
Asynchronous sequential circuits, Modes of operation, Hazards, Synthesis of SIC fundamental-mode circuits. **(Contemporary Issues related to Topic)**		
Unit :6	**Testing of sequential circuits**	**7 Hours**
State-identification experiments and testing of sequential circuits, Experiments, Homing experiments, Distinguishing experiments, Checking experiments, **(Contemporary Issues related to Topic)**		
Total Lecture Hours		**42 Hours**

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

Textbooks	
1	Switching & Finite Automata Theory: ZviKohavi, Niraja K. Jha, Third Edition 2010, Cambridge University Press

Reference Books	
1	Modern Switching Theory and Digital Design, Lee S.C, PHI Edition
2	Digital Logic and Computer Design, M.Morris Mano, PHI Edition

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

MOOCs Links and additional reading, learning, video material	
1	NPTEL Video Link: https://youtu.be/1u_R0d54o1o
2	NPTEL Video Linl: https://youtu.be/Hv4mbqm9Iwk
3	NPTEL Video Linl: https://youtu.be/5Zstl5d5Byc
4	NPTEL Video Linl: https://youtu.be/uCqTzWsZ804

III SEMESTER
22EE310: Lab: Programming Language

Course Outcomes:
Upon successful completion of the course the students will be able to
1. To **understand** syntax and semantics of language
2. To **understand** and **apply** the basics of the programming language
3. To **analyse** and **apply** special language features
4. To **create** functions for any application

Sr. No.	Experiments based on
1	Introduction to python, variables and data types
2	To perform different operations on "Strings" in Python.
3	To learn and write a program using "List" and "Tuple" in Python.
4	To learn and write a program using "Set" and "Dictionary" in Python.
5	To learn and write a program using Loop statements in Python.
6	To learn "NumPy" in Python.
7	To learn how to create a matrix using Python and perform different operation on it.
8	To learn and write programs using functions in Python.
9	To write programs for fun games in Python.
10	Mini Project

III SEMESTER

Audit Course

MLC2123 - YCCE Communication Aptitude Preparation (YCAP3)

III SEMESTER
MLC107 : Basics of MATLAB

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Learn features of MATLAB as a programming tool. 2. Develop programming skills and techniques to solve mathematical problems. 3. Understand MATLAB graphic feature and its applications. **4.** Use MATLAB as a simulation tool.

Unit I: Introduction to MATLAB Environment	**(4 Hrs.)**
MATLAB Basics – Variables, Numbers, Operators, Expressions, Input and output., Vectors, Arrays – Matrices.	
Unit II: MATLAB Functions	**(4 Hrs.)**
Built-in Functions, User defined Functions.	
Unit III: Graphics with MATLAB	**(4 Hrs.)**
Files and File Management – Import/Export, Basic 2D, 3D plots, Graphic handling	
Unit IV: Programming with MATLAB	**(4 Hrs.)**
Conditional Statements, Loops, MATLAB Programs – Programming and Debugging, Applications of MATLAB Programming	
Unit V: Mathematical Computing with MATLAB	**(4 Hrs.)**
Algebraic equations, Basic Symbolic Calculus and Differential equations, Numerical Techniques and Transforms'	
Unit VI: Introduction to SIMULINK	**(4 Hrs.)**
Basics of SIMULINK modelling	
Total Lecture	**24 Hours**

Textbooks:	
1.	Holly Moore, Matlab For Engineers (5th Edition) , Pearson Publication
2.	MATLAB: An Introduction With Applications, (5th Edition) , Wiley Publication

Reference Books:	
1.	*William Palm* , MATLAB for Engineering Applications, 4th edition, Mcgraw hill education

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

MOOCs Links and additional reading, learning, video material	
1.	https://www.mathworks.com
2.	https://youtu.be/IuEOMyGuuIg
3.	https://youtu.be/v2AJblv4y88

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 Electronics Engineering)

B. Tech in Electronics Engineering

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 Electronics Engineering)

B. Tech in Electronics Engineering

SoE No. 22EE-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	EE/EE	22EE301	Signal and Systems	T	3	0	0	3	3	30	20	50	3 Hrs
2	3	HS	GE/HUM	22EE302	Fundamentals of Management and Economics	T	3	0	0	3	3	30	20	50	3 Hrs
3	3	PC	EE/EE	22EE303	Electronic Devices and Circuits	T	3	1	0	3	3	30	20	50	3 Hrs
4	3	PC	EE/EE	22EE304	**Lab:**Electronic Devices and Circuits	P	0	0	2	2	1		60	40	
5	3	PC	EE/EE	22EE305	Microprocessor and Interfacing	T	3	0	0	3	3	30	20	50	3 Hrs
6	3	PC	EE/EE	22EE306	**Lab:**Microprocessor and Interfacing	P	0	0	2	2	1		60	40	
7	3	PC	EE/EE	22EE307	Network Analysis	T	3	0	0	2	3	30	20	50	3 Hrs
8	3	PC	EE/EE	22EE308	**Lab:**Network Analysis	P	0	0	2	2	1		60	40	
9	3	PC	EE/EE	22EE309	Switching Theory and Finite Automata	T	3	0	0	2	3	30	20	50	3 Hrs
10	3	PC	EE/EE	22EE310	**Lab:** Programming Language	P	0	0	2	2	1		60	40	
					TOTAL THIRD SEM		**18**	**1**	**8**	**24**	**22**				
List of Mandatory Learning Course (MLC)															
1	3	HS	T&P	MLC2123	YCCE Communication Aptitude Preparation (YCAP3)	A	3	0	0	3	0				
2	3	BES	EE	MLC107	Basics of MATLAB	A	2	0	0	2	0				
Fourth Semester															
1	4	BS	GE/HUM	22EE401	Probability and Statistical Theory	T	3	0	0	3	3	30	20	50	3 Hrs
2	4	PC	EE/EE	22EE402	Digital System Modelling	T	3	0	0	3	3	30	20	50	3 Hrs
3	4	PC	EE/EE	22EE403	Microcontroller and its Applications	T	3	0	0	3	3	30	20	50	3 Hrs
4	4	PC	EE/EE	22EE404	**Lab:** Microcontroller and its Applications	P	0	0	2	2	1		60	40	
5	4	PC	EE/EE	22EE405	Algorithm and Data Structure	T	3	0	0	3	3	30	20	50	3 Hrs
6	4	PC	EE/EE	22EE406	**Lab**: Algorithm and Data Structure	P	0	0	2	2	1		60	40	
7	4	PC	EE/EE	22EE407	Digital CMOS Circuits	T	3	0	0	3	3	30	20	50	3 Hrs
8	4	PC	EE/EE	22EE408	**Lab**:Digital CMOS Circuits	P	0	0	2	2	1		60	40	
9	4	PC	EE/EE	22EE409	Electromagnetic Fields	T	3	1	0	3	3	30	20	50	3 Hrs
10	4	PC	EE/EE	22EE410	**Lab**: Electronics Workshop	P	0	0	2	2	1		60	40	
11	4	PC	CV/EE	22EE411	Environmental Sustainability, Pollution and Management	T	3	0	0	3	3	30	20	50	3 Hrs
					TOTAL FOURTH SEM		**21**	**1**	**8**	**29**	**25**				
List of Mandatory Learning Course (MLC)															
1	4	HS	T&P	MLC2124	YCCE Communication Aptitude Preparation (YCAP4)	A	3	0	0	3	0				
2	4	BES	EE	MLC108	Basics of Arduino Programmimg	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
22EE401 : Probability and Statistical Theory

Course Outcomes:

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

1. Identify an appropriate probability distribution for a given discrete or continuous random variable and compute probabilities.
2. Use of probability distributions to solve real life problems.
3. Find probabilities and estimates parameters of various problems in sampling theory.
4. Identify scientific data to use proper curve fitting and find correlation and regression of variables.

Unit:1	Random Variables & Probability Distributions	7 Hours

Conditional probability, Baye's theorem. Random variables: Discrete and Continuous random variables, Probability function and Distribution function, Joint distributions. Independent Random variables, Conditional Distribution.

Contemporary Issues related to Topic

Unit:2	Mathematical Expectation	7 Hours

Mathematical Expectation, Variance & Standard Deviation, Moments, Moment generating function, Skewness and Kurtosis.

Contemporary Issues related to Topic

Unit:3	Special Probability Distributions	6 Hours

Binomial, Geometric, Poisson, Exponential, Normal distributions, Central Limit theorem.

Contemporary Issues related to Topic

Unit:4	Sampling Theory	6 Hours

Population and sample. Statistical inference. Sampling with and without replacement. Population parameters, sample statistics. Sampling distribution of means. Sampling distribution of proportions.

Unit:5	Estimation	7 Hours

Unbiased and efficient estimates. Point estimates and interval estimates. Confidence interval for means, Confidence interval for proportions, Confidence interval for differences and sums of mean and proportions.

Contemporary Issues related to Topic

Unit :6	Curve Fitting	6 Hours
Fitting of straight line, $y = a + bx$, a parabola $y = a + bx + cx^2$, exponential curves and power curves by method of least squares; Lines of regression and correlation; Rank correlation. **Contemporary Issues related to Topic**		
	Total Lecture Hours	**39 Hours**

Text books	
1	M. R. Spiegel, The theory and problems of probability and Statistics, 5th Edition, Schaum series. (McGraw Hill).
2	Dr. B. S. Grewal, Engineering Mathematics, 43rd edition, Khanna Publisher
3	Michael J. Evans and Jeffrey S. Rosenthal, Probability and Statistics, 2nd edition.

Reference Books	
1	Miller Freund and Johnson, Probability and Statistics for Engineering, 6th edition, Richard A. Johnson
2	S. C.Gupta and V.K.Kapoor, Fundamentals of Mathematical statistics, 3rd Edition, Sultan Chand and Sons.
3	E. K.Bowen, M. K.Star , Basic Statistics for Business and economics, 3rd edition, McGraw Hill

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

MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/111105041
2	https://archive.nptel.ac.in/courses/111/105/111105090/
3	https://onlinecourses.nptel.ac.in/noc21_ma74/preview

IV SEMESTER
22EE402: Digital System Modelling

Course Outcomes:
Upon successful completion of the course the students will be able to 1. Understand hardware description language and able to design digital systems using different abstraction levels 2. Apply combinational and sequential logic circuits in designing digital system 3. Analyze timing issues in multiple contexts. 4. Evaluate building blocks in digital system 5. Create basic building blocks in digital system using modern tools.

Unit:1	Basic Concepts of Verilog	7 Hours
HDL Based Design flow, Requirements of HDL, Design Methodologies, Different Modelling styles, Introduction to Verilog, Elements of Verilog, Verilog Module definition, Elements of Module ,Basic Concepts in Verilog, Reserved Keywords, Syntax & Semantics, Comments, Identifiers, Number Representation, System Representation, Verilog Ports, Verilog Data Types, Wire & Variables, Constants, Parameter, Verilog Data Operators. **(Contemporary Issues related to Topic)**		

Unit:2	Data Flow Modeling	7 Hours
Data Flow Modeling, Delay, Continuous Assignment, Delayed Continuous assignment Design entry in Verilog & Test bench, Combinational blocks design, Compilation and synthesis, Timing analysis resolving signal values . **(Contemporary Issues related to Topic)**		

Unit:3	Structural Modeling	7 Hours
Structural Modeling Feature, Module Instantiation, Gate level Primitives, Gate Delays, Switch Level Primitives, User Defined Primitives. **(Contemporary Issues related to Topic)**		

Unit:4	Behavioral Modeling	7 Hours
Behavioral Modeling, Initial, Always, Procedural Assignment, Blocking and Non- Blocking assignments, Sequential & Parallel Blocks, Timing Control, Procedural Statements, Conditional Statements if case loop repeat forever etc, Zero Delay Control, Event Based Timing Control, State Machine Coding ,Moore and Mealy Machines. **(Contemporary Issues related to Topic)**		

Unit:5	Combinational & sequential Circuits	7 Hours
Combinational & sequential system Design examples like Shift Registers, Counters, LFSR, Latches and Flip Flops , Multi bit Adders examples like Ripple Carry Adder, Carry look ahead adder ,two bit and three bit Multiplier, CPU, Design Verification. **(Contemporary Issues related to Topic)**		
Unit :6	**Pogrammable Devices**	**7 Hours**
Introduction to programmable devices, PLA, PAL, PROM, Structure of CPLDs, Introduction to FPGA, Architecture, CLB, IOB, Programmable Interconnect Points, Different type of programmable switches used in PLDs. **(Contemporary Issues related to Topic)**		
Total Lecture Hours		**42 Hours**

Textbooks	
1	Verilog HDL : A Guide to Digital Design and Synthesis, 2 nd Edition, Samir Palnitkar

Reference Books	
1	Verilog Digital System Design Second Edition ZainalabedinNavabi Tata McGraw Hill , 2009

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

MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/106105165
2	https://onlinecourses.nptel.ac.in/noc20_cs63/preview
3	https://nptel.ac.in/courses/108103179
4	https://onlinecourses.nptel.ac.in/noc21_ee97/preview

IV SEMESTER
22EE403: Microcontroller and its Applications

Course Outcomes:
After completion of the course, student will demonstrate the ability to: CO1: **Describe** the architecture of 8051, its features and instructions CO2: **Write** program for specific task CO3: **Analyze** and Interface the peripherals to 8051 microcontroller CO4: **Develop** application using 8051 microcontroller CO5: **Simulate** programusing IDE tool like KeiluVision

Unit:1		**7 Hours**
Overview of 8051 Microcontroller family, Introduction to MCS51 family, Architecture, Memory organization, Internal RAM, Flag Register, Register Banks, SFRs , Functional pin description and various resources of MCS 51,Hardware Overview, Addressing modes, Instruction set. **(Contemporary Issues related to Topic)**		
Unit:2		**7 Hours**
Branching instructions, Bit manipulation instructions, Assembly language Programs., 8051 I/O programming, Logic operations, Data conversion programs, Lookup table access **(Contemporary Issues related to Topic)**		
Unit:3		**7 Hours**
Delay Programs. 8051 programming in C:Data types and time delay, I/O programming, I/O Interfacing and programming for LED, switches, 7 segment display. **(Contemporary Issues related to Topic)**		
Unit:4		**6 Hours**
Timer programming in assembly and C: Various timer operations. SFR related to timer operation. Serial Port programming in assembly and C: Basics of serial communication, RS 232. Serial data transfer programs. **(Contemporary Issues related to Topic)**		
Unit:5		**7 Hours**
Interrupts Control, Interrupts programming in assembly and C, programming timer interrupt, external interrupt, serial interrupt. Interfacing and programming for LCD. **(Contemporary Issues related to Topic)**		

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

Unit :6		7 Hours
Keyboard matrix programming, Interfacing of ADC, DAC, stepper motor and programming. Interfacing RTC, EEPROM using I2C Bus and programming **(Contemporary Issues related to Topic)**		
Total Lecture Hours		**39 Hours**

Textbooks	
1	The 8051 Microcontroller and Embedded System, by M. A. Mazidi, Prentice Hall
2	The 8051 Microcontroller, by Kenneth J. Ayala, West Publishing Company

Reference Books	
1	"The 8051 Microcontroller Based Embedded Systems", Manish K Patel, McGraw Hill, 2014, ISBN: 978-93-329-0125-4.
2	"Microcontrollers: Architecture, Programming, Interfacing and System Design", Raj Kamal, Pearson Education, 2005.

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

MOOCs Links and additional reading, learning, video material	
1	https://www.keil.com/dd/docs/datashts/atmel/at89c51_ds.pdf
2	https://www.electronicwings.com/
3	https://www.tutorialspoint.com/microprocessor/microcontrollers_8051_architecture.htm
4	https://nptel.ac.in/courses/108/105/108105102/

IV SEMESTER
22EE404: Lab: Microcontroller and its Applications

Course Outcomes:
After completion of the course, student will demonstrate the ability to: CO1: **Describe** the architecture of 8051, its features and instructions CO2: **Write** program for specific task CO3: **Analyze** and Interface the peripherals to 8051 microcontroller CO4: **Develop** application using 8051 microcontroller CO5: **Simulate** programusing IDE tool like KeiluVision.

Sr. No.	Experiments based on
1	1.a: Write program to perform addition of two nos. (X + Y) 1.b: Write program to perform subtraction of two nos. (X - Y) 1.c. Write Program for Multiplication of two nos. (X *Y) 1.d. Write Program for Multiplication of two nos. (X / Y) 1.e: Write program to perform Logical AND of two nos. (X and Y) 1.f: Write program to perform Logical OR of two nos. (X or Y) 1.g. Write Program for Logical AND of two nos. (X exor Y)
2	2.a: X and Y are two 8 bit nos. present in memory location 40H and 41H. Write program to perform X + Y and store result in M. L. 50H 2.b: X and Y are two 8 bit nos. present in memory location 60H and 61H. Write program to perform X - Y and store result in M. L. 70H
3	Five 8 bit nos. are present from M. L. 40H onwards. Write program to add these nos. and store result in M. L. 50H
4	Ten 8 bit nos. are present from M. L. 40H onwards. Write program to find the greatest no. and store result in M. L. 60H
5	6.a.: Interface LED with 8051 i/o pin P1.4 and write program to blink LED (ON/ OFF duration 1 sec) 6.b: Interface 8 LED's with 8051 i/o pin P1 and write program to turn ON alternate LED.
6	Interface 8 LED's with 8051 i/o pin P1 and write program to turn ON LED one by one from P1.0 to P1.7 after a delay of 1 sec
7	Interface LED with 8051 i/o pin P1.4 and switch with P1.1. Write program to turn on LED if switch is pressed
8	Interface common cathode 7 segment display to P2 of 8051 and write program to display 0 to 9 continuously at an interval of 3 sec.
9	Write program to send "ABC" via serial port of 8051 with 9600 baud rate
10	Interface 2X16 LCD with 8051.Use 8 bit data length and write program to display "HI FRIENDS " in first line from first position. Use P2 for data pins and P0 for control pins

IV SEMESTER
22EE405: Algorithm and Data Structure

Course Outcomes:
Upon successful completion of the course the students will be able to 1. Understand the trade-offs of algorithms and programming aspects 2. Apply various operation on data Structure 3. Analyze various types of Data Structure 4. Implement various types of algorithms and analyze performance of system 5. Develop programs using data structures and latest compilers

Unit:1	**Introduction to Algorithms**	**7 Hours**
Introduction to Algorithms, Basics of Algorithm, Sub Algorithms, Procedures and Functions, Analysis of Algorithms, Time and Space Complexity, Programming aspects with respect to structured programming, Top down and bottom Up Approach. **(Contemporary Issues related to Topic)**		

Unit:2	**Arrays**	**7 Hours**
Arrays, Operations, Types, Representation of 1D, 2D arrays in memory, Sparse Matrices, Sorting, Quick Sort, Merge Sort, Insertion, Radix, Selection and Bubble Sort, Heap Sort, Searching , Linear, Binary Search, Hashing and collision Handling mechanism. **(Contemporary Issues related to Topic)**		

Unit:3	**Stack**	**7 Hours**
Stack , Fundamentals, Operations, Push , Pop , Applications of Stacks, Evaluation of Expressions, Recursion, Stack Machines and Multiple Stacks, Queues , Operations, Add , Delete, Types of Queues , Priority Queues, Circular Queue, Dequeue. **(Contemporary Issues related to Topic)**		

Unit:4	**Linked Stacks and Queues**	**6 Hours**
Fundamentals of singly, Doubly, Circular, Linked Stacks and Queues, Examples of Linked List, Circular Linked List, Doubly Linked List and Dynamic Storage Management, Garbage Collection, Compaction and Applications of Linked List, Operations of Polynomials, Generalized Linked List. **(Contemporary Issues related to Topic)**		

Unit:5	**Binary Tree**	**7 Hours**
Basic Terminology, Binary Tree Traversals, Threaded Storage Representation, Binary Search Tree, Applications of Tree, Preliminary Treatment of AVL Trees, B-Trees, B+ Trees. **(Contemporary Issues related to Topic)**		

Unit :6	List	7 Hours
Basic Terminology, Graph Representation, Matrix, List, Multi-List, Graph Traversals, Breath First Search, Depth First Search, Minimum Cost Spanning Trees, Shortest Path Algorithm, Topological Sort, Critical Path. **(Contemporary Issues related to Topic)**		
Total Lecture Hours		**39 Hours**

Textbooks	
1	Fundamentals of Data Structures, Ellis Horowtiz and SartajSahani, Galgotia,Publication,

Reference Books	
1	Data Structures and Program, Design in C, Kruse, Leung and Tondo , PHI
2	An Introduction to Data Structures with Applications , Tremblay & Sorenson, TMH
3	Data Structures, Schaum Series, Seymour Lipschutz, G.A. V. Pai, TMH

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

MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/106102064
2	https://archive.nptel.ac.in/courses/106/106/106106127/
3	https://onlinecourses.nptel.ac.in/noc20_cs85/preview

IV SEMESTER
22EE406: Lab.: Algorithm and Data Structure

Course Outcomes:
Upon successful completion of the course the students will be able to 1. Understand the trade-offs of algorithms and programming aspects 2. Apply various operation on data Structure 3. Analyze various types of Data Structure 4. Implement various types of algorithms and analyze performance of system 5. Develop programs using data structures and latest compilers

Sr. No.	Experiments based on
1	Write a program on control Structure & Statements
2	Write a program on If –else structure
3	Write a program on Case Statement
4	Write a program on Functions
5	Write a program on Macros
6	Write a program on Pointers
7	Write a program on Structures
8	Write a program on Linked List
9	Write a program on Doubly linked list
10	Write a program on graphs
11	Write a program on Trees
12	Write a program on Search Algorithms
13	Write a program on Stacks

IV SEMESTER
22EE407: Digital CMOS Circuits

Course Outcomes:
Upon successful completion of the course the students will be able to 1. Describe and interpret the basic concepts of MOS transistors, 2.Construct the ability to design a system, component or process as per needs and specifications. 3. Analyze inverter design, characteristics and applications and performance parameters of CMOS Circuits. 4. Evaluate circuits using different CMOS styles and measure performance of the complex logic structures.

