Bachelor of Technology
SoE & Syllabus 2022
1st to 8th Semester

(Department of Electronics & Telecommunication Engineering)
B. Tech in Electronics & Telecommunication 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 & Telecommunication Engineering)
B. Tech in Electronics & Telecommunication Engineering

SoE No.
22ET-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	22ET101	Differential and Integral Calculus	T	3	1	0	4	4	30	20	50	3 Hrs
2	1	BS	GE/CHE	22ET102	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3 Hrs
3	1	BS	GE/CHE	22ET103	Lab: Engineering Chemistry	P	0	0	2	2	1		60	40	
4	1	HS	GE/HUM	22ET104	Professional Communication	T	3	0	0	3	3	30	20	50	3 Hrs
5	1	BES	CV/CV	22ET105	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3 Hrs
6	1	BES	CV/CV	22ET106	Lab: Engineering Mechanics	P	0	0	2	2	1		60	40	
7	1	BES	EE/EE	22ET107	Basic Electrical and Electronics Engineering	T	3	0	0	3	3	30	20	50	3 Hrs
8	1	BES	IT/IT	22ET108	Programming for Problem Solving	T	3	0	0	3	3	30	20	50	3 Hrs
9	1	BES	IT/IT	22ET109	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)

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject		L	T	P	Hrs	Credits				
1	1	HS	GE/HUM	GE2131	Universal Human Value	A	2	0	0	2	0				
2	1	HS	GE/T&P	MLC2121	YCAP1-Get Set Go	A	2	0	0	2	0				

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	L	T	P	Hrs	Credits	MSEs*	TA**	ESE	ESE Duration Hours
SECOND SEMESTER															
1	2	BS	GE/MTH	22ET201	Differential Equation, Complex Variables & Matrices	T	3	1	0	4	4	30	20	50	3 Hrs
2	2	BS	GE/PHY	22ET202	Engineering Physics	T	3	0	0	3	3	30	20	50	3 Hrs
3	2	BS	GE/PHY	22ET203	Lab: Engineering Physics	P	0	0	2	2	1		60	40	
4	2	HS	GE/HUM	22ET204	Social Science	T	3	0	0	3	3	30	20	50	3 Hrs
5	2	BES	ME/ME	22ET205	Engineering Graphics	T	1	0	0	1	1	30	20	50	3 Hrs
6	2	BES	ME/ME	22ET206	Lab: Engineering Graphics	P	0	0	4	4	2		60	40	
7	2	BES	CT/CT	22ET207	Elements of AIML	T	3	0	0	3	3	30	20	50	3 Hrs
8	2	BES	EL/EL	22ET208	Electrical workshop	P	0	0	2	2	1		60	40	
9	2	BES	ET/ET	22ET209	Digital Logic Design	T	3	0	0	3	3	30	20	50	3 Hrs
10	2	BES	ET/ET	22ET210	Lab: Digital Logic Design	P	0	0	2	2	1		60	40	
					TOTAL		16	1	10	27	22				

List of Mandatory Learning Course (MLC)

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject		L	T	P	Hrs	Credits				
1	2	HS	GE/T&P	MLC2122	YCAP2 -Functional English	A	2	0	0	2	0				
2	2	BES	GE/CHE	GE2132	Environmental Science	A	2	0	0	2	0				

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

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

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

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

Nagar Yuwak Shikshan Sanstha's
Yeshwantrao Chavan College of Engineering
(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)
B.TECH SCHEME OF EXAMINATION 2022
(Scheme of Examination w.e.f. 2022-23 onward)
(Department of Electronics & Telecommunication Engineering)
B. Tech in Electronics & Telecommunication Engineering

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	L	T	P	Hrs	Credits	MSEs*	TA**	ESE	ESE Duration Hours
							Contact Hours					% Weightage			
					Third Semester										
1	3	BS	ET/ET	22ET301	Signals & Systems	T	3	0	0	3	3	30	20	50	3 Hours
2	3	BS	ET/ET	22ET302	Lab:Signals & Systems	P	0	0	2	2	1		60	40	
3	3	HS	GE/HUM	22ET303	Fundamentals of Management and Economics	T	3	0	0	3	3	30	20	50	3 Hours
4	3	PC	ET/ET	22ET304	Electronic Devices and Circuits	T	3	1	0	4	4	30	20	50	3 Hours
5	3	PC	ET/ET	22ET305	Lab: Electronic Devices and Circuits	P	0	0	2	2	1		60	40	
6	3	PC	ET/ET	22ET306	Digital System Design	T	3	0	0	3	3	30	20	50	3 Hours
7	3	PC	ET/ET	22ET307	Lab: Digital System Design	P	0	0	2	2	1		60	40	
8	3	PC	ET/ET	22ET308	Computer Organization	T	3	0	0	3	3	30	20	50	3 Hours
9	3	PC	ET/ET	22ET309	Network Theory	T	3	0	0	3	3	30	20	50	3 Hours
10	3	PC	CV/ET	22ET310	Environmental Sustainability, Pollution and Management	T	3	0	0	3	3	30	20	50	3 Hrs
					TOTAL THIRD SEM		21	1	6	28	25				