Unit:1	**Introduction of MOSFETs**	**7 Hours**
Introduction of MOSFETs: CMOS Fabrication Process steps, NMOS Enhancement Transistor, MOS Transistor Operations, PMOS Enhancement Transistor, Regions of Operations, Threshold Voltage, MOS Device Equations, Small Signal Modeling of MOSFETs. **(Contemporary Issues related to Topic)**		

Unit:2	**Logic Design With MOSFETs**	**7 Hours**
Logic Design With MOSFETs: Ideal Switches and Boolean Operations, MOSFETs as Switches, Basic Logic Gates in CMOS, Compound Gates in CMOS, Transmission Gate Circuits (TG), Pass Transistor. **(Contemporary Issues related to Topic)**		

Unit:3	**MOS inverter Characteristics**	**7 Hours**
MOS inverter Characteristics: Resistive load inverter, Inverters with n type MOSFET load, CMOS inverter, Principle of operation, DC characteristics, Tristate Inverter, Noise Margin, Introduction to Bi-CMOS Inverter. **(Contemporary Issues related to Topic)**		

Unit:4	**Combinational circuit design**	**7 Hours**
Combinational circuit design, static CMOS, Ratioed Logic circuits, Analysis of CMOS Logic Gates: MOS Device Capacitance, Switching Characteristics, Rise Time, Fall Time, Propagation Delay, Power Dissipation in CMOS, Charge Sharing, Fan-in, Fan-out, Complex Logic Structures, Complementary Static CMOS, Pseudo NMOS Logic, Dynamic CMOS Logic, CMOS Domino Logic, CMOS Pass Transistor Logic. **(Contemporary Issues related to Topic)**		

Unit:5	**Sequential Circuit Design**	**7 Hours**
Sequential Circuit Design, Latches and Flip Flops. Advanced Techniques in CMOS Logic Circuits: and Flip-Flops, data path design. **(Contemporary Issues related to Topic)**		

Unit :6	Data path VLSI System Components	7 Hours
Data path VLSI System Components: Comparators, barrel shifters, Multiplexers, Binary Decoders, Equality Detectors and Comparators, Priority Encoders, Shift and Rotation Operations, Bit Adder Circuits, Multipliers. **(Contemporary Issues related to Topic)**		
Total Lecture Hours		**42 Hours**

Textbooks	
1	John P. Uyemura, Introduction to VLSI Circuits and Systems, Students Edition, Wiley Publication.

Reference Books	
1	Neil H. E. WesteHarris, Principle of CMOS VLSI Design, 4th Edition, Addison Wesley VLSI Series.
2	Sung-Mo Kang, Yusuf leblebici, CMOS VLSI Design, Third edition, 2008, TataMcGraw Hill.

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

MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/108107129
2	https://nptel.ac.in/courses/106103116
3	https://nptel.ac.in/courses/117106092

IV SEMESTER
22EE408: Lab.: Digital CMOS Circuits

Course Outcomes:
Upon successful completion of the course the students will be able to 1. Describe and interpret the basic concepts of MOS transistors. 2.Construct the ability to design a system, component or process as per needs and specifications. 3. Analyze inverter design, characteristics and applications and performance parameters of CMOS Circuits. 4. Evaluate circuits using different CMOS styles and measure performance of the complex logic structures.

Sr. No.	Experiments based on
1	Design of CMOS Inverter using DSCH2 Tool.
2	Gate Level Analysis of 2-Input NAND & NOR Gate.
3	Implement the Following Function using Compound Gates. F(A,B,C,D)=(ABC+CD)'
4	Design Half Adder using NAND Gates.
5	Design Full Adder using NAND Gates.
6	Design 2:1 Multiplexer using NAND Gates.
7	Design 2:4 Decoder using NAND Gates.
8	Design of 4 bit binary Adder
9	Draw Layout of CMOS Inverter Microwind/Cadence Tools
10	Draw Layout of 2-Input NAND Gate using Microwind /Cadence Tools
11	Draw Layout of Multiplexer
12	Design 4 bit adder circuits
13	Design Multiplier circuits

IV SEMESTER
22EE409: Electromagnetic Fields

Course Outcomes:
Upon successful completion of the course the students will be able to 1. **Define** and **recognize** different co-ordinate systems, apply different techniques of vector calculus to understand concepts of electromagnetic field theory. 2. **Determine** the electromagnetic force exerted on charged particles, current elements, working principle of various electric and magnetic fields. 3. **Explain** fundamental laws governing electromagnetic fields and evaluate the physical quantities of electromagnetic fields in different media using the fundamental laws. 4. **Deduce** and justify the concepts of electromagnetic waves, means of transporting energy or information, in the form of radio waves.

Unit:1	**Orthogonal coordinate systems**	**7 Hours**
Orthogonal coordinate systems: Cartesian, Cylindrical, Spherical and Transformations, differential lengths, surfaces and volumes. **(Contemporary Issues related to Topic)**		

Unit:2	**Electric field**	**7 Hours**
Coulomb's law, Electric field Intensity for different charge distribution: Point, Line, Surface & Volume, Electric flux, Gauss's law and Application, Divergence, Maxwell's First equation (Electrostatics), The Divergence Theorem. **(Contemporary Issues related to Topic)**		

Unit:3	**Energy & Potential**	**7 Hours**
Energy & Potential: Energy Expended in Moving a Point charge in an Electric Field, Definition of Potential Difference and Potential, Potential field of a point charge, Potential field of a System of charges: Conservative Property, Potential Gradient, The Dipole, Poisson's and Laplace's equation, Uniqueness Of Electrostatic solution. **(Contemporary Issues related to Topic)**		

Unit:4	**Magnetic fields**	**7 Hours**
Biot-Savart's law and its applications, Ampere's Circuital law and its applications, Curl, Stoke's Theorem, Magnetic flux and magnetic flux density, Faraday's law, displacement current, Maxwell's equations for static and time varying fields with physical significance. **(Contemporary Issues related to Topic)**		

Unit:5	Uniform plane wave	7 Hours
Uniform plane wave, wave propagation in free space & dielectric, Poynting's Theorem and Wave Power, Propagation in Good Conductors: Skin Effect. **(Contemporary Issues related to Topic)**		
Unit :6	**Reflection of uniform plane waves**	**7 Hours**
Reflection of uniform plane waves at Normal incidence, standing wave ratio, plane wave propagation in general directions, plane wave reflection at oblique incidence angles, Brewsters angle. **(Contemporary Issues related to Topic)**		
Total Lecture Hours		**42 Hours**

Textbooks	
1	William H. Hayt, Engineering Electromagnetic, 7th Edition, Tata McGraw – Hill, 2006 reprint.

Reference Books	
1	J D Kraus, Electromagnetics, 3rd edition 1984, McGraw – Hill
2	M. N. O. Sadiku, Elements of Electromagnetics, 4th edition 2007, Oxford Press
3	Ashutosh Pramanik, Electromagnetism: Theory and application, 2nd edition august 2009, Prentice Hall

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
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MOOCs Links and additional reading, learning, video material	
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2	https://nptel.ac.in/courses/108106073
3	https://nptel.ac.in/courses/115101005

IV SEMESTER
22EE410 : Lab: Electronics Workshop

Course Outcomes:
Upon successful completion of the course the students will be able to 1. Students Will able to identify different Electronics Components. 2.Students Will be able to work in teamwork 3.Students Will be able to do Artwork, printing, etching & drilling of PCB 4.Students will be able to do mini projects to enhance their practical Knowledge.

Sr. No.	Experiments based on
1	Identification of Various electronic components used in electronics workshop
2	Identification of various equipment used in electronics workshop
3	Testing of various electronics components
4	Soldering and De-Soldering Practice
5	PCB Design using EDA Tools (Orcad Layout Plus /Allegro/ MultisimUltiboard / EasyEDA / Express PCB)
6	Etching and fabrication
7	Mini Project (Arduino / Node MCU / Raspberry Pi, etc.)
8	Report Writing

IV SEMESTER

22EE411 : 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

IV SEMESTER

Audit Course

MLC2124 : YCAP4 -

IV SEMESTER

MLC108 : Basics of Arduino programming

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Learn features of Arduino 2. Develop programming techniques for Arduino 3. Understand interfacing of Arduino with peripherals **4.** Use of Arduino for any application

Unit I:	**(4 Hrs.)**
Overview of Arduino: What is Arduino, Types of Arduino, Architecture of Arduino	
Unit II:	**(4 Hrs.)**
Electronic components and connections, Introduction to Arduino	
Unit III:	**(4 Hrs.)**
Arduino components and IDE, First Arduino Program,	
Unit IV:	**(4 Hrs.)**
Arduino with Tricolor LED and Push button, Arduino with LCD	
Unit V:	**(4 Hrs.)**
Display counter using Arduino, Seven segment display,	
Unit VI:	**(4 Hrs.)**
Pulse Width Modulation, Analog to Digital Conversion, Wireless Connectivity to Arduino	
Total Lecture	**24 Hours**

Textbooks:	
1.	50 ELECTRONIC PROJECTS, by A.K.Maini
2.	Arduino Book for Beginners,by Mike Cheich

Reference Books:	
1.	Make: Getting Started With Arduino, Fourth Edition (Grayscale Indian Edition), by Massimo Banzi (Author), Michael Shiloh (Author)

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

MOOCs Links and additional reading, learning, video material	
1.	https://spoken-tutorial.org/
2.	https://spoken-tutorial.org/media/videos/85/Arduino-Brochure-English.pdf

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 Electronics Engineering)

B. Tech in Electronics Engineering

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

SoE No. 22EE-101

B.TECH SCHEME OF EXAMINATION 2022

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

(Department of Electronics Engineering)

B. Tech in Electronics Engineering

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	EE	22EE501	Analog Communication	T	3	0	0	3	3	30	20	50	3 Hrs
2	5	PC	EE	22EE502	**Lab:** Analog Communication	P	0	0	2	2	1		60	40	
3	5	PC	EE	22EE503	Embedded System	T	3	0	0	3	3	30	20	50	3 Hrs
4	5	PC	EE	22EE504	**Lab:** Embedded System	P	0	0	2	2	1		60	40	
5	5	PC	EE	22EE505	Analog Integrated Circuits & Design	T	3	0	0	3	3	30	20	50	3 Hrs
6	5	PC	EE	22EE506	**Lab:** Analog Integrated Circuits & Design	T	0	0	2	2	1	30	20	50	3 Hrs
7	5	PE	EE		**Professional Elective-I**	T	3	0	0	3	3	30	20	50	3 Hrs
8	5	PE	EE		**Lab.**: Professional Elective-I	P	0	0	2	2	1		60	40	
9	5	STR	EE	22EE507	Industrial training, Seminar & Report	P	0	0	2	2	1		60	40	
10	5	OE-I	EE		**Open Elective - I**	T	3	0	0	3	3	30	20	50	3 Hrs
11	5	OE-II	EE		**Open Elective - II**	T	3	0	0	3	3	30	20	50	3 Hrs
TOTAL FOURTH SEM							**18**	**0**	**10**	**28**	**23**				

List of Professional Electives-I *

1	5	PE-I	EE	22EE511	PE-I:Operating System
2	5	PE-I	EE	22EE512	PE-I: **Lab:** Operating System
3	5	PE-I	EE	22EE513	PE-I: Object Oriented Programming
4	5	PE-I	EE	22EE514	PE-I: **Lab:** Object Oriented Programming
5	5	PE-I	EE	22EE515	PE-I: Computer Communication Networks
6	5	PE-I	EE	22EE516	PE-I: **Lab:** Computer Communication Networks
7	5	PE-I	EE	22EE517	PE-I: Analog VLSI Design
8	5	PE-I	EE	22EE518	PE-I: **Lab:** Analog VLSI Design

Open Elective-I

1	5	OE-I	EE	22EE531	OE I : Fuzzy Logic & Neural Networks
2	5	OE-I	EE	22EE532	OE I : Basics of Analog and Digital
3	5	OE-I	EE	22EE533	OE I : Biomedical Instrumentation
4	5	OE-I	EE	22EE534	OE I : Digital Logic Design

Open Elective-II

1	5	OE-II	EE	22EE551	OE II : Sensors and Actuators
2	5	OE-II	EE	22EE552	OE II : Computer Architecture
3	5	OE-II	EE	22EE553	OE II : Consumer Electronics
4	5	OE-II	EE	22EE554	OE II : Industrial Automation

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, 12 marks on two TA2 activitied decided by course teacher, 2 marks on class attendance and 4 marks on TA4

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
22EE501 : Analog Communication

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Demonstrate and analyze various analog modulation and demodulation techniques. 2. Understand various types of receivers & noise in communication system and investigate noise parameters. 3. Analyze various pulse modulation techniques. 4. Apply the concept of Radiation & Propagation of waves to design communication system. **5.** Simulate and conduct experiments on different types of Analog communication subsystems.		
Unit:1	Amplitude Modulation: Need for modulation, mathematical Analysis, modulation index, frequency spectrum, power requirement of AM, DSB-SC, Balanced Modulator for carrier suppression, SSB, Methods of SSB Generation, Generation of AM system.	**7 Hours**
Unit:2	Angle Modulation: Frequency Modulation (FM), mathematical Analysis, modulation index, frequency spectrum, power requirement of FM, narrowband & wideband FM, noise triangle in FM, pre-emphasis & de-emphasis techniques, phase modulation, noise reduction characteristics of angle modulation, FM Transmitter	**7 Hours**
Unit:3	Receivers: Basic receiver (TRF), Super heterodyne receiver, performance parameters for receiver such as sensitivity, selectivity, fidelity, image frequency rejection etc., AM detectors, FM discriminators, double-spotting effect.	**7 Hours**
Unit:4	Noise: External Noise, internal Noise, Noise Calculations, Addition of Noise due to several sources, Addition of Noise due to several amplifiers in cascade, Noise in reactive circuits, Definition of Noise figure, signal to noise ratio, calculation of noise figure, Noise figure from equivalent resistance, Noise Temperature.	**7 Hours**
Unit:5	Pulse Modulation: Generation and demodulation of PAM, PWM, PPM, Time division Multiplexing, Frequency division multiplexing, Pulse code modulation.	**7 Hours**
Unit :6	Radiation & Propagation of waves:-Fundamental of electromagnetic waves, propagation of waves- Ground wave, space wave and sky wave propagation, tropospheric scatter propagation, extraterrestrial communications.	**7 Hours**
Total Lecture Hours		**42 Hours**

Textbooks	
1	Electronic communication system , Fourth edition, Gorge kennedy,Tata McGraw-Hill
Reference Books	
1	G.K. Mithal, Radio Engineering, Khanna Publications
2	
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://172.16.1.9/LocalGuru/listLectures.php?cid=29086f3420285fdf&bid=927d7542627865a3
MOOCs Links and additional reading, learning, video material	
1	http://nptel.iitm.ac.in/syllabus/syllabus.php?subjectId=117101055

V Semester
22EE502 : Lab:- Analog Communication

Course Outcomes:
Upon successful completion of the course the students will be able to 1. Demonstrate and analyze various analog modulation and demodulation techniques. 2. Understand various types of receivers & noise in communication system and investigate noise parameters. 3. Analyze various pulse modulation techniques. 4. Apply the concept of Radiation & Propagation of waves to design communication system. **5.** Simulate and conduct experiments on different types of Analog communication subsystems.

Sr. No.	Experiments based on
1	To study the Generation of Amplitude Modulation using transistor. Calculate modulation index for value of modulating amplitude.
2	To study the Generation of Frequency Modulation and calculate the depth of modulation by varying the modulating voltage.
3	To perform Frequency Demodulation using Foster Seeley Detector.
4	To perform DSB-SC using Balanced Modulator.
5	To generate and observe the Single Side Band (SSB) using Filter method.
6	To study the Pulse Amplitude modulation and de-modulation and their waveforms.
7	To study the Pulse Width Modulation (PWM) and Demodulation process and record the corresponding waveforms
8	To study the Pulse Position Modulation (PPM) and demodulation process and record corresponding waveforms

V Semester
22EE503 : Embedded System

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Understand & Learn concept of Architecture & organization of ARM. 2. Understand & Learn concept of RTOS Architecture. 3. Apply the concept of programming language to interface I/O Devices. 4. Establish the communication between the different Devices.		
Unit:1	Introduction to ARM, Advantages of architectural features of ARM Processor, Processor modes, Register organization, Exceptions and its handling, 3/5- stage pipeline ARM organization	**7 Hours**
Unit:2	ARM and THUMB instruction sets, ARM programmer's model, addressing modes, Instruction set in detail and programming, data processing instruction, data transfer instruction, Control flow instructions, simple assembly language programs.	**7 Hours**
Unit:3	ARM assembly language programs and C language programs. Code conversion programs.	**7 Hours**
Unit:4	LPC 2148 architecture block diagrams, pins and signals. GPIO, I / O Interfaces like LED and Switch and their Programs.	**7 Hours**
Unit:5	Display interfacing with LPC 2148. 7segment display interfacing. LCD interfacing and programs.	**7 Hours**
Unit :6	LPC 2148 TIMER and PWM Applications. Embedded ARM applications	**7 Hours**
	Total Lecture Hours	**42 Hours**

Text books	
1	ARM System–on-chip Architecture, 2nd edition, 2000, Steve Furber, Pearson Education Asia
2	Embedded Linux, Hardware, Software and interfacing, 2002. Craig Hallabaugh, Addison-Wesley Professional
3	ARM System Developer's Guide: Designing and Optimizing, 2005 Sloss Andrew N, Symes Dominic, Wright Chris Morgan Kaufman Publication
Reference Books	
1	Technical references on www.arm.com.
2	Web base resources for RTOS and μCOS.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://172.16.1.9/LocalGuru/listLectures.php?cid=29086f3420285fdf&bid=927d7542627865a3
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/106105159
2	https://nptel.ac.in/courses/106105193

V Semester
22EE504 : Lab:- Embedded System

Course Outcomes:
Upon successful completion of the course the students will be able to 1. Understand & Learn concept of Architecture & organization of ARM. 2. Understand & Learn concept of RTOS Architecture. 3. Apply the concept of programming language to interface I/O Devices. 4. Establish the communication between the different Devices.

Sr. No.	Experiments based on
1	To swap data byte.
2	To perform addition, subtraction of 16 bit number.
3	To find larger of a two numbers.
4	To perform factorial of a given number.
5	To perform ON/OFF LED and show status of LED on LCD.
6	To display number from 0 to 9 on seven segment display.
7	To ON/OFF LED using Switch.
8	To rotate a stepper motor in clockwise & anti-clock wise direction with equal delay.
9	Perform experiment on DAC of LPC2103
10	ADC and display value on LCD.

V Semester
22EE505 : Analog Integrated Circuits & Design

Course Outcomes:

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

CO-1 : Student will acquire knowledge of the fundamentals, the different Parameters and internal structure of the operational amplifier.
CO-2 : Student will analyze and design the linear applications of the operational amplifier.
CO-3 : Students will analyze and design active Butterworth filters using operational amplifier
CO-4 : Student will analyze and design the non-linear applications of the operational amplifier.
CO-5 : Student will be able to use simulation tools and hardware to conduct experiments using operational amplifier circuits

Unit:1	Differential Amplifier, configurations, DC & AC Analysis of DIBO and DIUBO, Differential amplifier using swamping resistor, constant current bias, current mirror, cascaded differential amplifier. DC Level Shifter.	**7 Hours**
Unit:2	OPERATIONAL AMPLIFIER FUNDAMENTALS: Block Diagram of Op-AMP, Ideal Op-Amp, OPAMP parameters, Basic Op-Amp Configurations: Open loop, Feedback in OPAMP circuit: Inverting, Non-inverting, voltage follower. Compensation of error parameters :Input Bias and Offset Current, Input Bias and Offset voltages, frequency compensation.	**7 Hours**
Unit:3	LINEAR APPLICATIONS : Summing, difference amplifier, integrator, differentiator, Current-to-Voltage Converter, Voltage-to-Current Converter, Instrumentation Amplifiers, Instrumentation Applications, Transducer Bridge amplifiers.Precision Rectifiers, Log/Antilog amplifiers	**7 Hours**
Unit:4	ACTIVE FILTERS: Transfer function, first order filter, Standard second order response, higher order filter, KRC Filters, Multiple feedback filters, second and higher order Butterworth filter design.	**6 Hours**
Unit:5	NONLINEAR CIRCUITS: Voltage Comparators, Comparator Applications, Peak Detectors, Schmitt Triggers: Inverting & Non-inverting, Sample-and-Hold Circuits, clipper, clamper, WAVEFORM GENERATORS: multivibrators, triangular wave generator, Sinusoidal Oscillators.	**7 Hours**
Unit :6	Monolithic timer IC555, D-A AND A-D CONVERTERS: Performance Specifications of D-A Converters (DACs) and A-D Converters (ADCs), D-A Conversion Techniques, A-D Conversion Techniques.	**7 Hours**
	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	Op-amps and Linear Integrated Circuits, RamakantA.Gayakwad,Prentice Hall 3rd Edition
2	Linear Integrated Circuits, S. Salivahanan, V. S. Bhaaskaran, Tata McGraw Hill Publication 3rd Edition
3	Linear Integrated Circuits, D. Roy Chaudhuri, Shail Jain, New Age International 3rd Edition
Reference Books	
1	Design with Operational Amplifiers and Analog Integrated Circuits, Sergio Franco, McGraw-Hill 3rd Edition
2	
3	
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://172.16.1.9/LocalGuru/listLectures.php?cid=29086f3420285fdf&bid=927d7542627865a3
2	
MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.nptel.ac.in/noc24_ee73/preview
2	https://archive.nptel.ac.in/courses/108/108/108108111/
3	

V Semester
22EE506 : Lab:- Analog Integrated Circuits & Design

Course Outcomes:
Upon successful completion of the course the students will be able to **CO-1 :** Student will acquire knowledge of the fundamentals, the different Parameters and internal structure of the operational amplifier. **CO-2 :** Student will analyze and design the linear applications of the operational amplifier. **CO-3 :** Students will analyze and design active Butterworth filters using operational amplifier **CO-4 :** Student will analyze and design the non-linear applications of the operational amplifier. **CO-5 :** Student will be able to use simulation tools and hardware to conduct experiments using operational amplifier circuits

Sr. No.	Experiments based on
1	To determine DC operating point and verify Gain relationship of Dual input Balanced Output Differential amplifier. To plot input output waveforms.
2	To determine DC operating point and verify Gain relationship of Dual input Un-balanced Output Differential amplifier. To plot input output waveforms.
3	To verify Gain relationship of Inverting and Non-inverting amplifier. To plot frequency response of Non-Inverting amplifier and verify gain bandwidth relation.
4	To determine CMRR and Slew rate of OP-AMP and compare with theoretical values.
5	To verify gain relationship of Summer, Scalar and Subtractor circuits.
6	To determine cut-off frequencies f_a and f_b of Integrator using frequency response and verify input output waveforms.
7	To determine cut-off frequencies f_a and f_b of Differentiator using frequency response and verify input output waveforms.
8	To determine cut-off frequency of second order Butterworth Low pass filter using frequency response and verify order of filter from stop band of frequency response.
9	To determine cut-off frequency of second order Butterworth High pass filter using frequency response and verify order of filter from stop band of frequency response.
10	To verify VUT and VLT of Schmitt trigger using OP-AMP IC 741 and plot the hysteresis curve.

V Semester
22EE507 : Industrial training, Seminar & Report

V Semester
22EE511 : PE-I: Operating System

Course Outcomes:		
Upon successful completion of the course the students will be able to 1.Understand the concepts of operating systems and processes 2. Learn processes, threads and memory management and storage structures 3. Evaluate the algorithms and solutions for operating system management 4. Analyze the security issues in operating systems		
Unit:1		**7 Hours**
Computer System organization, Architecture, Structure, Operations, Process Management, Memory Management, OS Services, User Operating System Interface, System Calls, System Programs		
Unit:2		**7 Hours**
Process Concept, Scheduling, Operations, Scheduling Criteria, Scheduling Algorithms, Tread Scheduling, Multiple Processor Scheduling		
Unit:3		**7 Hours**
Synchronization, Critical Section Problem, Semaphores, Deadlocks, System Models, Characterization, Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance		
Unit:4		**6 Hours**
Memory Management Strategies, Swapping, Continuous Memory Allocation, Paging, Segmentation, Virtual Memory Management, Demand Paging, Page Replacement, Trashing,		
Unit:5		**7 Hours**
File System Concept, Access Methods, Directory and Disk Structure, Mounting, Sharing, Mass Storage Structure, Disk Attachment, Scheduling, RAID Structure		
Unit :6		**7 Hours**
Protection and Security, Domain of Protection, Access Matrix, Access Control, Language based Protection, Security Problem, System and Network Threats, Cryptography as Security Tool		
	Total Lecture Hours	**39 Hours**

Text books	
1	Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin , John Wiley & Sons Publications

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

Reference Books	
1	Modern Operating Systems, Andrew S. Tanenbaum, Prentice Hall of India Pvt. Ltd
2	Operating System, William Stallings, Prentice Hall of India
3	
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://172.16.1.9/LocalGuru/listLectures.php?cid=29086f3420285fdf&bid=927d7542627865a3
2	
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/106105214
2	https://archive.nptel.ac.in/courses/106/105/106105214/
3	https://onlinecourses.nptel.ac.in/noc23_cs101/preview
4	https://nptel.ac.in/courses/106106144

V Semester
22EE512 : PE-I: Lab: Operating System

Course Outcomes:
Upon successful completion of the course the students will be able to 1.Understand the concepts of operating systems and processes 2. Learn processes, threads and memory management and storage structures 3. Evaluate the algorithms and solutions for operating system management 4. Analyze the security issues in operating systems

Sr. No.	Experiments based on
1	Study of various operating systems
2	Study of various command line programs
3	Study of processor architectures
4	Study of semiconductor memory types
5	Study of synchronization problems in operating systems
6	Study of deadlock avoidance, semaphores
7	Study of memory management in operating systems.
8	Study of computer viruses
9	Study of device driver programming
10	Study of Real time Operating Systems

V Semester
22EE513 : PE-I: Object Oriented Programming

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Understand the concept of Object Oriented Programming 2. Analyse the concept of Inheritance , Polymorphism, overloading 3. Choose the appropriate data structure and algorithm design method for specified application 4. Develop and use linear and non-linear data structures 5. Create software solutions for complex problems		
Unit:1		**7 Hours**
Principles of Object Oriented Programming (OOP), Software Evaluation, OOP Paradigm, Basic Concepts of OOP, Benefits of OOP, Application of OOP		
Unit:2		**7 Hours**
Introduction to C++, Tokens, Keywords, Identifiers, Variables, Operators, Manipulators, Expressions and Control Structures, Pointers, Functions, Function Prototyping Parameters Passing in Functions, Values Return by Functions, Inline Functions, Friend and Virtual Functions		
Unit:3		**7 Hours**
Classes and Objects, Constructors and Destructors, Operator overloading, Type of Constructors, Function Overloading, Inheritance, Types of Inheritance Virtual Functions and Polymorphism		
Unit:4		**7 Hours**
Definition of a data structure, Primitive and Composite data types, Asymptotic notations, Arrays, Operations of Arrays, Order lists, Stacks, Applications of Stack, Infix to Postfix Conversion, Recursion, Queues, Operations of Queues. (7 Hours)		
Unit:5		**7 Hours**
Singly linked list, Operations, Doubly linked list, Operations, Trees and Graphs: Binary tree, Tree traversal; Graph, Definition, Types of Graphs, Traversal (BFS & DFS), Dijkstra`s algorithm		
Unit :6		**7 Hours**
Files, classes for file stream operations, Opening, Closing and Processing files, End of file detection , File pointes, Updating a file , Error Handling during file operations, Command line arguments, Templates, Exception Handling		
	Total Lecture Hours	**42 Hours**

Text books	
1	Object Oriented programming with C++, E. Balagurusamy
Reference Books	
1	Fundamentals of Data Structures in C++, Robert Lafore
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://172.16.1.9/LocalGuru/listLectures.php?cid=29086f3420285fdf&bid=927d7542627865a3
2	
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/106105153
2	https://archive.nptel.ac.in/courses/106/105/106105153/
3	https://nptel.ac.in/courses/106105151
4	https://onlinecourses.nptel.ac.in/noc19_cs48/preview

V Semester
22EE514 : PE-I: Lab: Object Oriented Programming

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Understand the concept of Object-Oriented Programming
2. Analyse the concept of Inheritance, Polymorphism, overloading.
3. Choose the appropriate data structure and algorithm design method for specified application.
4. Develop and use linear and non-linear data structures.
5. Create software solutions for complex problems

Sr. No.	Experiments based on
1	Implement the concept of Class and its data members and member functions in C++
2	Implement the concept of function and operator overloading in C++
3	Implement the concept of friend function
4	Implement the concept of class constructor and its type in C++
5	Implement the concept of Abstraction in C++
6	Implement the concept of all types of inheritance in C++
7	Implement the concept of run time polymorphism in C++
8	Implement the concept of Files using command line arguments in C++
9	Implement the concept of function templates and class template in C++
10	Implement the concept of exception in C++

V Semester
22EE515 : PE-I: Computer Communication Networks

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Understand fundamental underlying principles of computer networking 2. Describe and analyze a number of data link, network, and transport layer protocols. 3. Analyze and design routing algorithms. 4. Understand network security and the working of various application layer protocols 5. Design and simulate basic network concepts using modern tool		
Unit:1	Introduction, network and services: communication network, approaches to network design, types of network, two stage and three stage network. Uses of computer networks, LAN, MAN, WAN, design issues for layers, connection oriented and connectionless services, service primitives, Application and layered architecture, OSI reference model.	**7 Hours**
Unit:2	Physical layer and medium access layer: Guided transmission media, Unguided transmission media, multiple access protocols, IEEE standard 802 for LAN and MAN, high speed LANS, repeaters, hubs, bridges, fast Ethernet, Wireless LAN	**7 Hours**
Unit:3	Data link layer: .Data link layer design issues, Framing, error detection and correction methods, , Flow Control ,elementary data link protocols, sliding window protocols.	**7 Hours**
Unit:4	Network layer and transport layer: network layer design issues, routing, congestion, internetworking, transport layer design issues, transport service primitives, internet transport protocol, TCP/IP architecture, TCP/IP protocol, IP packets, IP addressing, TCP/IP utilities ,wireless TCP and UDP, routers and gateways	**7 Hours**
Unit:5	Application layer: Domain name system, electronic mail system, Remote Logging and File Transfer, WWW and HTTP, Multimedia.	**7 Hours**
Unit :6	Security: Cryptography, e-mail security, web security, communication security, Digital Signature Entity Authentication, FIREWALLS, SSL Services	**7 Hours**
	Total Lecture Hours	**42 Hours**

Text books	
1	Data Communications and Networking by Behrouz a Forouzan,5th Edition
Reference Books	
1	Computer Networks by Tanenbaum,5th Edition
2	Data and Computer Communication by W. Stallings ,8th Edition
3	
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://172.16.1.9/LocalGuru/listLectures.php?cid=29086f3420285fdf&bid=927d7542627865a3
2	
MOOCs Links and additional reading, learning, video material	
1	https://www.tutorialspoint.com/digital_communication/digital_communication_quick_guide.htm
2	https://nptel.ac.in/courses/106/105/106105080/
3	https://nptel.ac.in/courses/106/106/106106091/

V Semester
22EE516 : PE-I: Lab: Computer Communication Networks

Course Outcomes:
Upon successful completion of the course the students will be able to 1. Understand fundamental underlying principles of computer networking 2. Describe and analyze a number of data link, network, and transport layer protocols. 3. Analyze and design routing algorithms. 4. Understand network security and the working of various application layer protocols 5. Design and simulate basic network concepts using modern tool

Sr. No.	Experiments based on
1	To construct and verify Simple LAN using Cisco Packet Tracer.
2	To Connect Two Local Area Networks using a Router using Cisco Packet Tracer
3	To design Star and Bus Topology using Cisco Packet Tracer.
4	To design Mesh and Ring Topology using Cisco Packet Tracer.
5	To design Static routing using 3 routers using Cisco Packet Tracer.
6	To design Wireless LAN using Cisco Packet Tracer.
7	To Connect DNS server using Packet tracer
8	To study Fabrication of UTP cables.

V Semester
22EE517 : PE-I: Analog VLSI Design

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. **understand** and **explain** concepts related to MOSFET 2. **apply** the knowledge of circuit analysis models in analysis of analog VLSI circuit 3. **analyze** given analog VLSI circuit to arrive at a suitable conclusion 4. **design** analog VLSI circuit for given application and specifications 5. **design** and **conduct** experiment using analog VLSI circuit for given application and specifications		
Unit:1	Basic MOS Device Physics: Basic MOS Device Physics: Threshold voltage, Derivation of I/V characteristics, second order effects, MOS device capacitance, MOS small signal models, MOS SPICE models.	**7 Hours**
Unit:2	Single stage amplifiers: Basic concept, common source, common source stage with resistive load, CS stage with source degeneration, source follower, common gate.	**7 Hours**
Unit:3	Differential amplifiers: Single ended & differential operation, Basic differential pair, qualitative and quantitative analysis, Common mode response	**7 Hours**
Unit:4	Passive and active current mirrors: Basic current mirror,Cascode current mirror, Active current mirror,common mode properties	**6 Hours**
Unit:5	frequency response of amplifiers: Miller effect, association of poles with node, common source stage , source follower, common gate stage	**7 Hours**
Unit :6	Operational amplifiers: Performance parameters, one stage op amp, Two stage op amp, Gain boosting, Noise in op amp (6	**7 Hours**
	Total Lecture Hours	**41 Hours**

Text books	
1	Design of Analog CMOS Integrated circuits, Ninteenth reprint 2010 ,BehzadRazavi Mc-graw-Hill
Reference Books	
1	CMOS circuit design, layout, and Simulation, Second edition, reprint 2009,Jacob Baker WSE
2	CMOS Analog Circuit Design second edition, 2010 P.E.Allen, D.R.Holdberg, Oxford univ. press
3	Analysis and Design of Analog Integrated Circuits fifth edition, reprint 2010 Paul B Gray , Hurst , Lewis, Meyer John Wiley & sons
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://172.16.1.9/LocalGuru/listLectures.php?cid=29086f3420285fdf&bid=927d7542627865a3
2	
MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.nptel.ac.in/noc23_ee142/preview
2	https://nptel.ac.in/courses/117101105

V Semester
22EE518 : PE-I: Lab: Analog VLSI Design

Course Outcomes:
Upon successful completion of the course the students will be able to 1. **understand** and **explain** concepts related to MOSFET 2. **apply** the knowledge of circuit analysis models in analysis of analog VLSI circuit 3. **analyze** given analog VLSI circuit to arrive at a suitable conclusion 4. **design** analog VLSI circuit for given application and specifications 5. **design** and **conduct** experiment using analog VLSI circuit for given application and specifications

Sr. No.	Experiments based on
1	NMOS characteristic :- VdsVs ID for various values of Vgs.
2	PMOS characteristic :- VdsVs ID for various values of Vgs.
3	Current source using current mirror :- DC analysis
4	Common Source amplifier:- AC analysis Transient analysis
5	Common Drain amplifier:- AC analysis ,Transient analysis
6	Differential Amplifier :- AC analysis Transfer curve (Vin VsVout, DC condition)
7	Op-Amp Design: AC analysis Transient analysis DC analysis
8	SPICE simulation of basic analog circuits, Analog Circuit simulation Verification of layouts.
9	Basic CMOS Comparator Design
10	Source Coupled Pair Differential Amplifier

V Semester
22EE531 : OE I : Fuzzy Logic & Neural Networks

Course Outcomes:

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

CO1: Understand and learn the basic concepts, working principles of various soft computing techniques, especially Fuzzy logic and Artificial Neural Networks.

CO2: Analyze the problem statements; provide engineering solutions through development of membership functions / membership graphs, Learning & Recognition approaches

CO3: Work on Case studies based on Application areas of Soft Computing, Design / Develop and Demonstrate models for Fuzzy controllers, Neural Networks

CO4: Get involved in self learning approach for developing models using Soft computing techniques, Reveal different applications of these models to solve engineering and other problems and develop solutions for problems related to society and industry needs, writing Technical reports, presentations.

Unit:1	Crisp sets: An overview, Fuzzy sets: Basic types, basic concepts, basic properties of α-cuts, representation of fuzzy sets, and extension principle of fuzzy sets	**7 Hours**
Unit:2	Operations on fuzzy sets, Fuzzy numbers, Arithmetic operations on intervals, arithmetic operations on fuzzy numbers	**7 Hours**
Unit:3	Fuzzy controllers: an overview with applications, applications of fuzzy logic	**7 Hours**
Unit:4	Fundamental concepts of ANN: Basic building blocks of artificial neural networks, network architectures, activation functions, McCulloch-Pitt's neuron model	**6 Hours**
Unit:5	Brief introduction to single layer and multilayer perceptions, ADALINE and MADALINE, feed-forward networks, back propagation networks and applications.	**7 Hours**
Unit :6	Radial basis function network, Self organizing feature map and applications of ANN	**7 Hours**
	Total Lecture Hours	**39 Hours**

Text books	
1	'Fuzzy sets and Fuzzy logic', George J. Klir and Bo Yuan, Prentice Hall
2	Neural Networks: A comprehensive Foundation', Simon Haykin, Pearson publications
Reference Books	
1	'Principles of Soft Computing', S. N. Sivanandanam, S.N.Deepa, Wiley Publication
2	Fuzzy sets: Uncertainty & information, Klir and Folger, PHI
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://172.16.1.9/LocalGuru/listLectures.php?cid=29086f3420285fdf&bid=927d7542627865a3
2	
MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.nptel.ac.in/noc22_ge04/preview
2	https://www.udemy.com/course/fuzzylogic/
3	www.digimat.in › nptel › courses ›
4	NPTEL Video Course: NOC:Introduction to Soft Computing

V Semester
22EE532 : OE I : Basics of Analog and Digital Communication

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Understand different modulation and demodulation schemes for analog communication with the concept of noise 2. Understand different pulse analog and digital modulation techniques. 3. Understand different digital modulation schemes 4. Understand the different coding techniques for communication systems.		
Unit:1	Basic block diagram of Analog communication system, Modulation techniques: Need for modulation, Basic concepts of AM, FM, PM, Transmitters	**7 Hours**
Unit:2	Receivers: Basic receiver (TRF), Super heterodyne receiver, AM detectors, FM Detectors, Noise Types of Noise, Definition of Noise figure, signal to noise ratio, calculation of noise figure.	**7 Hours**
Unit:3	Pulse Modulation: Generation and demodulation of PAM, PWM, PPM, Time division Multiplexing, Frequency division multiplexing, Basic digital Modulation System- PCM.	**7 Hours**
Unit:4	Channel capacity, DPCM, Delta Modulation, ADM, ADPCM, Adaptive sub-band coding, applications.	**6 Hours**
Unit:5	Digital Modulation techniques: ASK, FSK, PSK, BPSK, QPSK, MSK, DPSK, BFSK, M-ary PSK, FSK, and QAM.	**7 Hours**
Unit :6	Source coding and channel coding, Information theory, Huffman coding, LZ coding, Basic concept of convolution code.	**7 Hours**
	Total Lecture Hours	**39 Hours**

Text books	
1	Electronic Communication System Fifth Edition, Gorge Kennedy Tata McGraw-Hill
2	Digital Communications 1999 Symon Hykin Wiley, 1988

Reference Books	
1	Electronic Communication Systems Second Edition, 1993 Frank R. Dungan Delmar Publishers
2	Communication Electronics Third Edition, 2007 Louis Frenzel McGraw-Hill

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]
http://172.16.1.9/LocalGuru/listLectures.php?cid=29086f3420285fdf&bid=927d7542627865a3
MOOCs Links and additional reading, learning, video material
https://archive.nptel.ac.in/courses/117/105/117105143/
https://nptel.ac.in/courses/117101051
https://nptel.ac.in/courses/108102120
https://archive.nptel.ac.in/courses/108/102/108102096/

V Semester
22EE533 : OE I : Biomedical Instrumentation

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Differentiate and analyse the biomedical signal sources. 2. Understand cardiovascular system and related measurements. 3. Explain the respiratory and nervous systems and related measurements 4. Understand non-invasive diagnostic parameters		
Unit:1	Introduction to Biomedical instrumentation, development of biomedical instrumentation, biometrics, Physiological system of body, problems encountered in measuring a living system	**6 Hours**
Unit:2	Basic transducer principle, active transducer, passive transducer, electrode theory, biopotential electrodes, biochemical transducers	**7 Hours**
Unit:3	The heart and cardiovascular system, characteristics of blood flow, blood pressure measurement, heart sound measurement. Principles of ultrasonic diagnosis, temperature measurement, electrocardiograph, plethysmography, pulmonary function measurement spirometry, pulmonary function analyzers, respiratory gas analyzers.	**7 Hours**
Unit:4	Generation of ionizing radiation, instrumentation for diagnostic X-ray, special technique, instrumentation for medical use of radioisotopes, radiation therapy, EMG	**7 Hours**
Unit:5	Patient care and monitoring, the elements of intensive care monitoring , instrumentation for monitoring patient, pacemakers, defibrillators, Electrical safety of medical equipment. Physiological effects of electrical current, shock hazards from electrical equipments	**7 Hours**
Unit :6	Computers in biomedical instrumentation, digital computer, Telemedicine concept, Telemedicine applications, video conferencing, digital communication in telemedicine Teleradiology, Tele Cardiology, Telepsychiatry	**6 Hours**
Total Lecture Hours		**40 Hours**

Textbooks	
1	Leaslie Cromwell, Fred Weibell, Erich A Pfeiffer, Biomedical Instrumentation & Measurement ,Prentice Hall

Reference Books	
1	R.S.Khandpur, Handbook of Biomedical Instrumentation, TMH
2	Dean A Dmane, David Michaels, Bioelectronics Measurement, Prentice hall
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://172.16.1.9/LocalGuru/listLectures.php?cid=29086f3420285fdf&bid=927d7542627865a3
2	
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/108105101
2	https://onlinecourses.swayam2.ac.in/nou23_bt05/preview
3	https://onlinecourses.nptel.ac.in/noc22_bt56/preview
4	https://onlinecourses.nptel.ac.in/noc21_ee17/preview

V Semester
22EE534 : OE I : Digital Logic Design

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Simplify combination logic circuits using Boolean algebra and exhibit the methods to solve logical functions . 2. Understand and apply the concept of combinational logic circuits in various digital systems. 3. Understand and demonstrate the various codes and illustrate concept of logic family with their characteristics. 4. Understand the working of Flip-flops and its use to design Synchronous counters and Design and demonstrate finite state machines		
Unit:1	Number Systems and IEEE Floating point representations, Logic gates, Switching Algebra & simplification of Boolean expressions, Boolean algebraic theorems, DeMorgan's theorem, SOP, POS, Canonical forms of Boolean expression. Implementations of Boolean expressions using logic gates.	**7 Hours**
Unit:2	Combinational Circuits: Minimization methods: Karnaugh map(upto 4 variable), Quine McClauskey methods.	**7 Hours**
Unit:3	Design of Arithmetic circuits: Half & Full adders, Half & Full Subtractions, Comparators, Multi-bit Application designs, Formation of switching functions from word statements, Functions & its implementation using Multiplexer, De multiplexer, Encoder, Decoder	**7 Hours**
Unit:4	Combinational circuits design using MSI and LSI chips, PLA's ,Parity Checkers and generators, Introduction to Logic families & their characteristics such as Fan-In, Fan-out, Propagation delay, Power dissipation, Noise Margin.	**6 Hours**
Unit:5	Sequential circuits: Latches and flip-flops: RS-FF, D-FF, JK-FF, Master-Slave JK-FF & T-FF's, Excitation & Truth Table, Flip flop conversions, Shift registers, Introduction to Synchronous, Counters, Design of synchronous counter.	**7 Hours**
Unit :6	Classification of synchronous machines, Design of synchronous sequential machines using Moore & Mealy circuits: Sequence detector	**7 Hours**
Total LectureHours		**39 Hours**

Textbooks	
1	"Digital Circuits & Microprocessors" by Hebert Taub

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Reference Books	
1	Modern Digital Electronics by RP Jain , 3rd Edition, Tata McGraw Hill
2	Digital Design by M. Morris Mano , 4th edition 2008, Prentice Hall of India
3	
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://172.16.1.9/LocalGuru/listLectures.php?cid=29086f3420285fdf&bid=927d7542627865a3
2	
MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.nptel.ac.in/noc21_ee39/preview
2	https://nptel.ac.in/courses/117105080
3	https://nptel.ac.in/courses/108106177
4	https://archive.nptel.ac.in/courses/108/106/108106177/

V Semester
22EE551 : OEII : Sensor and actuators

Course Outcomes:
Upon successful completion of the course the students will be able to 1. Understand and explain the concepts of Sensors and Actuators. 2. Explain the working of magnetic sensors and its applications in real time scenario. 3. Acquire knowledge of Model linear actuators and differentiate various solenoids. 4. Evaluate performance characteristics of different types of sensors.

Unit:1	**Introduction Sensors and Actuators**	**7 Hours**
Classification of Sensors and Actuators - Magnetic Sensors - Special Magnetic Devices - Rotary and Linear Actuators - Magnetic Materials and Technology - Soft Magnetic Materials - Hard Magnetic Materials -Coating Technologies - Magnetic Materials Market and Applications.		
Unit:2	**Magnetic Sensors**	**6 Hours**
Theory of Magnetic Sensors - Magnetic Sensor Analysis - VR Sensors - Solid-State Sensors - Magnetic Sensor Applications - Magnetic Speed Sensor Requirements - Magnetic Speed Sensor Applications - Magnetic Position Sensor Applications - VR Sensor Noise.		
Unit:3	**Pressure Sensor**	**7 Hours**
Units of pressure - Manometers – Different types – Elastic type pressure gauges – Bourdon type bellows – Diaphragms – Electrical methods – Elastic elements with LVDT and strain gauges – Capacitive type pressure gauge – Piezo resistive pressure sensor – Resonator pressure sensor – Measurement of vacuum –Ionization gauge.		
Unit:4	**Position, Proximity, Flow Level Sensor**	**6 Hours**
Measurement of position using Hall effect sensors. Proximity sensors: Inductive & Capacitive, Use of proximity sensor as accelerometer and vibration sensor. Flow Sensors: Ultra sonic & Laser. Level Sensors: Ultra sonic & Capacitive		
Unit:5	**Linear Actuators**	**7 Hours**
Mathematical Model for Linear Actuators - Fast-Acting Actuators - Disk Solenoids - Plunger Solenoids - Ball Solenoids - Conical Solenoids - Applications of Solenoid Actuators - Long Stroke Solenoid Fuel Pump - Gasoline Injectors - Natural Gas Injectors - Diesel Fuel Injectors - Compressor Solenoid Valves .		
Unit :6	**Rotary Actuators**	**6 Hours**
Disk Rotary Actuators - Disk Rotary Actuator Analysis - Disk Rotary Actuator Design - Disk Rotary Actuator Excitation Electromagnetic Circuit - Disk Rotary Actuator Toothed Magnetic Part - Disk Rotary Actuator PM ,Cylindrical Rotary Actuators - Cylindrical Rotary Actuator PM - Cylindrical Rotary Actuator Excitation Electromagnetic Circuit.		
Total Lecture Hours		**39 Hours**

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Textbooks	
1	Measurement Systems – Application and Design, 6th Edition, E.O. Doebelin, Tata McGraw Hill publishing company, 2003
2	Sensors and Actuators in Mechatronics, Design and Applications, Andrzej M. Pawlak, Taylor & Francis Group 2006
Reference Books	
1	Principles of Industrial Instrumentation, 2nd Edition, D. Patranabis, Tata McGraw Hill Publishing Company Ltd, 1996
2	Mechanical and Industrial Measurements, R.K. Jain, Khanna Publishers, New Delhi,1999,
3	A Course on Mechanical Measurements, Instrumentation and Control, A.K. Sawhney and P. Sawhney, DhanpathRai and Co, 2004
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/108108147
2	https://nptel.ac.in/courses/108105064

V Semester
22EE552 : OE II : Computer Architecture

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. 1. Understand the basic concepts of peripherals of computer system 2. Apply the design issues in the development of computer system architecture 3. Analyze the concepts of Parallel processing and pipelining for computer architecture design 4. Evaluate parameters required for processor design		
Unit:1	**Register and processor Level Design**	**7 Hours**
Register Level components, Programmable logic devices, Register level design, The Processor level components, Processor level design		
Unit:2	**CPU Organization**	**6 Hours**
CPU organization, Data representation, Fixed point numbers, Floating point numbers, IEEE 754 floating point formats, Instruction sets – Instruction formats, instruction types, addressing modes		
Unit:3	**Datapath Design**	**7 Hours**
Fixed point arithmetic, addition and subtractions, Multiplication, Division, Arithmetic operations on Floating point numbers		
Unit:4	**Control design**	**6 Hours**
Basic Concepts, Hard-wired control-Design methods, classical method, one hot method, parallelism in microinstruction, Micro programmed control, Horizontal versus vertical, Multiplier Control Unit		
Unit:5	**Memory organization**	**7 Hours**
Device characteristics, RAM, Serial access memories, virtual memory, concept of cache & associative memories.		
Unit :6	**System Organization**	**6 Hours**
Local and long distance communication input-output systems, Interrupt, DMA, introduction to parallel Processing		
	Total Lecture Hours	**39 Hours**

Text books	
1	Jhon.P. Hayes, Computer Architecture and organization McGraw-Hill Companies
Reference Books	
1	Carl Hammacher, Computer organization , McGraw-Hill Science
2	Andrew S. Tanenbaum, Structured computer and Organization, PHI
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
1	http://103.152.199.179/YCCE/yccelibrary.html

V Semester
22EE553 : OE II : Consumer Electronics

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Understand and aware of the safety aspects in the field of Electrical and Electronics products. 2. Analyze the basics of Audio and Video Systems. 3. Know about recent trends in Processors and computer peripherals, mobile and wireless technologies. 4. Understand the basics of refrigeration cycle and cooling system		
Unit:1	**Standards and Safety norms**	**6 Hours**
Electronics and Electrical safety norms and standards, Electronic products covered under compulsory registration		
Unit:2	**Audio Systems**	**7 Hours**
Sound Recording and reproduction, Hi-Fi Sound System, Audio Mixers, Graphics Equalizers, Public Address System.		
Unit:3	**Video Systems**	**7 Hours**
Color fundamentals, Luminance and Chrominance signal , Color camera, digital television systems.		
Unit:4	**Wireless Technology & Mobile phones**	**6 Hours**
Mobile Phones, various wireless technologies, Introduction to 3G, WiFi Techhnology, GSM		
Unit:5	**Air conditioner and Refrigerators**	**6 Hours**
Fundamentals, Refrigeration cycles, compressors, home automation		
Unit :6	**Computers**	**7 Hours**
Recent microprocessor, Pentium family architecture and salient features , Recent Memories technologies (RAM, HDD), Computer peripherals		
Total Lecture Hours		**39 Hours**

Textbooks	
1	S.P. Bali, "Consumer Electronics", Pearson Education, First Edition
2	B. R. Gupta, Vandana Singhal, "Consumer Electronics", S. K. Kataria & Sons, 2006
Reference Books	
1	J.S. Chitode, "Consumer Electronics", Technical Publication,
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
1	for unit-I Electronics Standards of India www.electronicstds.gov.in

V Semester
22EE554 : OE II : Industrial Automation

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Remember the architecture of industrial automation system. 2. Understand the process control, PLC architecture and interfacing 3. Apply PLC ladder logic for industrial applications 4. Apply the function of SCADA with PLC systems.		
Unit:1	**Introduction:** Automation overview, requirement of automation, systems, architecture of industrial automation system, introduction of PLC and supervisory control and data acquisition (SCADA). Industrial bus systems: Modbus & profibus.	**7 Hours**
Unit:2	**Controllers & actuators :** PID controller, mechanical switches, solid-state switches, electrical actuators: Solenoids, relays and contactors, ac motor, energy conservation schemes through vfd, dc motors, servo motor, pneumatic and hydraulic actuators.	**7 Hours**
Unit:3	**PLC operation:** Definition, advantages and importance of PLC, history of PLC, architecture and block diagram, types of PLC, CPU unit architecture, memory classification.	**7 Hours**
Unit:4	**PLC programming :** Basic ladder logic function, electrical wiring diagram, scan cycle, programming language of PLC, module addressing, basic relay, input, output and timer counter instruction, arithmetic and comparison function,	**6 Hours**
Unit:5	**SCADA & distributed control system:** Introduction, block diagram, elements of SCADA, features of SCADA, MTU, RTU functions, applications of SCADA, communications in SCADA, introduction to DCS, architecture, input and output modules, specifications of DCS.	**7 Hours**
Unit :6	**Material handling, automated storage system, and Identification Technologies** The material handling function, its types, analysis for Material handling systems, Storage system performance, automated storage/retrieval systems, work-in-process storage, interfacing handling and storage with manufacturing. Product identification system: Barcode, RFID etc.	**7 Hours**
	Total Lecture Hours	**41 Hours**

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Text books	
1	Programmable Logic controllers and Industrial Automation Penram International Publishing India Pvt. Ltd Madhuchhanda Mitra, Samarjit Sen Gupta
Reference Books	
1	Programmable Logic Controllers, Principles and Applications 2002 Prentice Hall of India Pvt. Ltd,5th Edition John W. Webb, Ronold A.
2	Industrial Instrumentation and Control 2007 S.K. Singh The McGraw Hill Companies
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
2	
MOOCs Links and additional reading, learning, video material	
1	https://www.youtube.com/watch?v=oxMdDsud5vg
2	https://www.youtube.com/watch?v=3N0kWzC6jmE

V Semester

Audit Course

MLC2125 : YCAP5: YCCE Communication Aptitude Preparation

V Semester

Audit Course

MLC125 : Design thinking

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

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

Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2022

6th Semester

(Department of Electronics Engineering)

B. Tech in Electronics Engineering

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 Electronics Engineering)

B. Tech in Electronics Engineering

SoE No. 22EE-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	EE	22EE601	Control System Engineering	**T**	3	0	0	3	3	30	20	50	3 Hrs
2	6	PC	EE	22EE602	Digital Signal Processing	**T**	3	0	0	3	3	30	20	50	3 Hrs
3	6	PC	EE	22EE603	**Lab:** Digital Signal Processing	P	0	0	2	2	1		60	40	
4	6	PC	EE	22EE604	**Lab:** Electronics Design Automation	P	0	0	2	2	1		60	40	
5	6	PE	EE		**Professional Elective-II**	**T**	0	0	2	2	3	30	20	50	3 Hrs
6	6	PE	EE		**Lab.: Professional Elective-II**	P	3	0	0	3	1		60	40	
7	6	PE	EE		**Professional Elective-III**	**T**	3	0	0	3	3	30	20	50	3 Hrs
8	6	OE-III	EE		**Open Elective - III**	**T**	3	0	0	3	3	30	20	50	3 Hrs
9	6	OE-IV	EE		**Open Elective - IV**	**T**	3	0	0	3	3	30	20	50	3 Hrs
10	6	PR	EE	22EE605	Project Phase -I	P	0	0	4	4	2		60	40	
					TOTAL SIXTH SEM		**18**	**0**	**10**	**28**	**23**				

List of Professional Electives- II & III

Professional Electives-II

1	6	PE-II	EE	22EE611	PE II:Digital Image Processing
2	6	PE-II	EE	22EE612	**Lab:** PE II: Digital Image Processing
3	6	PE-II	EE	22EE613	PE II:Machine Learning
4	6	PE-II	EE	22EE614	**Lab:** PE II: Machine Learning
5	6	PE-II	EE	22EE615	CMOS Subsystem Design
6	6	PE-II	EE	22EE616	**Lab:**CMOS Subsystem Design
7	6	PE-II	EE	22EE617	PE II: Soft Computing & OptimizationTechniques
8	6	PE-II	EE	22EE618	**Lab**:PE II: Soft Computing & Optimization Techniques
9	6	PE-II	EE	22EE619	PE II: RF and Microwave
10	6	PE-II	EE	22EE620	**Lab:** PE II: RF and Microwave

Professional Electives-III

1	6	PE-III	EE	22EE631	PE III: Industrial Automation
2	6	PE-III	EE	22EE632	PE III :Power Electronics
3	6	PE-III	EE	22EE633	PE III: Optical Communication
4	6	PE-III	EE	22EE634	PE III: Computer Orgnization
5	6	PE-III	EE	22EE635	PE III:Transmission line and wave Guide

Open Electives-III

1	6	OE-III	EE	22EE651	OE III : Fuzzy Logic & Neural Networks
2	6	OE-III	EE	22EE652	OE III : Basics of Analog and Digital Communication
3	6	OE-III	EE	22EE653	OE III : Biomedical Instrumentation
4	6	OE-III	EE	22EE654	OE III : Digital Logic Design

Open Electives-IV

1	6	OE-IV	EE	22EE671	OE IV : Sensors and Actuators
2	6	OE-IV	EE	22EE672	OE IV : Computer Architecture
3	6	OE-IV	EE	22EE673	OE IV : Consumer Electronics
4	6	OE-IV	EE	22EE674	OE IV : Industrial Automation

List of Mandatory Learning Course (MLC)

1	6	HS		MLC2126	YCCE Communication Aptitude Preparation (YCAP6)		**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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Applicable for AY 2022-23 Onwards

VI SEMESTER
22EE601 : Control System Engineering

Course Outcomes:

1. Understand concepts related to linear control system
2. Apply the concepts of control system to obtain the system Transfer function
3. Analyze time domain analysis of given control system
4. Apply frequency domain analysis method to various linear control systems

Unit:1	**7 Hours**

Introduction to Control Systems: History of control system, Basic Components of Control System. Open loop control and close loop control with examples. Classification of control systems, Transfer function, block Diagram and signal flow graph:-Transfer function and gain. Order of a system. Block diagram algebra & reduction techniques Signal flow graph, its constructions and Mason's gain formula.

Unit:2	**7 Hours**

Mathematical modeling of physical system: Mathematical modelling of physical system such as –electrical, mechanical, electro-mechanical, thermal, hydraulic, pneumatic etc., Analogous systems,Characteristics of Feedback Control Systems: Effect of negative feedback compared to open loop system such as –sensitivity to parameter variation. sensitivity to parameter variation such gain and forward path, Speed of time response, bandwidth, and disturbance rejection., Linearizing effect, Effect of positive feedback.

Unit:3	**7 Hours**

Time Domain Analysis of Control Systems: Concept of transient response, Steady state response, time response, standard test signals, Time response of first order systems, Transfer function of second order system, Time response of second order system, Time response specifications of second order system, steady state error (ess) analysis, static error constants and system type, dominant poles. Relation between roots of characteristic equation, damping ratio and transient response.

Unit:4	**6 Hours**

Stability of Linear Control Systems: Concept of stability, stable, unstable and marginally stable system, Absolutely stable and conditionally stable system, Necessary conditions for stability, method to determine stability, Routh-Hurwitz stability criterion with special cases, relative stability analysis, Routh-Hurwitz stability criterion with special cases, relative stability analysis. State Variable Analysis.

Unit:5	**7 Hours**

Root Locus Technique: Definition, magnitude and angle criteria, properties of root locus, construction rules, for root locus plot of negative feedback systems, determining the gain from root locus plot, effect of addition of poles and zeros of G(s) H(s).

Unit :6	**7 Hours**

Frequency domain analysis of control systems: Concept of frequency response and sinusoidal transfer function, resonant frequency, resonant peak, cut off frequency, bandwidth, and correlation between time and frequency response, polar plot, Bode plot, all pass and minimum, log magnitude verses phase plot. Stability in Frequency domain: Nyquist stability criteria, concept of gain margin and phase margin and its computation using polar plot and log magnitude verses phase plot. Lag, lead and lag-lead compensation

Total Lecture Hours	**39 Hours**

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Text books	
1	I.J. Nagrath. M. Gopal, Control system Engineering Sixth Edition, Prentice Hall
Reference Books	
1	Katsuhiko Ogata, Modern Control system, Fifth Edition, Prentice Hall.
2	Joseph J. DiStefano, Feedback and Control Systems, 2nd Edition. McGraw-Hill Education
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.nptel.ac.in/noc22_ee31/preview

VI Semester
22EE602 : Digital Signal Processing

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Understand and Apply the Knowledge of discrete-time signals and systems for signal analysis 2. Apply DFT for the analysis of digital signals and systems 3. Design various Filter structures and IIR and FIR filters, Muti-rate Systems 4. Apply Matlab Programming concept on Discrete signal and perform its software analysis		
Unit:1	Discrete Time (DT) Signals and System, Classification of DT signals, classification of DT systems, linear Convolution, Sampling and reconstruction.	**7 Hours**
Unit:2	Discrete Time Fourier Transform, Discrete Fourier Transform, Computation of DFT, Properties of DFT, convolution of data sequences, FFT algorithms, Decimation in time, Decimation in Frequency	**7 Hours**
Unit:3	Digital Filter structures: FIR digital filter structures, IIR digital filter structures, Lattice structures, Finite word length effect	**7 Hours**
Unit:4	IIR Digital filter Design, Bilinear transformation, Impulse invariant transformation, Low pass IIR digital filters, Butterworth and Chebyshev filter	**6 Hours**
Unit:5	FIR Digital Filter Design, FIR filter design using windowing techniques	**7 Hours**
Unit :6	Multi-rate Digital Signal processing fundamentals, sampling rate alteration, multi-rate structures, Decimator and Interpolator and Multistage design.	**7 Hours**
	Total Lecture Hours	**39 Hours**

Text books	
1	Oppenheim A V, Willsky A S and Young I T, "Signal & Systems", Prentice Hall, (1983).
2	Michael Weeks. Digital Signal Processing Using MATLAB & Wavelets. Jones & Bartlett Publishers, 2011. p.492

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Reference Books	
1	Ifeachor and Jervis, "Digital Signal Processing", Pearson Education India.
2	DeFatta D J, Lucas J G and Hodgkiss W S, "Digital Signal Processing", J Wiley and Sons, Singapore, 1988
3	
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/117102060
2	https://archive.nptel.ac.in/courses/108/106/108106136/

VI Semester
22EE603 : Lab:- Digital Signal Processing

Course Outcomes:
Upon successful completion of the course the students will be able to 1. Apply DFT to Discrete Time sequences and learn the properties and Applications of DFT. 2. Apply Computationally Efficient Algorithms for DFT of Signals. 3. Construct and Optimize structures for the realization of Discrete Time system. 4. Design of Digital Filters for given specifications. 5. Solve Problems based on Sampling rate conversion in Multirate Signal Processing

Sr. No.	Experiments based on
1	To compute DFT and IDFT of Discrete Time Signals.
2	Calculate the DFT of the given sequence using FFT
3	Linear Convolution using FFT
4	Circular Convolution using FFT
5	Design of filter using Bilinear Transformation
6	To design FIR and IIR filter.
7	To perform Upsampling and Downsampling on discrete time signal.
8	To illustrate signal processing application

VI Semester
22EE604 : Lab:- Electronics Design Automation

Course Outcomes:
Upon successful completion of the course the students will be able to 1. Gain proficiency in using industry-standard EDA tools and software for electronics design. 2. Handle application of EDA in Real-world Design Challenges 3. Automate various stages of the design process using languages or automation features within EDA tools. 4. Understand advanced circuit simulation and analysis skills. 5. Demonstrate the ability to work in multidisciplinary teams.

Sr. No.	Experiments based on
1	Mini project based on SPICE modelling
2	Mini project based on Embedded System/IoT
3	Mini project based on FPGA Design (Verilog)
4	Mini project based on Complex problem-solving using programming language.

VI Semester
Project Phase -I

VI Semester
22EE611 : PE II: Digital Image Processing

Course Outcomes:		
Upon successful completion of the course the students will be able to **CO-1 :** Understand the basic concepts of digital image processing and f digital image geometry. **CO-2 :** Implement the image enhancement and restoration techniques in spatial and frequency domain. **CO-3 :** Apply and implement image segmentation techniques using edge detection and merging. **CO-4 :** Apply different Image processing algorithms.		
Unit:1	Digital image fundamentals : Digital Image through scanner, digital camera, Concept of gray levels, Gray level to binary image conversion, Sampling and quantization, Relationship between pixel, Imaging Geometry.	**7 Hours**
Unit:2	Image Transforms: 2-D FFT, Properties, Walsh transform, Hadamard Transform, Discrete cosine Transform, Haar transform, Slant transform.	**7 Hours**
Unit:3	Image enhancement : Point processing, Histogram processing, Spatial filtering and its frequency domain interpretation. Enhancement in frequency domain, Image smoothing, Image sharpening.	**7 Hours**
Unit:4	Image segmentation: Detection of discontinuities. Edge linking and boundary detection, Thresholding, Region oriented segmentation.	**6 Hours**
Unit:5	Image Restoration: Degradation model, Algebraic approach to restoration, Inverse filtering, Least mean square filters, Constrained Least Squares Restoration, Interactive Restoration.	**6 Hours**
Unit :6	Image compression: Redundancies and their removal methods, Fidelity criteria, Image compression models,Source encoder and decoder, Error free compression, Lossy compression	**6 Hours**
	Total Lecture Hours	**39 Hours**

Text books	
1	Digital Image processing 2nd Edition,2002,R.C. Gonzalez & R.E. Woods,Wesley/ Pearson education
2	Fundamentals of Digital Image processing, 1989. A.K.Jain PHI
3	Digital Image Processing, 2012,S Jayaraman, Tata McGraw Hill Education Pvt.Ltd.

Reference Books	
1	Digital Image processing using MATLAB,2004 Rafael C. Gonzalez,Richard E Woods and Steven L. Pearson education
2	Digital Image Processing 3rd Edition,2004. William K. Pratt John Wilely
3	Fundamentals of Electronic Image Processing ,SPIC/IEEE Series,1996, Arthur R. Weeks PHI
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2	
MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.nptel.ac.in/noc22_ee116/preview
2	https://nptel.ac.in/courses/117105135
3	https://archive.nptel.ac.in/courses/117/105/117105135/
4	https://nptel.ac.in/courses/117105079
5	https://archive.nptel.ac.in/courses/106/105/106105032/4

VI Semester
22EE612 : Lab: PE II: Digital Image Processing

Course Outcomes:
Upon successful completion of the course the students will be able to
CO-1 : Understand the basic concepts of digital image processing and f digital image geometry.
CO-2 : Implement the image enhancement and restoration techniques in spatial and frequency domain.
CO-3 : Apply and implement image segmentation techniques using edge detection and merging.
CO-4 : Apply different Image processing algorithms.

Sr. No.	Experiments based on
1	Image Fundamentals 1. Read and display RGB Image 2. Observe three different image planes of RGB image 3. Convert RGB image to Grayscale Image 4. Determine negative of image using a) imcomplement function b) Using for loop logic c) Find difference of output for above two methods
2	Spatial Image Enhancement 1. Image Thresholding a. Intensities below 127 converted to 0 b. Intensities equal to or above 127 converted to 255 c. Convert image into black and white 2. Intensity Slicing (enhance perticular range of intencities) 3. Intensity modification using log and antilog 4. Intensity modification using piecewise linear transformation
3	Image Transform 1. DFT : Verify the magnitude and phase interchanging effect of two images of same size 2. DCT: Reconstruction of image using fewer coeffients of DCT (Information in DCT is concentrated on left most corner)
4	Bit plane Slicing 1. Creation of 8 bit plane images and display the same. 2. Reconstruct image using B7+B6, B7+B6+B5, B7+B6+B5+B4 bit planes. 3. Reconstruct image using MSB bit planes and LSB bit planes
5	Histogram Equalization 1. Perform Image enhancement using imhist command from Matlab 2. Perform Image enhancement using program developed for histogram equalisation

Sr. No.	Experiments based on
6	Spatial Filtering 1. Perform Spatial filtering on image having noise with a. Averaging Filter mask (3x3,5x5,9x9,25x25) b. Median Filter mask
7	Edge detection 1. Edge detection using different directional Prewitt, Sobel operators
8	Transform domain Filtering 1. Perform Transform domain filtering on image having noise with a. Butterworth filter Low pass & High Pass b. Gaussian Filter

VI Semester
22EE613 : PE II: Machine Learning

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. **Apply** the knowledge of Mathematics and programming to build machine learning models 2. **Analyze** different use cases to evaluate the performance of the models 3. **Design and develop** application models using supervised and unsupervised learning algorithms 4. **Compare** different machine learning techniques and **demonstrate the comprehension** of the trade-offs involved in design choices.		
Unit:1	**Regression:** Supervised and Unsupervised Learning, Regression, Model and Cost Function, Gradient Descent, Multivariate Linear Regression, Feature Scaling, Gradient Descent for multivariable	**7 Hours**
Unit:2	**Classification:** Classification, Hypothesis Representation, Decision Boundary, Cost function and Gradient Descent, Multi-classification, Regularization, Model Evaluation	**6 Hours**
Unit:3	**Supervised Learning:** KNN, SVM, Decision tree, Naive Bayes Classifiers, Random Forest	**7 Hours**
Unit:4	**Unsupervised learning:** K-means clustering, Hierarchical Clustering, DBSCAN Clustering, PCA, Anomaly Detection, Recommender System	**6 Hours**
Unit:5	**Artificial Neural Network:** Introduction to neural network, Activation Functions, Perceptron rule, Back propagation	**6 Hours**
Unit :6	**Deep Learning:** Introduction to deep learning, building blocks of CNN, Computational Complexity, Lenet, Alexnet, **New topics to be announced time to time**	**7 Hours**
	Total Lecture Hours	**39 Hours**

Text books	
1	Shai Shalev-Shwartz and Shai Ben-David. Understanding Machine Learning. Cambridge University Press.2017 https://www.cse.huji.ac.il/~shais/UnderstandingMachineLearning/copy.html
2	Trevor Hastie, Robert Tibshirani and Jerome Friedman, The Elements of Statistical Learning. Second Edition, 2009. https://web.stanford.edu/~hastie/ElemStatLearn/
3	Christopher Bishop,Pattern Recognition and Machine Learning, Springer,2006, https://www.microsoft.com/en-us/research/people/cmbishop/downloads/
Reference Books	
1	Avrim Blum, John Hopcroft and Ravindran Kannan, Foundations of Data Science. 2017
2	Goodfellow, I., Bengio, Y., Courville, A., Deep Learning, Part II, MIT Press, 2016
3	Kevin P. Murphy , Machine Learning: A Probabilistic Perspective, MIT Press,2012
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
1	https://cognitiveclass.ai/courses/machine-learning-with-python
2	https://cognitiveclass.ai/courses/python-for-data-science
3	https://www.youtube.com/playlist?list=PLfwnwx2j1EkrcP2FiDCW2ajJZ08pWDAur
4	NPTEL: Practical Machine Learning with Tensor flow

VI Semester
22EE614 : Lab: PE II: Machine Learning

Course Outcomes:
Upon successful completion of the course the students will be able to
Upon successful completion of the course the students will be able to
1. **Apply** the knowledge of Mathematics and programming to build machine learning models
2. **Analyze** different use cases to evaluate the performance of the models
3. **Design and develop** application models using supervised and unsupervised learning algorithms
4. **Compare** different machine learning techniques and **demonstrate the comprehension** of the trade-offs involved in design choices.

Sr. No.	Experiments based on
	Apply Following Techniques on different use cases. Apply, analyse, develop and demonstrate different ML models and evaluate it using Python
1	Data Pre-processing , cleaning and EDA
2	Linear Regression
3	Non Linear Regression
4	K-Nearest Neighbours
5	Decision Tree
6	Support Vector Machine
7	K-Means Clustering
8	Hierarchical Clustering
9	Content based Recommendation System
10	Collaborative filtering Recommendation System
11	Mini Project

VI Semester
22EE615 : PEII:CMOS Subsystem Design

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Analyze VLSI circuit timing using Logical Effort analysis. 2. Design elementary data path subsystems like adder and subtrctors. 3. Design elementary data path subsystems like Multiplier and comparators 4.Estimate and compute the power consumption of a VLSI chip.		
Unit:1	**Wires and Interconnect :** Resistance, Capacitance, RC delay analysis, Cross-talk delay and noise effects, Repeaters, Logical Effort, Crosstalk control, reliability.	**7 Hours**
Unit:2	Synchronizers; Arbiters; Clock Synthesis; PLLs; Clock generation; Clock distribution; Synchronous Vs Asynchronous design, introduction to pipelined system/ALU.	**7 Hours**
Unit:3	**Datapath Subsystems :** Adders: Full Adder using a variety of Logics styles, bit-serial Adder, Ripple Carry Adder, Carry-skip Adder, Carry Look-ahead Adder, Brent-Kung Adder, Kogge-Stone Adder, Carry-Save Adder (multi-operand addition), etc. with power and speed trade-off	**7 Hours**
Unit:4	**Datapath Subsystems :** Multipliers: Unsigned Array Multiplier, Booth Encoded Multiplier, Baugh-Wooley Multiplier, Wallace tree multiplier, etc. , comparators, shifter-registers, random number generator based on Linear Feedback Shift-Registers (LFSR).	**7 Hours**
Unit:5	**Memory Array Subsystems :** Register-file, Content-addressable memory, LIFO and FIFO SRAM design, Reliability; Power dissipation in Memories	**7 Hours**
Unit :6	**Special-purpose Subsystems :** Packaging; power distribution; I/O pads, Emerging topics in VLSI.	**7 Hours**
	Total Lecture Hours	**42 Hours**

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

Text books	
1	Neil H. E. WesteHarris, Principle of CMOS VLSI Design, 4th Edition, Addison Wesley VLSI Series.
Reference Books	
1	John P. Uyemura, Introduction to VLSI Circuits and Systems, Students Edition, Wiley Publication.
2	Sung-Mo Kang, Yusuf leblebici, CMOS VLSI Design, Third edition, 2008, TataMcGraw Hill.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/108107129
2	https://nptel.ac.in/courses/106103116
3	https://nptel.ac.in/courses/117106092

VI Semester
22EE616 : Lab: CMOS Subsystem Design

Course Outcomes:
Upon successful completion of the course the students will be able to 1. Analyze VLSI circuit timing using Logical Effort analysis. 2. Design elementary data path subsystems like adder and subtrctors. 3. Design elementary data path subsystems like Multiplier and comparators 4. Estimate and compute the power consumption of a VLSI chip.

Sr. No.	Experiments based on
1	Design and verify the inverter circuit using transient analysis.
2	Design NAND and NOR gate perform all the analysis.
3	Design XOR gate by using NAND and NOR gate. Perform transient analysis.
4	Design half adder and verify the circuit using transient analysis
5	Design Full adder and verify the circuit using transient analysis.
6	Design a multiplexer and perform all the analysis to verify its characteristics.
7	Design half Subtractor and verify the circuit using transient analysis
8	Design Full Subtractor and verify the circuit using transient analysis.
9	Design multiplier and verify the circuit using transient analysis.
10	Mini Project

VI Semester
22EE617 : PE II: Soft Computing & Optimization Techniques

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Describe the role of soft computing techniques in real world 2. Apply fuzzy logic controller for engineering problem 3. Apply different neural network controller for engineering problem 4. Apply and compare performance of different optimization techniques for engineering problem		
Unit:1	Concept of computing systems. "Soft" computing versus "Hard" computing, characteristics of Soft computing, Some applications of Soft computing techniques Fuzzy sets, logic operations, and relations, extension principle	**7 Hours**
Unit:2	Fuzzy controllers , Fuzzy decision-making; fuzzy inference systems; design steps in fuzzy logic controller; application of fuzzy logic controller	**7 Hours**
Unit:3	**Artificial Neural Network:** Fundamental concept, Evolution of Neural Networks, Basic Models, McCulloh-Pitts Neuron, Linear Separability, Hebb Network. Supervised Learning Network: Perceptron Networks, Adaptive Linear Neuron, Multiple Adaptive Linear Neurons, Backpropagation Network,	**7 Hours**
Unit:4	**Unsupervised Learning Networks:** Fixed weight competitive nets, Kohonen self-organizing feature maps, learning vectors quantization, counter propagation networks, adaptive resonance theory networks. Convolutional neural networks, deep learning neural networks, extreme learning machine model.	**6 Hours**
Unit:5	**Genetic Algorithms:**Concept of "Genetics" and "Evolution" and its application to probabilistic search techniques. Basic GA framework and different GA architectures GA operators: Encoding, Crossover, Selection, Mutation, etc. Evolutionary Algorithm, Simulated Annealing, Ant colony optimization. Solving single-objective optimization problems using GAs.	**7 Hours**
Unit :6	**Multi-objective Optimization Problem Solving:** Concept of multi-objective optimization problems (MOOPs) and issues of solving them. Multi-Objective Evolutionary Algorithm (MOEA). Non-Pareto approaches to solve MOOPs Pareto-based approaches to solve MOOPs Some applications with MOEAs.	**7 Hours**
Total LectureHours		**41 Hours**

			July 2022	1.00	Applicable for AY 2022-23 Onwards
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Textbooks	
1	George J.Klir and Bo Yuan, Fuzzy sets and Fuzzy Logic, Second Edition, PHI, 2006
2	S.N.Sivanandam, and S.N.Deepa, Principles of Soft computing, Second Edition, Wiley India Pvt. Ltd, 2013
3	D.E. Goldberg, Genetic algorithms in search, optimization, and machine learning, Addison-Wesley
Reference Books	
1	N.P.Padhy and S.P.Simon, Soft computing with MATLAB programming, Oxford publishers, 2015.
2	J.M.Zurada, Introduction to artificial neural systems, Jaico Publishing House, 2006
3	D.E. Goldberg, Genetic algorithms in search, optimization, and machine learning, Addison-Wesley.
4	
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
1	http://nptel.ac.in/courses/106106046/41
2	https://www.coursera.org/learn/neural-networks
3	http://www.iitk.ac.in/kangal/deb.shtml

VI Semester
22EE618 : Lab:PE II: Soft Computing & Optimization Techniques

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Define, describe and analyze uncertainty, unpredictability and vagueness using fuzzy logic concepts. 2. Will be able to find solution to automation problems through fuzzy logic controllers. 3. Will be able to introduce intelligence in conventional structure using neural networks and solve pattern recognition and classification problems. 4. Will be able to determine optimized solutions for some problems using concepts of Genetic algorithm.

Sr. No.	Experiments based on
1	Programs on Matrix operations to understand the basic concepts of MATLAB.
2	To print all the Continues Discrete Membership Functions by using MATLAB.
3	To perform different fuzzy operations on Membership Functions by using MATLAB
4	Design a Fuzzy controller for Air conditioning system/Washing Machine.
5	Identification of a system using Perceptron/Radial Base Function Network (RBFN).
6	Identification of a system by using Backpropagation algorithm.
7	Minimizing the objective function by using Genetic Algorithm (GA)
8	Minimizing the objective function by using Particle Swarm Optimization (PSO)
9	Minimizing the objective function by using Cuckoo Search Algorithm (CSA)
10	Minimizing the objective function by using Ant Colony Optimization (ACO)

VI Semester
22EE619 : PE II: RF and Microwave

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Understand the causes of failure of conventional tubes at high frequency and the detail concept of liner beam O type tubes and linear beam M type tubes 2. Understand and analyze transmission characteristics of Microwave passive Devices 3. Understand different microwave measurement techniques 4. Understand Microwave solid state devices 5. Conduct experiments to evaluate various RF parameters using Microwave test bench		
Unit:1	Microwave linear beam tubes (O type): High frequency limitations of conventional microwave devices, Two cavity Klystron Amplifier – Mechanism and mode of Operation, Power output and Efficiency, Applegate diagram, applications, Reflex Klystron Oscillator – Mechanism and mode of Operation Power output, efficiency ,mode curve, Electronic Admittance, Modulation of Reflex Klystron; Applications, Helix TWT, BWO. Slow wave structures.	**7 Hours**
Unit:2	Microwave cross-field tubes (M Type): Magnetron Oscillator – Hull cut-off voltage, Mechanism of Operation, Mode separation, Phase focusing effect, Power output and Efficiency, Cylindrical magnetron, parallel plate magnetron, split anodemagnetron, Types of strapping, Tuning of magnetron. Applications, Numerical Problems.	**7 Hours**
Unit:3	Introduction to S-matrix and S-parameters, attenuators, tees, directional couplers, circulators, isolators, gyrators, phase shifter, cavity resonator and their S-parameters.	**7 Hours**
Unit:4	Microwave Test Bench, measurement of VSWR , frequency, power, attenuation, insertion loss, directivity, beam width, radiation pattern and gain of various microwave antennas. Microwave filter by Image parameter and Insertion loss method	**6 Hours**
Unit:5	Introduction to microstrip lines, characteristic impedance, losses, quality factor, Gunn diode as oscillator, Detector Diode, PIN diode and its application. Introduction to microwave solid state devices and monolithic microwave integrated circuits.	**7 Hours**
Unit :6	Basics of Microwave systems: Radar, RF ID, microwave imaging, modern trends in microwave engineering, effect of microwave on human body, EMI/EMC.	**7 Hours**
Total Lecture Hours		**41 Hours**

Textbooks	
1	R. Chatterjee , Elements of Microwave Engineering, 2 ed. Prentice Hall
2	Samuel Liao , Microwave Devices and Circuits , 1990 Pearson
Reference Books	
1	Annapurna Das, Sisir Das , Microwave Engineering (2nd edition), Tata Mcgraw hill
2	Edgar Hund , Microwave communications: components and circuits:; 1 ed., McGraw-Hill.
3	David M. Pozar , Microwave Engineering, Wiley India. rd
4	R.E.Collin, Foundations for Microwave Engineering , 3 ed, IEEE Press
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
1	https://youtu.be/DIN_fH82VNE
2	https://youtu.be/wqDGLxEOg1o

VI Semester
22EE620 : Lab:- PEII:RF and microwave

Course Outcomes:
Upon successful completion of the course the students will be able to 1. Apply concepts of Fields and Networks to study working principles of specific microwave active/passive devices, transmission lines/microwave devices. 2. Analyze microwave networks and components using S-parameters. 3. Design of microwave filters by various methods, Microwave solid state devices. 4. Apply concepts of instrumentation and measurements to study microwave measurement of power, frequency and VSWR , impedance for the analysis and design of circuits

Sr. No.	Experiments based on
1	To find the frequency of reflex klystron & Determine electronic andmechanical tuning range.
2	To verify power verses repeller voltage characteristics of reflexklystron.
3	To verify the performance of wave-guide tees i) E-plane tee ii) H-planetee.
4	To verify the performance of E-H plane tee (magic tee).
5	To determine coupling and isolation of a three port circulator
6	To verify the performance of directional coupler i) multi hole ii) crossdirectional coupler.
7	To find attenuation of fixed attenuator and To verify the calibration ofvariable attenuators.
8	To measure the small V.S.W.R. and large V.S.W.R.
9	To verify the relationship among free space wavelength, cut offwavelength, guide wavelength.
10	To verify characteristics of Gunn diode

VI Semester
22EE631 : PEIII: Industrial Automation

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Remember the architecture of industrial automation system. 2. Understand the process control, PLC architecture and interfacing 3. Apply PLC ladder logic for industrial applications 4. Apply the function of SCADA with PLC systems.		
Unit:1	**Introduction:** Automation overview, requirement of automation, systems, architecture of industrial automation system, introduction of PLC and supervisory control and data acquisition (SCADA). Industrial bus systems: Modbus & profibus.	**7 Hours**
Unit:2	**Controllers & actuators :** PID controller, mechanical switches, solid-state switches, electrical actuators: Solenoids, relays and contactors, ac motor, energy conservation schemes through vfd, dc motors, servo motor, pneumatic and hydraulic actuators.	**7 Hours**
Unit:3	**PLC operation:** Definition, advantages and importance of PLC, history of PLC, architecture and block diagram, types of PLC, CPU unit architecture, memory classification.	**7 Hours**
Unit:4	**PLC programming :** Basic ladder logic function, electrical wiring diagram, scan cycle, programming language of PLC, module addressing, basic relay, input, output and timer counter instruction, arithmetic and comparison function,	**6 Hours**
Unit:5	**SCADA & distributed control system:** Introduction, block diagram, elements of SCADA, features of SCADA, MTU, RTU functions, applications of SCADA, communications in SCADA, introduction to DCS, architecture, input and output modules, specifications of DCS.	**7 Hours**
Unit :6	**Material handling, automated storage system, and Identification Technologies** The material handling function, its types, analysis for Material handling systems, Storage system performance, automated storage/retrieval systems, work-in-process storage, interfacing handling and storage with manufacturing. Product identification system: Barcode, RFID etc.	**7 Hours**
	Total Lecture Hours	**41 Hours**

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

Text books	
1	Programmable Logic controllers and Industrial Automation Penram International Publishing India Pvt. Ltd Madhuchhanda Mitra, Samarjit Sen Gupta
Reference Books	
1	Programmable Logic Controllers, Principles and Applications 2002 Prentice Hall of India Pvt. Ltd,5th Edition John W. Webb, Ronold A.
2	Industrial Instrumentation and Control 2007 S.K. Singh The McGraw Hill Companies
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
2	
MOOCs Links and additional reading, learning, video material	
1	https://www.youtube.com/watch?v=oxMdDsud5vg
2	https://www.youtube.com/watch?v=3N0kWzC6jmE

VI Semester
22EE632 : PEIII: Power Electronics

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Students will be able to **apply** knowledge about fundamental concepts and techniques used in power electronics. 2. Students will able to able to **analyze** various single phase and three phase power converter circuits and understand their applications 3. Foster ability to **evaluate** basic requirements for power electronics based design application. 4. Foster ability to **understand** the use of power converters in commercial and industrial applications		
Unit:1	Power Semiconductor Diodes and Circuits, control Characteristics of power devices, power modules, power diodes, reverse recovery, series, shunt connected diodes, Diode Rectifiers-single phase, three phase rectifiers,bride rectifiers, design of rectifiers.	**7 Hours**
Unit:2	Power Transistors, Switching characteristics of BJT, Power MOSFETs, IGBTs, limitations, Power Thyristors.	**7 Hours**
Unit:3	Pulse-width Modulated Inverters: Principle, single phase, multiple phase, PWM Forced commuted inverters,current source inverters, design of inverter, DC-DC Converters, Step up, stepdown, SMPS, thyristerChoppers,design of choppers	**7 Hours**
Unit:4	Resonant Pulse Inverters-Series, parallel, resonant inverters, Class E resonant inverter, Zero voltage/current Switching resonant inverter, Multilevel Inverters.	**6 Hours**
Unit:5	Controlled Rectifiers: phase control converter, single phase, three phase converters, power factor improvement,AC Voltage Controllers. Principle of ON-OFF control, Phase control, Single phase controllers, three phasecontrollers, cyclo-converters.	**7 Hours**
Unit :6	Power Supplies, SMPS, SMAC power supplies, power factor conditioning Gate Drive Circuits- Protection of Devices and Circuits Snubber, reverse recovery transients, protection devices varisters, Introduction to AC and DC drives.	**7 Hours**
	Total Lecture Hours	**39 Hours**

Text books	
1	Power Electronics: Circuits,Devices and Applications 2nd edition 1993 M. Rashid PHI
Reference Books	
1	Power Electronics and its application 2nd Edition 2004 Alok Jain Penram International Publishing Pvt Ltd
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html.
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/108105066
2	https://archive.nptel.ac.in/courses/108/102/108102145/

VI Semester
22EE633 : PEIII: Optical Communication

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Apply the fundamental principles of optics and light wave to optical fiber communication system. 2. Differentiate losses in optical fiber link and state transmission characteristics of optical fiber. 3. Design optical fiber communication links using appropriate optical fibers light sources, detectors. 4. Understand the operational principal of WDM, SONET, measurement of attenuation, dispersion, refractive index profile in optical fibers.		
Unit:1	Evolution of fiber Optic system. Principle of optical communication-Attributes and structures of various fibers such as step index, graded index mode and multi modefibers. Propagation in fibers-Ray mode, Numerical aperture and multipath dispersion in step index and graded index fibers structure.	**7 Hours**
Unit:2	Attenuation, Absorption losses, Scattering losses, Bending Losses, Core and Cladding losses, Group Delay, Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers, Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in GI fibers, Mode Coupling	**6 Hours**
Unit:3	Direct and indirect Band gap materials, LED structures, Light source materials, Quantum efficiency and LED power, Modulation of a LED, Laser Diodes , Modes and Threshold condition, Rate equations, External Quantum efficiency, Resonant frequencies, Laser Diodes structures and radiation patterns, Single Mode lasers, Modulation of Laser Diodes, Temperature effects, Fabry Perot cavity	**7 Hours**
Unit:4	PIN and APD diodes , Photo detector noise, SNR, Detector Response time, Avalanche Multiplication Noise, Comparison of Photo detectors, Fundamental Receiver Operation, Error Sources, Receiver Configuration, Probability of Error, Eye diagram.	**6 Hours**
Unit:5	Introduction of fibers cables, Fiber cleaving methods.Fiber Splicing and connectors, Operational Principals of WDM, SONET, LAN 1000 baseSX, LX and Passive Components, Optical TDM.	**7 Hours**
Unit :6	Attenuation, Time domain dispersion and Frequency domain dispersion, OTDR, NA measurement Refractive index profile and optical source characteristic measurements.	**6 Hours**
Total LectureHours		**39 Hours**

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Textbooks	
1	John Senior, Optical Communication, Principles and Practice, Prentice Hall of India, 2nd Edition,1994
Reference Books	
1	J. Gower, Optical Communication System, Prentice Hall of India
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/117/104/117104127/

VI Semester
22EE634 : PEIII: Computer Organization

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. 1. Understand the basic concepts of peripherals of computer system 2. Apply the design issues in the development of computer system architecture 3. Analyze the concepts of Parallel processing and pipelining for computer architecture design 4. Evaluate parameters required for processor design		
Unit:1	**Register and processor Level Design**	**7 Hours**
Register Level components, Programmable logic devices, Register level design, The Processor level components, Processor level design		
Unit:2	**CPU Organization**	**6 Hours**
CPU organization, Data representation, Fixed point numbers, Floating point numbers, IEEE 754 floating point formats, Instruction sets – Instruction formats, instruction types, addressing modes		
Unit:3	**Datapath Design**	**7 Hours**
Fixed point arithmetic, addition and subtractions, Multiplication, Division, Arithmetic operations on Floating point numbers		
Unit:4	**Control design**	**6 Hours**
Basic Concepts, Hard-wired control-Design methods, classical method, one hot method, parallelism in microinstruction, Micro programmed control, Horizontal versus vertical, Multiplier Control Unit		
Unit:5	**Memory organization**	**7 Hours**
Device characteristics, RAM, Serial access memories, virtual memory, concept of cache & associative memories.		
Unit :6	**System Organization**	**6 Hours**
Local and long distance communication input-output systems, Interrupt, DMA, introduction to parallel Processing		
	Total Lecture Hours	**39 Hours**

Text books	
1	Jhon.P. Hayes, Computer Architecture and organization McGraw-Hill Companies
Reference Books	
1	Carl Hammacher, Computer organization , McGraw-Hill Science
2	Andrew S. Tanenbaum, Structured computer and Organization, PHI
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
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VI Semester
22EE635 : PEIII: Transmission line and wave Guide

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Explain fundamental parameters of transmission line and its constraints in high frequency transmission of information. 2. Make use of the Transmission line to develop impedance matching networks and any communication system. 3. Relate the propagation characteristics of electromagnetic waves in various wave guide structures. 4. Analyze transmission line using Smith Chart and Design Impedance Matching network		
Unit:1	TRANSMISSION LINE THEORY :Different types of transmission lines , Definition of Characteristic impedance ,The transmission line as a cascade of T-Sections Definition of Propagation Constant, General Solution of the transmission line , The two standard forms for voltage and current of a line terminated by an impedance , physical significance of the equation and the infinite line , The two standard forms for the input impedance of a transmission line terminated by an impedance , meaning of reflection coefficient , wavelength and velocity of propagation.	**7 Hours**
Unit:2	Waveform Distortion: Distortion less transmission line, The telephone cable, Inductance loading of telephone cables, Input impedance of lossless lines – reflection on a line not terminated by Zo, Transfer impedance reflection factor and reflection loss	**7 Hours**
Unit:3	LINE AT RADIO FREQUENCIES: Standing waves and standing wave ratio on a line , One eighth wave line , The quarter wave line and impedance matching , the half wave line, The circle diagram for the dissipation less line , The Smith Chart , Application of the Smith Chart , Conversion from impedance to reflection coefficient and vice versa. Impedance to Admittance conversion and vice versa, Input impedance of a lossless line terminated by impedance, single stub matching and double stub matching.	**8 Hours**
Unit:4	GUIDED WAVES: Waves between parallel planes of perfect conductors, Transverse electric and transverse magnetic waves, characteristics of TE and TM Waves, Transverse Electromagnetic waves, Velocities of propagation, component uniform plane waves between parallel planes.	**7 Hours**
Unit:5	RECTANGULAR WAVEGUIDES: Transverse Magnetic Waves in Rectangular Wave guides ,Transverse Electric Waves in Rectangular Waveguides ,characteristic of TE and TM Waves , Cutoff wavelength and phase velocity ,Dominant mode in rectangular waveguide ,Attenuation of TE and TM modes in rectangular waveguides , Wave impedances	**8 Hours**

Unit :6	CIRCULAR WAVE GUIDES AND RESONATORS: Bessel functions, Solution of field equations in cylindrical coordinates , TM and TE waves in circular guides wave impedances and characteristic impedance ,Dominant mode in circular waveguide ,excitation of modes.	**8 Hours**
Total Lecture Hours		**45 Hours**

Textbooks	
1	"Networks, Lines and Fields" BY J.D.Ryder, PHI
Reference Books	
1	Electro Magnetic Waves and Radiating System " BY E.C. Jordan and K.G.Balmain
2	"Transmission lines and wave guides" BY L.Ganesan,S.S.Sreeja Mole ,PHI
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
2	
MOOCs Links and additional reading, learning, video material	
1	https://archive.nptel.ac.in/courses/108/106/108106157/
2	https://archive.nptel.ac.in/courses/117/101/117101056/
3	

VI Semester
22EE651 : OEIII: Fuzzy Logic & Neural Networks

Course Outcomes:

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

CO1: Understand and learn the basic concepts, working principles of various soft computing techniques, especially Fuzzy logic and Artificial Neural Networks.

CO2: Analyze the problem statements; provide engineering solutions through development of membership functions / membership graphs, Learning & Recognition approaches

CO3: Work on Case studies based on Application areas of Soft Computing, Design / Develop and Demonstrate models for Fuzzy controllers, Neural Networks

CO4: Get involved in self learning approach for developing models using Soft computing techniques, Reveal different applications of these models to solve engineering and other problems and develop solutions for problems related to society and industry needs, writing Technical reports, presentations.

Unit:1	Crisp sets: An overview, Fuzzy sets: Basic types, basic concepts, basic properties of α-cuts, representation of fuzzy sets, and extension principle of fuzzy sets	**7 Hours**
Unit:2	Operations on fuzzy sets, Fuzzy numbers, Arithmetic operations on intervals, arithmetic operations on fuzzy numbers	**7 Hours**
Unit:3	Fuzzy controllers: an overview with applications, applications of fuzzy logic	**7 Hours**
Unit:4	Fundamental concepts of ANN: Basic building blocks of artificial neural networks, network architectures, activation functions, McCulloch-Pitt's neuron model	**6 Hours**
Unit:5	Brief introduction to single layer and multilayer perceptions, ADALINE and MADALINE, feed-forward networks, back propagation networks and applications.	**7 Hours**
Unit :6	Radial basis function network, Self organizing feature map and applications of ANN	**7 Hours**
	Total Lecture Hours	**39 Hours**

Text books	
1	'Fuzzy sets and Fuzzy logic', George J. Klir and Bo Yuan, Prentice Hall
2	Neural Networks: A comprehensive Foundation', Simon Haykin, Pearson publications
Reference Books	
1	'Principles of Soft Computing', S. N. Sivanandanam, S.N.Deepa, Wiley Publication
2	Fuzzy sets: Uncertainty & information, Klir and Folger, PHI
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
2	
MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.nptel.ac.in/noc22_ge04/preview
2	https://www.udemy.com/course/fuzzylogic/
3	www.digimat.in › nptel › courses ›
4	NPTEL Video Course: NOC:Introduction to Soft Computing

VI Semester
22EE652 : OEIII: Basics of Analog and Digital Communication

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Understand different modulation and demodulation schemes for analog communication with the concept of noise 2. Understand different pulse analog and digital modulation techniques. 3. Understand different digital modulation schemes 4. Understand the different coding techniques for communication systems.		
Unit:1	Basic block diagram of Analog communication system, Modulation techniques: Need for modulation, Basic concepts of AM, FM, PM, Transmitters	**7 Hours**
Unit:2	Receivers: Basic receiver (TRF), Super heterodyne receiver, AM detectors, FM Detectors, Noise Types of Noise, Definition of Noise figure, signal to noise ratio, calculation of noise figure.	**7 Hours**
Unit:3	Pulse Modulation: Generation and demodulation of PAM, PWM, PPM, Time division Multiplexing, Frequency division multiplexing, Basic digital Modulation System- PCM.	**7 Hours**
Unit:4	Channel capacity, DPCM, Delta Modulation, ADM, ADPCM, Adaptive sub-band coding, applications.	**6 Hours**
Unit:5	Digital Modulation techniques: ASK, FSK, PSK, BPSK, QPSK, MSK, DPSK, BFSK, M-ary PSK, FSK, and QAM.	**7 Hours**
Unit :6	Source coding and channel coding, Information theory, Huffman coding, LZ coding, Basic concept of convolution code.	**7 Hours**
	Total Lecture Hours	**39 Hours**

Text books	
1	Electronic Communication System Fifth Edition, Gorge Kennedy Tata McGraw-Hill
2	Digital Communications 1999 Symon Hykin Wiley, 1988
Reference Books	
1	Electronic Communication Systems Second Edition, 1993 Frank R. Dungan Delmar Publishers
2	Communication Electronics Third Edition, 2007 Louis Frenzel McGraw-Hill

VI Semester
22EE653 : OEIII: Biomedical Instrumentation

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Differentiate and analyse the biomedical signal sources. 2. Understand cardiovascular system and related measurements. 3. Explain the respiratory and nervous systems and related measurements 4. Understand non-invasive diagnostic parameters		
Unit:1	Introduction to Biomedical instrumentation, development of biomedical instrumentation, biometrics, Physiological system of body, problems encountered in measuring a living system	**6 Hours**
Unit:2	Basic transducer principle, active transducer, passive transducer, electrode theory, biopotential electrodes, biochemical transducers	**7 Hours**
Unit:3	The heart and cardiovascular system, characteristics of blood flow, blood pressure measurement, heart sound measurement. Principles of ultrasonic diagnosis, temperature measurement, electrocardiograph, plethysmography, pulmonary function measurement spirometry, pulmonary function analyzers, respiratory gas analyzers.	**7 Hours**
Unit:4	Generation of ionizing radiation, instrumentation for diagnostic X-ray, special technique, instrumentation for medical use of radioisotopes, radiation therapy, EMG	**7 Hours**
Unit:5	Patient care and monitoring, the elements of intensive care monitoring , instrumentation for monitoring patient, pacemakers, defibrillators, Electrical safety of medical equipment. Physiological effects of electrical current, shock hazards from electrical equipments	**7 Hours**
Unit :6	Computers in biomedical instrumentation, digital computer, Telemedicine concept, Telemedicine applications, video conferencing, digital communication in telemedicine Teleradiology, Tele Cardiology, Telepsychiatry	**6 Hours**
Total Lecture Hours		**40 Hours**

Textbooks	
1	Leaslie Cromwell, Fred Weibell, Erich A Pfeiffer, Biomedical Instrumentation & Measurement ,Prentice Hall
Reference Books	
1	R.S.Khandpur, Handbook of Biomedical Instrumentation, TMH
2	Dean A Dmane, David Michaels, Bioelectronics Measurement, Prentice hall
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
2	
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/108105101
2	https://onlinecourses.swayam2.ac.in/nou23_bt05/preview
3	https://onlinecourses.nptel.ac.in/noc22_bt56/preview
4	https://onlinecourses.nptel.ac.in/noc21_ee17/preview

VI Semester
22EE654 : OEIII: Digital Logic Design

Course Outcomes:		
Upon successful completion of the course the students will be able to		
1. Simplify combination logic circuits using Boolean algebra and exhibit the methods to solve logical functions .		
2. Understand and apply the concept of combinational logic circuits in various digital systems.		
3. Understand and demonstrate the various codes and illustrate concept of logic family with their characteristics.		
4. Understand the working of Flip-flops and its use to design Synchronous counters and Design and demonstrate finite state machines		
Unit:1	Number Systems and IEEE Floating point representations, Logic gates, Switching Algebra & simplification of Boolean expressions, Boolean algebraic theorems, DeMorgan's theorem, SOP, POS, Canonical forms of Boolean expression. Implementations of Boolean expressions using logic gates.	**7 Hours**
Unit:2	Combinational Circuits: Minimization methods: Karnaugh map(upto 4 variable), Quine McClauskey methods.	**7 Hours**
Unit:3	Design of Arithmetic circuits: Half & Full adders, Half & Full Subtractions, Comparators, Multi-bit Application designs, Formation of switching functions from word statements, Functions & its implementation using Multiplexer, De multiplexer, Encoder, Decoder	**7 Hours**
Unit:4	Combinational circuits design using MSI and LSI chips, PLA's ,Parity Checkers and generators, Introduction to Logic families & their characteristics such as Fan-In, Fan-out, Propagation delay, Power dissipation, Noise Margin.	**6 Hours**
Unit:5	Sequential circuits: Latches and flip-flops: RS-FF, D-FF, JK-FF, Master-Slave JK-FF & T-FF's, Excitation & Truth Table, Flip flop conversions, Shift registers, Introduction to Synchronous, Counters, Design of synchronous counter.	**7 Hours**
Unit :6	Classification of synchronous machines, Design of synchronous sequential machines using Moore & Mealy circuits: Sequence detector	**7 Hours**
	Total Lecture Hours	**39 Hours**

Textbooks	
1	"Digital Circuits & Microprocessors" by Hebert Taub
Reference Books	
1	Modern Digital Electronics by RP Jain , 3rd Edition, Tata McGraw Hill
2	Digital Design by M. Morris Mano , 4th edition 2008, Prentice Hall of India
3	
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
2	
MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.nptel.ac.in/noc21_ee39/preview
2	https://nptel.ac.in/courses/117105080
3	https://nptel.ac.in/courses/108106177
4	https://archive.nptel.ac.in/courses/108/106/108106177/

VI Semester
22EE671 : OEIV: Sensor and actuators

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Understand and explain the concepts of Sensors and Actuators. 2. Explain the working of magnetic sensors and its applications in real time scenario. 3. Acquire knowledge of Model linear actuators and differentiate various solenoids. 4. Evaluate performance characteristics of different types of sensors.		
Unit:1	**Introduction Sensors and Actuators**	**7 Hours**
Classification of Sensors and Actuators - Magnetic Sensors - Special Magnetic Devices - Rotary and Linear Actuators - Magnetic Materials and Technology - Soft Magnetic Materials - Hard Magnetic Materials -Coating Technologies - Magnetic Materials Market and Applications.		
Unit:2	**Magnetic Sensors**	**6 Hours**
Theory of Magnetic Sensors - Magnetic Sensor Analysis - VR Sensors - Solid-State Sensors - Magnetic Sensor Applications - Magnetic Speed Sensor Requirements - Magnetic Speed Sensor Applications - Magnetic Position Sensor Applications - VR Sensor Noise.		
Unit:3	**Pressure Sensor**	**7 Hours**
Units of pressure - Manometers – Different types – Elastic type pressure gauges – Bourdon type bellows – Diaphragms – Electrical methods – Elastic elements with LVDT and strain gauges – Capacitive type pressure gauge – Piezo resistive pressure sensor – Resonator pressure sensor – Measurement of vacuum –Ionization gauge.		
Unit:4	**Position, Proximity, Flow Level Sensor**	**6 Hours**
Measurement of position using Hall effect sensors. Proximity sensors: Inductive & Capacitive, Use of proximity sensor as accelerometer and vibration sensor. Flow Sensors: Ultra sonic & Laser. Level Sensors: Ultra sonic & Capacitive		
Unit:5	**Linear Actuators**	**7 Hours**
Mathematical Model for Linear Actuators - Fast-Acting Actuators - Disk Solenoids - Plunger Solenoids - Ball Solenoids - Conical Solenoids - Applications of Solenoid Actuators - Long Stroke Solenoid Fuel Pump - Gasoline Injectors - Natural Gas Injectors - Diesel Fuel Injectors - Compressor Solenoid Valves .		
Unit :6	**Rotary Actuators**	**6 Hours**
Disk Rotary Actuators - Disk Rotary Actuator Analysis - Disk Rotary Actuator Design - Disk Rotary Actuator Excitation Electromagnetic Circuit - Disk Rotary Actuator Toothed Magnetic Part - Disk Rotary Actuator PM ,Cylindrical Rotary Actuators - Cylindrical Rotary Actuator PM - Cylindrical Rotary Actuator Excitation Electromagnetic Circuit.		
Total Lecture Hours		**39 Hours**

Textbooks	
1	Measurement Systems – Application and Design, 6th Edition, E.O. Doebelin, Tata McGraw Hill publishing company, 2003
2	Sensors and Actuators in Mechatronics, Design and Applications, Andrzej M. Pawlak, Taylor & Francis Group 2006
Reference Books	
1	Principles of Industrial Instrumentation, 2nd Edition, D. Patranabis, Tata McGraw Hill Publishing Company Ltd, 1996
2	Mechanical and Industrial Measurements, R.K. Jain, Khanna Publishers, New Delhi,1999,
3	A Course on Mechanical Measurements, Instrumentation and Control, A.K. Sawhney and P. Sawhney, DhanpathRai and Co, 2004
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/108108147
2	https://nptel.ac.in/courses/108105064

VI Semester
22EE672 : OEIV: Computer Architecture

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. 1. Understand the basic concepts of peripherals of computer system 2. Apply the design issues in the development of computer system architecture 3. Analyze the concepts of Parallel processing and pipelining for computer architecture design 4. Evaluate parameters required for processor design		
Unit:1	**Register and processor Level Design**	**7 Hours**
Register Level components, Programmable logic devices, Register level design, The Processor level components, Processor level design		
Unit:2	**CPU Organization**	**6 Hours**
CPU organization, Data representation, Fixed point numbers, Floating point numbers, IEEE 754 floating point formats, Instruction sets – Instruction formats, instruction types, addressing modes		
Unit:3	**Datapath Design**	**7 Hours**
Fixed point arithmetic, addition and subtractions, Multiplication, Division, Arithmetic operations on Floating point numbers		
Unit:4	**Control design**	**6 Hours**
Basic Concepts, Hard-wired control-Design methods, classical method, one hot method, parallelism in microinstruction, Micro programmed control, Horizontal versus vertical, Multiplier Control Unit		
Unit:5	**Memory organization**	**7 Hours**
Device characteristics, RAM, Serial access memories, virtual memory, concept of cache & associative memories.		
Unit :6	**System Organization**	**6 Hours**
Local and long distance communication input-output systems, Interrupt, DMA, introduction to parallel Processing		
	Total Lecture Hours	**39 Hours**

Text books	
1	Jhon.P. Hayes, Computer Architecture and organization McGraw-Hill Companies
Reference Books	
1	Carl Hammacher, Computer organization , McGraw-Hill Science
2	Andrew S. Tanenbaum, Structured computer and Organization, PHI
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
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VI Semester
22EE673 : OEIV: Consumer Electronics

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Understand and aware of the safety aspects in the field of Electrical and Electronics products. 2. Analyze the basics of Audio and Video Systems. 3. Know about recent trends in Processors and computer peripherals, mobile and wireless technologies. 4. Understand the basics of refrigeration cycle and cooling system		
Unit:1	**Standards and Safety norms**	**6 Hours**
Electronics and Electrical safety norms and standards, Electronic products covered under compulsory registration		
Unit:2	**Audio Systems**	**7 Hours**
Sound Recording and reproduction, Hi-Fi Sound System, Audio Mixers, Graphics Equalizers, Public Address System.		
Unit:3	**Video Systems**	**7 Hours**
Color fundamentals, Luminance and Chrominance signal , Color camera, digital television systems.		
Unit:4	**Wireless Technology & Mobile phones**	**6 Hours**
Mobile Phones, various wireless technologies, Introduction to 3G, WiFi Techhnology, GSM		
Unit:5	**Air conditioner and Refrigerators**	**6 Hours**
Fundamentals, Refrigeration cycles, compressors, home automation		
Unit :6	**Computers**	**7 Hours**
Recent microprocessor, Pentium family architecture and salient features , Recent Memories technologies (RAM, HDD), Computer peripherals		
Total Lecture Hours		**39 Hours**

Textbooks	
1	S.P. Bali, "Consumer Electronics", Pearson Education, First Edition
2	B. R. Gupta, Vandana Singhal, "Consumer Electronics", S. K. Kataria & Sons, 2006
Reference Books	
1	J.S. Chitode, "Consumer Electronics", Technical Publication,
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
1	for unit-I Electronics Standards of India www.electronicstds.gov.in

VI Semester
22EE674 : OEIV: Industrial Automation

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Remember the architecture of industrial automation system. 2. Understand the process control, PLC architecture and interfacing 3. Apply PLC ladder logic for industrial applications 4. Apply the function of SCADA with PLC systems.		
Unit:1	**Introduction:** Automation overview, requirement of automation, systems, architecture of industrial automation system, introduction of PLC and supervisory control and data acquisition (SCADA). Industrial bus systems: Modbus & profibus.	**7 Hours**
Unit:2	**Controllers & actuators :** PID controller, mechanical switches, solid-state switches, electrical actuators: Solenoids, relays and contactors, ac motor, energy conservation schemes through vfd, dc motors, servo motor, pneumatic and hydraulic actuators.	**7 Hours**
Unit:3	**PLC operation:** Definition, advantages and importance of PLC, history of PLC, architecture and block diagram, types of PLC, CPU unit architecture, memory classification.	**7 Hours**
Unit:4	**PLC programming :** Basic ladder logic function, electrical wiring diagram, scan cycle, programming language of PLC, module addressing, basic relay, input, output and timer counter instruction, arithmetic and comparison function,	**6 Hours**
Unit:5	**SCADA & distributed control system:** Introduction, block diagram, elements of SCADA, features of SCADA, MTU, RTU functions, applications of SCADA, communications in SCADA, introduction to DCS, architecture, input and output modules, specifications of DCS.	**7 Hours**
Unit :6	**Material handling, automated storage system, and Identification Technologies** The material handling function, its types, analysis for Material handling systems, Storage system performance, automated storage/retrieval systems, work-in-process storage, interfacing handling and storage with manufacturing. Product identification system: Barcode, RFID etc.	**7 Hours**
	Total Lecture Hours	**41 Hours**

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

Text books	
1	Programmable Logic controllers and Industrial Automation Penram International Publishing India Pvt. Ltd Madhuchhanda Mitra, Samarjit Sen Gupta
Reference Books	
1	Programmable Logic Controllers, Principles and Applications 2002 Prentice Hall of India Pvt. Ltd,5th Edition John W. Webb, Ronold A.
2	Industrial Instrumentation and Control 2007 S.K. Singh The McGraw Hill Companies
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
2	
MOOCs Links and additional reading, learning, video material	
1	https://www.youtube.com/watch?v=oxMdDsud5vg
2	https://www.youtube.com/watch?v=3N0kWzC6jmE

VI Semester
Audit Course
MLC2126 : YCCE Communication Aptitude Preparation (YCAP6)

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

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

Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2022

7th & 8th Semester

(Department of Electronics Engineering)

B. Tech in Electronics Engineering

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

SoE No. 22EE-101

B.TECH SCHEME OF EXAMINATION 2022

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

(Department of Electronics Engineering)

B. Tech in Electronics Engineering

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	EE	22EE701	Digital Communication	**T**	3	0	0	3	3	30	20	50	3 Hrs
2	7	PC	EE	22EE702	**Lab:** Digital Communication	**P**	0	0	2	2	1		60	40	
3	7	PC	EE	22EE703	Internet of Things	**T**	3	0	0	3	3	30	20	50	3 Hrs
4	7	PC	EE	22EE704	**Lab:** Internet of Things	**P**	0	0	2	2	1		60	40	
5	7	PE	EE		**Professional Elective-IV**	**T**	3	0	0	3	3	30	20	50	3 Hrs
6	7	PE	EE		**Professional Elective-V**	**T**	3	0	0	3	3	30	20	50	3 Hrs
7	7	PE	EE		**Professional Elective-VI**	**T**	3	0	0	3	3	30	20	50	3 Hrs
8	7	STR	EE	22EE705	Project Phase-II	**P**	0	0	10	10	5		60	40	
9	7	STR	EE	22EE706	Campus Recruitment Training (CRT)	**P**	0	0	0	0	2		100		
					TOTAL SEVENTH SEM		**15**	**0**	**14**	**29**	**24**				

List of Professional Electives-IV,V & VI

Professional Electives -IV

1	7	PE-IV	EE	22EE721	PE IV: Introduction to remote sensing and Image Analysis
2	7	PE-IV	EE	22EE722	PE IV: Wireless Sensor Networks
3	7	PE-IV	EE	22EE723	PE IV: System on Chip Design
3	7	PE-IV	EE	22EE724	PE IV: Deep learning

Professional Electives -V

1	7	PE-V	EE	22EE741	PE V: Biomedical Engineering
2	7	PE-V	EE	22EE742	PE V: Wireless Communication
3	7	PE-V	EE	22EE743	PE V: Cryptography and Network Security
4	7	PE-V	EE	22EE744	PE V: Nano Electronics
5	7	PE-V	EE	22EE745	PE V: VLSI Signal Processing

Professional Electives -VI

1	7	PE-VI	EE	22EE761	PE-VI: Design Verification and Test of Digital VLSI Circuits
2	7	PE-V	EE	22EE762	PE-VI: Micro Electro Mechanical Systems (MEMS)
3	7	PE-V	EE	22EE763	PE-VI: Mechatronics
4	7	PE-V	EE	22EE764	PE-VI: Computer Vision

Eighth Semester															
1	**8**	**STR**	EE	22EE801	Industrial Internship	**P**	0	0	12	12	3		60	40	
2	**8**	**STR**	EE	22EE802	Extra Curricular Activity Evaluation	**P**	0	0	0	0	2		100		
					TOTAL EIGHTH SEM		**0**	**0**	**12**	**12**	**5**				
GRAND TOTAL							**124**	**4**	**78**	**204**	**166**				

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
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

VII Semester

Digital communication

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. **Understand** basic concepts of digital communication system 2. **Apply** the knowledge of information theory and the error control codes 3. **Apply** mathematical analysis for communication systems 4. **Describe** and **analyze** the digital and spread spectrum modulation techniques 5. **Simulate** experiments to demonstrate design and analysis of concepts.		
Unit:1	PCM, DM, ADM, DPCM, sub-band and transform coding, model based speech coding like LP coding, CELP coding.	**7 Hours**
Unit:2	Introduction to information theory, entropy, Huffman, Prefix code, and L-Z encoding algorithm, Rate distortion theory for optimum quantization.	**7 Hours**
Unit:3	Gram-Schmitt procedure, Signal space representation of baseband and modulated signals, line coding and baseband digital transmission, Error probability and optimum receivers for AWGN channels, Matched filters.	**7 Hours**
Unit:4	Digital Modulation techniques, Transmitter, Receiver and signal space representation of BPSK, BFSK, QPSK, Introduction to TDM, FDM, OFDM.	**6 Hours**
Unit:5	Channel capacity Review of channel coding, Linear block codes, cyclic codes convolution, encoding and decoding, distance properties, Viterbi algorithm and Fano algorithm. Trellis coded modulation methods	**7 Hours**
Unit :6	Study of PN sequences, direct sequence methods, Frequency hop methods, digital spread spectrum, slow and fast frequency hop, performance analysis, synchronization methods for spread spectrum. Application of spread spectrum, CDMA.	**7 Hours**
Total Lecture Hours		**41 Hours**
Textbooks		

1	Digital communication by Simon Haykin , John Wiley & publication
Reference Books	
1	Digital communication by John Prokis , Springer publication
2	Modern Communication systems (Principles and application) by Leon Couch, Pearson
3	Digital communication by Shanmugham San, John Wiley
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/117105144?authuser=1
2	https://nptel.ac.in/courses/117105077?authuser=1
3	https://nptel.ac.in/courses/108101113?authuser=1

VII Semester

Lab: Digital Communication

Course Outcomes:
Upon successful completion of the course the students will be able to 1. **Understand** basic concepts of digital communication system 2. **Apply** the knowledge of information theory and the error control codes 3. **Apply** mathematical analysis for communication systems 4. **Describe** and **analyze** the digital and spread spectrum modulation techniques 5. **Simulate** experiments to demonstrate design and analysis of concepts.

Sr. No.	Experiments based on
1	Study of sampling process (MATLAB & Simulink)
2	Study of Pulse Coded Modulation Technique (MATLAB & Simulink)
3	Study of Delta Modulation Technique (MATLAB & Simulink)
4	Calculation of Entropy, Efficiency, Average code word length,Variance for Huffman Code
5	Gram Schimdt orthogonalization procedure for given set of signals
6	Plot Amplitude Shift Keying, Frequency Shift Keying, Phase shift keying
7	Design of coherent Binary Phase shift keying system
8	Design of coherent Quaternary Phase shift keying system
9	Design of Encoder for Cyclic Hamming Code
10	Convolutional code generation (Time domain & Transform domain approach)
11	Pseudo random Noise sequence generation
12	Mini project based on simulink

VII Semester

Internet of Things

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. To **understand**, define and explain the fundamental concepts of Internet of things and wireless sensor networks. 2. To **apply** the knowledge of communication, networks and coding to networks 3. To **analyse** the given network parameters and arrive at suitable conclusions 4. To **implement** and demonstrate the specified mini-project using suitable communication and sensor network parameters.		
Unit:1	**Introduction** Internet of Things Promises–Definition–Scope–Sensors for IoT Applications–Structure of IoT, Sensing, Actuation, Basics of Networking, IoT architecture.	**7 Hours**
Unit:2	**Connectivity Technologies in IoT** Connectivity Technologies in IoT: MQTT, COAP, XMPP, AMQP	**7 Hours**
Unit:3	**Network Layer:** IPv4, IPv6, 6LoWPAN	**6 Hours**
Unit:4	**IoT Communication protocols:** IEEE802.15.4, ZigBee, Wireless HART, Zwave, Bluetooth, NFC, RFID	**7 Hours**
Unit:5	**Wireless Sensor networks** Wireless Sensor networks: Components of sensor nodes, Node Behavior in WSNs, Applications, WSN Coverage	**7 Hours**
Unit :6	**Cloud Computing** Cloud Computing: Characteristics, Components of Cloud Computing, Service Models, Deployment Models, Service Management, Cloud Security	**7 Hours**
	Total Lecture Hours	**39 Hours**

Text books	
1	Dr. Guillaume Girardin, Antoine Bonnabel, Dr. Eric Mounier, 'Technologies & Sensors for the

	Internet ofThings Businesses & Market Trends 2014 -2024',Yole Développement Copyrights ,2014
	NPTEL course material on Introduction to Internet of Things
Reference Books	
1	Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015
2	Editors OvidiuVermesan Peter Friess,'Internet of Things –From Research and Innovation to Market
3	Deployment', River Publishers, 20145.N. Ida, Sensors, Actuators and Their Interfaces, Scitech Publishers, 2014
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.nptel.ac.in/noc22_cs53/preview
2	https://nptel.ac.in/courses/106105166

VII Semester

Lab: Internet of Things

Course Outcomes:
Upon successful completion of the course, the student will be able to: **1.** Understanding of IoT value chain structure (device, data cloud), application areas and technologies involved **2.** Understand IoT sensors and technological challenges faced by IoT devices, with a focus on wireless, energy, power, RF and sensing modules **3.** Market forecast for IoT devices with a focus on sensors **4.** Explore and learn about Internet of Things with the help of preparing projects designed for Raspberry Pi

Sr. No.	Experiments based on
1	To study Arduino Uno IoT Kit with ATMega 328 Microcontroller & Design a sketch for running of LEDs
2	Design a sketch for traffic light control signal.
3	Design a sketch for blinking of LED using Node MCU.
4	Design a sketch for Web Access point using Node MCU.
5	Design a sketch for Web Server using Node MCU.
6	Design a sketch to read data from Ultrasonic Sensor and send it on serial monitor.
7	Design a sketch to read data from IR Sensor and send it on serial monitor.
8	Design a sketch to read data from DHT Sensor and send it on serial monitor. Also to log data of temperature sensor over internet (Thingspeak)
9	Advance Practical: Study and setup of ESP -32 board
10	Mini Project

VII Semester

PEIV: Introduction to remote sensing and Image Analysis

Course Outcomes:		
Upon successful completion of the course the students will be able to **1.** Comprehend the basic and applied principles of remote sensing, RS image characteristics **2.** Understand and evaluate image spatial and spectral transforms and their effect on image quality and data integrity **3.** Apply the image correction techniques and classificationalgorithms on remote sensing images **4.** Analyze high-dimensional remote sensing imagery with appropriate remote sensing data and processing methods.		
Unit:1	**Remote Sensing Concepts** Review of Remote Sensing Concepts: spatial and radiometric characteristics – spectral and temporal characteristics, Optical Radiation Model: The wave/ particle models - energy/matter interaction – Radiometric Correction–Atmospheric Correction, Image sensors	**7 Hours**
Unit:2	**Digital Image Formation and Characteristics** Digital Image Formation: point spread functions – sampling and quantization Digital Image Characteristics: Univariate and multivariate image statistics – noise models- power spectral density- co-occurrence matrix	**7 Hours**
Unit:3	**Image Enhancement and Spectral Transforms** Contrast enhancement – band rationing – principal component analysis – vegetation transforms – texture transforms, Spatial Transforms: convolution concept - low and high pass filtering – spatial transformations – Fourier transform	**7 Hours**
Unit:4	**Geometric Correction** Sensor geometry and empirical models for geometric corrections techniques. Distortion Correction, Sensor compensation, Noise reduction, Radiometric Calibration	**6 Hours**
Unit:5	**RS Image Classification** Thematic Information Extraction: review of supervised and unsupervised Image classification – Maximum Likelihood and Bayesian classification, Non-parametric & parametric classification	**6 Hours**

Unit :6	**Hyperspectral Image Analysis** Subpixel classification: Linear mixing model, fuzzy set classification, Hyperspectral Image Analysis: Feature extraction, classification algorithms for hyperspectral data, Applications of Remote Sensing	**6 Hours**
	Total Lecture Hours	**39 Hours**

Text books	
1	Remote Sensing: Models and Methods for Image Processing ,3rd Edition, 2007, Robert A Schowengerdt, Elsevier
2	Remote Sensing DigitalImage Analysis, 4th Edition, 2006, John A. Richards,Xiuping Jia, Springer
3	Introductory Digital Image Processing: A Remote Sensing Perspective, 4th Edition, 2016, Jhon R. Jensen, Pearson Series
Reference Books	
1	Physical Principles of Remote Sensing, Third Edition,2012, W.G. Rees, Cambridge UniversityPress
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/105108077
2	https://archive.nptel.ac.in/courses/121/107/121107009/
3	https://onlinecourses.nptel.ac.in/noc19_ce38/preview

VII Semester

PE IV: Wireless Sensor Networks

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. **Understand** the WSN node Architecture and Network Architecture and explain the basic concepts of wireless sensor networks 2. **Describe and explain** communication protocols adopted in wireless sensor networks. 3. **Identify** the Wireless Sensor Network Platforms. 4. **Describe and explain** the hardware, software, and communication for wireless sensor network nodes		
Unit:1		**7 Hours**
Introduction & architecture – Motivation of Wireless Sensor Nodes, Challenges, constraints for WSN, applications, single node architecture, Hardware components, Energy consumption of sensor nodes, Operating systems and execution environments		
Unit:2		**6 Hours**
Network architecture: Sensor network scenarios, Optimization goals and figures of merit, Design principles for WSNs, Service interfaces of WSNs, Gateway concepts		
Unit:3		**7 Hours**
communication protocols: Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC , Contention based Protocols, Schedule based protocols		
Unit:4		**6 Hours**
link layer Protocols: Fundamental, Error Control, Framing, Link Management, Naming And Addressing – Fundamentals, Assignment of MAC Address, Distributed assignment of locally unique addresses, Content based and geographic addressing		
Unit:5		**7 Hours**
Naming and addressing, Time synchronization: Properties of Localization and positioning procedures, single hop localization, positioning in multihop environments, and impact of anchor placement. Clustering		
Unit :6		**7 Hours**
Data centric and content based networking: Data centric routing, Data aggregation, Data centric storage, Topology control-controlling topology in a flat network, Hierarchical network by dominating set, Hierarchical network by clustering, transport layer and Quality of service		
	Total Lecture Hours	**39 Hours**
Text books		

1	H. Karl and A. Willig, Protocols and Architectures for Wireless Sensor Networks., June 2005, John Wiley & Sons
Reference Books	
1	Waltenegus Dargie,Christian Poellabauer, Fundamentals of wireless sensor networks: Theory and Practice, Wiley & Sons
2	K. Sohraby, D. Minoli, and T. Znati., Wireless Sensor Networks: Technology, Protocols, and Applications, John Wiley & Sons, March 2007.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
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MOOCs Links and additional reading, learning, video material	
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VII Semester

PEIV: System on Chip Design

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Understand about SoC Design Methodology 2. Understand the Time, Area, Power, Reliability and Configurability of System on chip 3. Understand the design of different embedded memories. 4. Understand the Validation and Testing Concepts 5. Investigate new techniques for future system.		
Unit:1	**Overview of System**	**7 Hours**
Overview of System Architecture, Components of the System, Programmability Versus Performance, Processor Architectures, Memory and Addressing, System-Level Interconnection, Bus-Based Approach, Network-on-Chip Approach, Design Iteration System Architecture and Complexity, Product Economics and Implications for SOC, Factors Affecting Product Costs, Modelling Product Economics and Technology		
Unit:2	**Chip Basics: Time, Area, Power, Reliability and Configurability**	**7 Hours**
Design Trade-Offs, Requirements and Specifications, Cycle Time, Optimum Pipeline, Die Area and Cost, Processor Area, Processor Subunits, Ideal and Practical Scaling Area–Time–Power Trade-Offs in Processor Design, Workstation Processor, Embedded Processor, Reliability, Dealing with Physical Faults, Error Detection and Correction, Dealing with Manufacturing Faults, Memory and Function Scrubbing, Configurability		
Unit:3	**Processors**	**7 Hours**
processor Selection for SOC, soft Processors, Processor Core Selection, Basic Concepts in Processor Architecture, Instruction Set Conventions, Branches, Interrupts and Exceptions, Processor Microarchitecture, Basic Elements in Instruction Handling, Instruction Decoder and Interlocks, Bypassing, Execution Unit, Buffers: Minimizing Pipeline Delays, Request Rate, Branch Prediction, More Robust Processors: Vector, Very Long Instruction Word (VLIW), and Superscalar		
Unit:4	**Memory Design: System-on-Chip and Board-Based Systems**	**6 Hours**
SOC External Memory: Flash, Internal Memory: Placement, Scratchpads and Cache Memory, Write Policies, Strategies for Line Replacement at Miss Time, Fetching a Line, Line Replacement, Cache Environment: Effects of System, Transactions, and Multiprogramming, Multilevel Caches, Limits on Cache Array Size, Evaluating Multilevel Caches, Logical Inclusion, Virtual-to-Real Translation, SOC (On-Die) Memory Systems, SDRAM and DDR SDRAM		
Unit:5	**Interconnect**	**7 Hours**
Interconnect Architectures, Bus: Basic Architecture, Arbitration and Protocols, Bus Bridge, Physical Bus Structure, SOC Standard Buses, AMBA, Bus Interface Units: Bus Sockets and Bus Wrappers, Analytic		

Bus Models, Contention and Shared Bus, Effect of Bus Transactions and Contention Time, Beyond the Bus: NOC with Switch Interconnects, Static Networks, blocking versus Nonblocking, Layered Architecture and Network Interface Unit, Evaluating Interconnect Networks, Static versus Dynamic Networks		
Unit :6	**Effectiveness of Customization**	**7 Hours**
Estimating Effectiveness of Customizations Customization, Customizing Instruction Processors, Processor Customization Approaches, Architecture Description, Identifying Custom Instructions Automatically, Reconfigurable Technologies, Reconfigurable Functional Units (FUs), Reconfigurable Interconnects, Software Configurable Processors, Mapping Designs Onto Reconfigurable Devices, Instance-Specific Design, Customizable Soft Processor, Reconfiguration Overhead Analysis, Trade-Off Analysis: Reconfigurable Parallelism		
	Total Lecture Hours	**39 Hours**

Text books	
1	Computer System Design: System-on-Chip, Michael J. Flynn Wayne Luk, John Wiley Publications
Reference Books	
1	System-on-Chip Design with Arm Cortex-M Processors, Joseph You, ARM education media
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
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MOOCs Links and additional reading, learning, video material	
1	https://elearn.nptel.ac.in/shop/iit-workshops/completed/lab-workshop-on-arm-based-soc-design/
2	https://nanohub.org/courses/ECE695R/o1a/outline/unit1introductionandbackground/l15overviewofsocdesignflow?time=00:01:18

VII Semester

PE IV: Deep Learning

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. **Apply** the knowledge of Mathematics and programming to build Deep learning models 2. **Analyze** different use cases to evaluate the performance of the models using Different Deep learning methods 3. **Design and develop** application models using Different Deep learning methods 4. **Compare** different Deep learning techniques and **demonstrate the comprehension** of the trade-offs involved in design choices.		
Unit:1	Introduction to Visual Computing and Neural Networks, Introduction to Deep Learning with Neural Networks, Multilayer Perceptron and Deep Neural Networks, Autoencoders for Representation Learning and MLP Initialization	**7 Hours**
Unit:2	Stacked, Sparse, Denoising, Autoencoders and Ladder Training, Cost functions, Optimization Techniques and Learning Rules	**6 Hours**
Unit:3	Convolutional Neural Network Building Blocks, Simple CNN Model: LeNet, Convolutional Autoencoder and Deep CNN, AlexNet, VGGNet, Computational Complexity	**7 Hours**
Unit:4	Very Deep CNN for Classification (GoogLeNet, ResNet, DenseNet, Assessing the space and computational complexity of very deep CNNs, Transfer Learning	**6 Hours**
Unit:5	Object Localization (RCNN), Region Proposal Networks (rCNN and Faster rCNN) and Semantic Segmentation with CNN, UNet and SegNet for Semantic Segmentation	**6 Hours**
Unit :6	Auto encoders and Latent Spaces, Principle of Generative Modelling, Adversarial Auto encoders Recurrent Neural Networks and Long Short-Term Memory	**7 Hours**
	Total Lecture Hours	**39 Hours**

Text books	
1	Goodfellow, Y, Bengio, A. Courville, "Deep Learning", MIT Press, 2016.

2	Ian Goodfellow, Yoshua Bengio, Aaron Courville. Deep Learning, MIT Press, 2015
3	S. Haykin, "Neural Networks and Learning Machines",3e,Pearson, 2008.
Reference Books	
1	Christopher and M. Bishop, Pattern Recognition and Machine Learning, Springer Science Business Media, 2006.
2	Jason Brownlee, Deep Learning with Python,ebook,2016
3	2. Kevin P. Murphy,—Machine Learning: A Probabilistic Perspective, MIT Press,2012.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
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MOOCs Links and additional reading, learning, video material	
1	https://cognitiveclass.ai/courses/machine-learning-with-python
2	https://cognitiveclass.ai/courses/python-for-data-science
3	NPTEL Course on Deep Learning for Visual Computing by IIT Kharagpur, https://onlinecourses.nptel.ac.in/noc20_ee74/preview

VII Semester

PE V: Biomedical Engineering

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Understand various physiological variables and systems of human body, basic concepts of bio signals and their characteristics. 2. Understand and Analyse the concepts of biomedical instrumentation and principle of working of transducer/sensors used to measure physiological parameters. 3. Understand various physiological systems and Analyse the instrumentation systems used to measure physiological parameters and diagnostics 4. Describe the fundamentals of medical imaging systems. 5. Create broad awareness of safety measures to be practiced while using the biomedical instruments, Understand Patient care monitoring and concept of Telemedicine.		
Unit:1	**Introduction to physiology and Biomedical instrumentation:** Development of biomedical instrumentation, biometrics, Physiological system of body, problems encountered in measuring a living system, Origin of bio potentials ,Cell resting potential and action potentials, characteristics of bio potential	**7 Hours**
Unit:2	**Transducers used in biomedical instrumentation:** Types of Transducers, selection criteria, Piezo- electric, ultrasonic transducers, Temperature, measurements - Fiber optic temperature sensors.	**6 Hours**
Unit:3	**Electro – Physiological measurements:** Electrodes: Limb electrodes, floating electrodes, pre-gelled disposable electrodes, Micro needle and surface electrodes, Amplifiers: Preamplifiers, differential amplifiers, chopper amplifiers, Isolation amplifier. ECG, EEG, EMG, ERG, Lead systems and recording methods, Typical waveforms. Electrical safety in medical environment shock hazards, leakage current-Instruments for checking safety parameters of biomedical equipment	**7 Hours**
Unit:4	**Non-electrical parameter measurements :** Measurement of blood pressure, Cardiac output, Heart rate, Heart sound Pulmonary function measurements, spirometer, Photo Plethysmography, Body Plethysmography, Blood Gas analysers : pH of blood, measurement of blood pCO2, pO2, finger-tipoximeter	**7 Hours**

Unit:5	**Medical Imaging**: Radiographic and fluoroscopic techniques, X rays, Computer tomography, Mammography, MRI, MRI, Ultrasonography, Endoscopy, Thermography, Different types of biotelemetry systems and patient monitoring	**6 Hours**
Unit :6	**Assisting and therapeutic equipment**: Pacemakers, Defibrillators, Ventilators, Nerve and muscle stimulators, Diathermy, Heart Lung machine, Audio meters, Dialyzers, Lithotripsy	**6 Hours**
Total Lecture Hours		**40 Hours**

Textbooks	
1	L. Cromwell, F. J. Weibell and E. A. Pfeiffer, "Biomedical Instrumentation and Measurements", Prentice-Hall of India, 1995.
Reference Books	
1	R.S.Khandpur, 'Hand Book of Bio-Medical instrumentation', Tata McGraw Hill Publishing CoLtd., 2003.
2	John G Webster, "Medical Instrumentation – Application and Design", 4th ed., John Wiley and Sons, 2007.
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1	http://www.aami-bit.org/
2	http://bio-medical.com/
3	http://www.ncbi.nlm.nih.gov/pmc/articles/
4	https://nptel.ac.in/courses/103/108/103108100/
5	https://nptel.ac.in/courses/108/105/108105064/
6	https://nptel.ac.in/courses/108/105/108105101/

VII Semester

PE V: Wireless Communication

Course Outcomes:		
Upon successful completion of the course the students will be able to 1.Understand basic concepts of wireless communication system 2. Apply the knowledge of Cellular concepts on wireless medium 3.Analyze wireless communication using mathematical analysis 4.Describe the importance of various wireless networking standards along with applications and standard formats used for transmission.		
Unit:1	The Cellular Concept: Evolution of Mobile Radio Communications, Comparison of common wireless communication systems, Examples of wireless communication system, Generations of cellular Networks, Cellular telephone system, frequency reuse, channel assignment and handoff strategies, interference and system capacity, Trunking & grade of service, improving capacity in cellular system	**7 Hours**
Unit:2	Mobile Radio Propagation-large scale path loss : Introduction to Radio Wave Propagation, free space propagation model, Reflection, Diffraction, Scattering, Signal Penetration into Buildings, Ray Tracing & Site Specific Modeling	**7 Hours**
Unit:3	Small Scale fading & Multipath: Multipath Propagation, Small Scale Multipath Measurements, Parameters of Mobile Multipath Channels, Types Of Small Scale Fading, Rayleigh &Rician Distribution	**7 Hours**
Unit:4	Equalization & Diversity: Fundamentals of equalization, space polarization, frequency and time diversity techniques, space diversity, polarization diversity, frequency and time diversity. RAKE Receiver	**6 Hours**
Unit:5	Wireless Systems and Standards: GSM- global system for mobile: services and	**7 Hours**

	features, GSM system architecture, GSM radio subsystem, GSM channel types, GSM frame structure, signal processing in GSM, introduction to CDMA digital cellular standard (IS-95).	
Unit :6	Wireless Networking: Introduction to wireless networks, Differences Between Wireless & Fixed Telephone Networks, Development of wireless networks, Traffic routing in wireless networks, Wireless data services, Common channel signalling, Signalling System No. 7.An Example of SS7-Global Cellular Network Interoperability.	**7 Hours**
	Total Lecture Hours	**39 Hours**

Textbooks	
1	Wireless Communication, Principles and practice 2nd edition, 2002 T S. Rappaport, Prentice Hall PTR, upper saddle river, New Jersey
Reference Books	
1	Mobile Communications Design fundamentals, 2nd edition, 1997, William C. Y. Lee, John Willey
2	Wireless digital communication: modulation, & spread spectrum applications 1995. Kamilo Feher Prentice Hall PTR; Har/Dis edition
3	Wireless and Cellular Communication 3rd Edition,2005 W .C .Y. Lee McGraw Hill
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2	https://archive.nptel.ac.in/courses/117/102/117102062/
3	https://nptel.ac.in/courses/106106167

VII Semester

PE V: Cryptography and Network Security

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Solve and relate mathematic concepts behind the cryptographic algorithms. 2. Explain basic concepts and algorithms of cryptography 3. Evaluate the role played by various security mechanisms like passwords 4. Understand IP security		
Unit:1	Introduction to Security: Security Goals , Cryptographic Attacks, Services and Mechanisms, Techniques.	**6 Hours**
Unit:2	Cryptography Mathematics: Integer Arithmatic, Modular Arithmatic, Euclidian Algorithm, Modulo operator, Congruence, Primitive roots, Inverses, Extended Euclidian Algorithm.	**6 Hours**
Unit:3	Traditional Symmetric Key Ciphers:-Kerchoff's Principal, Substitution Ciphers (mono alphabetic ciphers, poly alphabetic ciphers)-Transposition Ciphers-Stream and Block Ciphers. Modern Symmetric Key Ciphers:- Substitution Box-Permutation Box.	**6 Hours**
Unit:4	Symmetric Key Block Cipher: Fiestel and Non-Fiestel Ciphers, Data Encryption Standard (Encryption , Decryption , Key Generation Algorithm), Advanced Encryption Standard (AES) (Encryption , Decryption , Key Generation Algorithm).	**7 Hours**
Unit:5	Public Key Cryptosystems: - Knapsack Cryptosystem, RSA Cryptosystem, Rabin Cryptosystem (Encryption, Decryption, Key Generation)	**6 Hours**
Unit :6	Network Layer Security: - IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload- Intruders, Internet Key Exchange Algorithm (Diffie-Hellman Key Exchange)	**6 Hours**
	Total Lecture Hours	**39 Hours**

Text books	
1	Cryptography and Network Security, Second Edition, Behrouz A. Forouzan, Mcgraw-Hill

Reference Books	
1	Cryptography and Network Security Principles and Practices , 4'th Edition , William Stallings, (Pearson Edu Asia)
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
1	Nptel Video : https://www.youtube.com/watch?v=Q-HugPvA7GQ&list=PL71FE85723FD414D7
2	https://www.youtube.com/watch?v=LWU11bLvXKI&list=PLJ5C_6qdAvBFAuGoLC2wFGruY_E2gYtev&index=36

VII Semester

PE V :Nano Electronics

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Understand basic concepts of Nanoelectronics knowledge of Model. 2. Apply the knowledge of Nanoelectronics to basic parameters of MOS transistors. 3. Analyze MOS parameters using mathematical analysis. 4. Describe the fabrication process on MOS transistors.		
Unit:1	**Introduction Nanoelectronics**	**7 Hours**
Introduction to Nanoelectronics, CMOS Technology scaling issues, Short channel effects, sub-threshold conduction, Drain Induced Barrier Lowering, Design techniques for nanoscale transistor		
Unit:2	**MOS Transistor**	**6 Hours**
MOS Electrical Characterization, Ideal MOS C-V Characteristics, Effects on non idealities on C-V, MOS Parameter extraction, Overview of Non Classical MOSFETs and carrier transport in Nano MOSFETs, Ballistic Transport		
Unit:3	**Silicon on Insulator (SOI) MOSFET**	**7 Hours**
Silicon on Insulator (SOI) MOSFET, SOI technology comparison with bulk silicon CMOS Technology, Partially Depleted (PD) and Fully Depleted (FD) SOI-MOSFETs, Metal Semiconductor contacts and Metal-Source / Drain Junction MOSFETs		
Unit:4	**Compound semiconductor**	**6 Hours**
Germanium and Compound semiconductor Nano MOSFETs, Germanium as alternative to silicon, Compound semiconductors, GaAs MESFETs types, Introduction to Nanomaterials		
Unit:5	**Quantum Mechanics and Quantum Statistics for nanomaterials**	**7 Hours**
Quantum Mechanics and Quantum Statistics for considering nanomaterials, Basic principles of quantum mechanics, Energy bands in crystalline solids, Synthesis / Fabrication of Nanomaterials / structures, nanowires		
Unit :6	**Methods used in Nanotechnology**	**6 Hours**
Chemical vapor deposition (CVD) and atomic layer deposition (ALD), Carbon nanostructures, Characterization of Nanomaterials and Nanostructures		
	Total Lecture Hours	**39 Hours**
Textbooks		
1	Y. Taur and T. Ning, Fundamentals of Modern VLSI Devices, Cambridge University Press	
2	E. H. Nicollian and J. R. Brews, MOS Physics and Technology, John Wiley, 1982	
Reference Books		

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1	Plummer, Deal , Griffin, Silicon VLSI Technology, Pearson Education India.
2	Brundle, C.Richard; Evans, Charles A. Jr.; Wilson, Shaun, Encyclopedia of Materials Characterization, Elsevier.
3	Donald A Neamen, Semiconductor Physics and Devices: Basic Principles, McGraw-Hill (1997) ISBN 0-256-24214-3
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1	https://classroom.google.com/
2	https://nptel.ac.in/courses/117/108/117108047/
3	http://www.digimat.in/nptel/courses/video/117108047/L29.html

VII Semester

PE V: VLSI Signal Processing

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. Design architectures for DSP algorithms. 2. Apply the optimization concept in terms of area, speed and power on DSP systems. 3. Optimize DSP arithmetic 4. Design of algorithm structure for DSP algorithms based on algorithmic transformation.		
Unit:1	Representations of DSP algorithms: Block diagram, SFG, DFG, DFG representations Loop bound and iteration bound, Algorithms for computing Iteration bound.	**7 Hours**
Unit:2	Pipelining and Parallel Processing: Introduction, pipelining of FIR Digital filters, parallel processing, Pipelining and parallel processing for low power	**7 Hours**
Unit:3	Retiming: Introduction, Definition and properties, solving system of inequalities, retiming techniques	**7 Hours**
Unit:4	Unfolding: Introduction, algorithms for unfolding, Properties of unfolding, Critical path, unfolding and retiming.	**7 Hours**
Unit:5	Folding: Introduction Folding Transformation, Register minimization techniques, Register minimization in folded architectures.	**7 Hours**
Unit :6	Fast Convolution, Introduction, Cook-Toom algorithm, Winograd algorithm.	**7 Hours**
	Total Lecture Hours	**42 Hours**

Text books	
1	Keshab K. Parhi, "VLSI Digital Signal Processing Systems, Design and implementation ", Wiley, Interscience, 2007.
Reference Books	
1	U. Meyer – Baese, "Digital Signal Processing with Field Programmable Gate Arrays", Springer, Second Edition, 2004

2	Kung. S.Y., H.J. While house T.Kailath, "VLSI and Modern signal processing", Prentice hall
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
1	https://archive.nptel.ac.in/courses/108/105/108105157/
2	https://onlinecourses.nptel.ac.in/noc20_ee44/preview

VII Semester

PE VI: Design Verification and Test of Digital VLSI Circuits

Course Outcomes:		
Upon successful completion of the course the students will be able to 1. **Understands** the fundamental concepts of VLSI testing, including fault models, test generation, and Design-for-Testability (DFT) techniques. 2. **Apply** functional and structural testing methods to verify digital circuits. 3. **Analyze** different fault models and evaluate their impact on circuit performance and test coverage. 4. **Evaluate** the effectiveness of test methodologies by measuring fault coverage and optimizing test patterns for better defect detection.		
Unit:1	Overview Of Testing	**8 Hours**
Design Process, Verification, Faults & Their Detection, Test Pattern Generation, Fault Coverage, Types Of Tests, Test Application, Testing Economics. Defects, Failures, and Faults: Physical Defects, Failures Modes, Faults, Fault Equivalence and Dominance, Fault Collapsing		
Unit:2	Simulation.	**8 Hours**
Logic Simulation, Approaches to Simulation, Fault Simulation & Their Results. Testability Measures: SCOAP Controllability and Observability		
Unit:3	Automatic Test Pattern Generator	**8 Hours**
Binary Decision Diagram, Reduction rules and Algorithms, Ordered Binary Decision Diagram, ROBDDs, Automatic Test Pattern Generation: D-Algorithm, Critical Path Extensions to D-Algorithm PODEM, FAN.		
Unit:4	Scan Design & Boundary Scan Architecture	**7 Hours**
Ad Hoc Techniques, Scan–Path Design, Test pattern generation, Test Pattern Application, Scan architectures, multiple scan chains, Partial Scan Testing, Boundary Scans Architecture, Modes of Operation.		
Unit:5	Built In Self-Test:	**7 Hours**
Pseudorandom Test Pattern Generation, Response Compaction, BIST Architectures.		
Unit :6	Testing	**7 Hours**
Memory Testing: Types of Memory Testing, Functional Testing Schemes, Testing FPGAs and Microprocessors: Testability Of FPGAs, Testing RAM- Based FPGAs, Testing Microprocessors, Synthesis For Testability.		
	Total Lecture Hours	**45 Hours**

Text books	
1	"Essentials of Electronic Testing for Digital, Memory, and Mixed-Signal VLSI Circuits",Michael L. Bushnell and Vishwani D. Agrawal, B.S.Publications, 2000
Reference Books	
1	"Principles of Testing Electronic Systems", 2nd edition SamihaMourad, YervantZorian
2	"Digital Systems Testing and Testable Design" ,MironAbramovici, Melvin Breuer and Arthur Friedman, IEEE press.
3	"A Guide to VHDL" by Stanley Mazor,2nd Edition, Kluwer Academic Press, 2007
4	"HDL Chip Design" by Douglas Smith, 3rd Edition, Doone Publications, 2008
5	"Rapid Prototyping of Digital Systems", by J. O. Hamblen and M. Furman, Kluwer Academic Publishers.2001
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
1	https://archive.nptel.ac.in/courses/106/103/106103116/
2	https://nptel.ac.in/courses/106103016

VII Semester

PE VI: Micro Electro Mechanical Systems (MEMS)

Course Outcomes:

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

1. Understand working principles of MEMS technology.
2. Learn the basic principles and applications of Micro fabrication and micromachining processes.
3. Discuss various applications of RF MEMS.
4. Classify types of micro sensors and micro actuators used in Micro systems.

Unit:1		**7 Hours**

Introduction to MEMS: Benefits of Miniaturization, Types of MEMS: Optical MEMS, Bio- MEMS, RF-MEMS, Microfludics, Success Stories, Pressure sensor, Accelerometer, Micro-mirror TV Projector.

Unit:2		**7 Hours**

Microfabrication and Micromachining: Integrated Circuit Processes, Bulk Micromachining, Isotropic Etching and Anisotropic Etching, Wafer Bonding, High Aspect-Ratio Processes (LIGA), MEMS Device fabrication using Bulk Micromachining.

Unit:3		**7 Hours**

Surface Micromachining: One or two sacrificial layer processes, Surface micromachining requirements, Device fabrication using Surface Micromachining example, Microcantilever fabrication.

Unit:4		**6 Hours**

RF MEMS Devices: Capacitor, Inductor, Switches, and antennas, RF MEMS components in communications,
space and defence applications.

Unit:5		**6 Hours**

Physical Micro sensors: Classification of physical sensors, Integrated, Intelligent, or Smart sensors, Sensor
Principles and Examples: Thermal sensors, Electrical Sensors, Mechanical Sensors, Chemical and Biosensors.

Unit :6		**6 Hours**

Microactuators: Classification of microactuators, Electrostatic, Electromagnetic and Thermal microactuation,
Mechanical design of microactuators, Microactuator examples, microvalves, micropumps, micromotors.

Total Lecture Hours	**39 Hours**

Text books	
1	Micro and Smart Systems: Ananthasuresh, G. K., Vinoy, K. J., Gopalakrishnan, S., Bhat, K. N., and Aatre, V. K., Wiley-India, NewDelhi, 2010.
Reference Books	
1	VLSI Technology, Sze S.M. (ed),McGraw Hill
2	RF MEMS and Their Applications: Vijay Varadan, K. J. Vinoy, K. A. Jose, Wiley, 2002.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
1	NPTEL Course on Introduction to MEMS & Microsystems by **Prof. Santiram Kal** IIT Kharagpur. **https://nptel.ac.in/courses/117105082**

VII Semester

PE VI: Mechatronics

Course Outcomes:

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

1. Demonstrate the ability to employ the knowledge of mathematics, science, and engineering.
2. Design and conduct experiments to evaluate, analyze, interpret data and performance of a mechatronics system
3. Design mechatronics component, system or process to meet desired needs
4. Demonstrate knowledge of statics, dynamics and solid mechanics relevant to Mechatronics

Unit:1		**6 Hours**

Introduction: Mechatronics key elements, design processes and issues, Modeling and simulation of physical system, electrical system, Mechanical translation- rotation system, electromechanical coupling

Unit:2		**7 Hours**

Sensor and transducer: Introduction to sensor and transducer, sensor for motion, position measurement, force, torque, tactile sensor and flow sensor, temperature sensing device, ultrasonic sensor, range sensor, active vibration control

Unit:3		**7 Hours**

Actuating device: Direct current motor, permanent magnet stepper motor, fluid power actuation, fluid power design element, piezoelectric actuators. Transducer signal conditioning and device for data conversion

Unit:4		**7 Hours**

Signal, system and controls: Introduction to signal, system and controls, system representation, linearization of nonlinear system, time delay, measure of system, performance, root locus and bode plots, Real-time interfacing i.e. I/O cards

Unit:5		**7 Hours**

Closed loop controllers: Continuous and discrete process, control modes, two step mode, proportion mode, derivative control, integral control, PID controller, digital controller, control system performance, Programmable controllers.

Unit :6		7 Hours
Advanced application in Mechatronics: Case studies in mechatronics system design.		
	Total Lecture Hours	**39 Hours**

Text books	
1	Devdas Shetty and Richard A. kolk, Mechatronics system design, Thomson Asia Pvt. Ltd, second reprint, 2001
Reference Books	
1	W.Bolton, Mechatronics, Pearson education Asia, third Indian reprint 2001 , Additional Reading:
2	David G. Alciatore and Michael B.hisland, Introduction to Mechatronics and measurement system, Tata McGraw hill, second edition,2003.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.nptel.ac.in/noc21_me27/preview
2	https://archive.nptel.ac.in/courses/112/107/112107298/
3	https://nptel.ac.in/courses/112107298

VII Semester

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:1	**Overview of computer vision and its applications**: Image Formation and Representation: Imaging geometry, radiometry, digitization, cameras and Projections, rigid and affine transformation	**6 Hours**
Unit:2	**Image Processing:** Pixel transforms, color transforms, histogram processing, histogram equalization, filtering, convolution, Fourier transformation and its applications in sharpening, blurring and noise removal	**7 Hours**
Unit:3	**Feature detection:** edge detection, corner detection, line and curve detection, active contours, SIFT and HOG descriptors, shape context descriptors, Morphological operations	**7 Hours**
Unit:4	**Segmentation:** Active contours, split & merge, watershed, region splitting, region merging, graph-based segmentation, mean shift and model finding, Normalized cut	**7 Hours**
Unit:5	**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.	**7 Hours**
Unit :6	**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:** statistical filtering; iterated estimation; observability and linear	**7 Hours**

	systems; the Kalman filter	
	Total Lecture Hours	**39 Hours**

Text books	
1	Computer Vision: Algorithms and Applications, R. Szeliski, Springer, 2011.
2	Introductory techniques for 3D computer vision, E. Trucco and A. Verri, Prentice Hall, 1998.
3	Computer Vision: A Modern Approach, Forsyth/Ponce, Pearson Education India;2nd edition(2015)
Reference Books	
1	Multiple View Geometry in Computer Vision, Richard Hartley and Andrew Zisserman, Second Edition, Cambridge University Press, March 2004.
2	Image Processing, Analysis and Machine Vision · Authors: Milan Sonka, Vaclav Hlavac, Roger Boyle · Cengage Learning, 2014
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.nptel.ac.in/noc19_cs58/preview
2	https://nptel.ac.in/courses/108103174
3	https://onlinecourses.nptel.ac.in/noc21_cs93/preview

VII SEMESTER

22EE705__ Project Phase-II

VII SEMESTER
22EE706__Campus Recruitment Training

Course Outcomes :

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

1. Make detailed notes and reports.
2. Compute the problems on quants
3. Illustrate the problems on logical, technical and verbal
4. Apply the field knowledge to the practical applications.

SN.	Contain
1	Quantitative Aptitude
2	Logical Reasoning
3	Verbal Ability
4	Technical

Student would be required to undergo a practical training for One months during the summer vacation after 6th semester. They would submit a report about the same and also make the presentation for evaluation.

VIII SEMESTER

22EE801__Internship - training / Seminar & Report

VIII SEMESTER

22EE802__Extracurricular Activity Evaluation