				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		ET/ET	MLC109	Exploring MATLAB	A	2	0	0	2	0				

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	L	T	P	Hrs	Credits	MSEs*	TA**	ESE	ESE Duration Hours
					Fourth Semster										
1	4	BS	GE/MTH	22ET401	Probability and Statistical Theory	T	3	0	0	3	3	30	20	50	3 Hours
2	4	PC	ET/ET	22ET402	Electromagnetic Fields	T	3	0	0	3	3	30	20	50	3 Hours
3	4	PC	ET/ET	22ET403	Microcontroller and Interfacing	T	3	0	0	3	3	30	20	50	3 Hours
4	4	PC	ET/ET	22ET404	Lab: Microcontroller and Interfacing	P	0	0	2	2	1		60	40	
5	4	PC	ET/ET	22ET405	Analog Communication	T	3	0	0	3	3	30	20	50	3 Hours
6	4	PC	ET/ET	22ET406	Lab.: Analog Communication	P	0	0	2	2	1		60	40	
7	4	PC	ET/ET	22ET407	Control Systems	T	3	0	0	4	3	30	20	50	3 Hours
8	4	PC	ET/ET	22ET408	Lab.: Control Systems	P	0	0	2	2	1		60	40	
9	4	PC	ET/ET	22ET409	Object Oriented Programming	T	3	0	0	3	3	30	20	50	3 Hours
10	4	PC	ET/ET	22ET410	Lab.: Object Oriented Programming	P	0	0	2	2	1		60	40	
					TOTAL FOURTH SEM		18	1	8	27	22				

				List of Mandatory Learning Course (MLC)											
1	4	HS	T&P	MLC2124	YCCE Communication Aptitude Prepartion (YCAP 4)	A	3	0	0	3	0				
2	4		ET/ET	MLC110	Embedded System & IoT	A	2	0	0	2	0				

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

TA ** = for Theory :12 marks on lecture quizzes, 12 marks on 2 Activities, 2 marks on class performance,4 marks on Common TA

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

Chairperson	Dean (Acad. Matters)	June 2023	1.00	Applicable for AY 2022-23 Onwards
		Date of Release	Version	

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Yeshwantrao Chavan College of Engineering
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B.TECH SCHEME OF EXAMINATION 2022
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SoE No.
22ET-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
					Fifth Semester										
1	5	PC	ET/ET	22ET501	Digital Communication	T	3	0	0	3	3	30	20	50	3 Hours
2	5	PC	ET/ET	22ET502	Lab:Digital Communication	P	0	0	2	1	1		60	40	
3	5	PC	ET/ET	22ET503	Analog Circuits	T	3	0	0	3	3	30	20	50	3 Hours
4	5	PC	ET/ET	22ET504	Lab:Analog Circuits	P	0	0	2	2	1		60	40	
5	5	PC	ET/ET	22ET505	Fields & Radiating System	T	3	0	0	3	3	30	20	50	3 Hours
6	5	PE	ET/ET		Professional Elective I	T	3	0	0	3	3	30	20	50	3 Hours
7	5	PE	ET/ET		Lab:Professional Elective I	P	0	0	2	2	1		60	40	
8	5	OE-I	ET/ET		Open Elective - I *	T	3	0	0	3	3	30	20	50	3 Hours
9	5	OE -II	ET/ET		Open Elective - II *	T	3	0	0	3	3	30	20	50	3 Hours
10	5	PC	ET/ET	22ET506	Lab.: Electronics Design Workshop	P	0	0	2	2	1		60	40	
11	5	STR	ET/ET	22ET507	Industrial training, Seminar & Report	P	0	0	2	2	1		60	40	
					TOTAL FIFTH SEM		18	0	10	27	23				

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

Professional Elective-I

1	5	PE	PC	22ET511	PE I : CMOS VLSI Design
2	5	PE	PC	22ET512	PE I :Lab:CMOS VLSI Design
3	5	PE	PC	22ET513	PE I : Sensors & Wearable Device
4	5	PE	PC	22ET514	PE I :Lab: Sensors & Wearable Device
5	5	PE	PC	22ET515	PE I : Discrete Structures and Algorithms
6	5	PE	PC	22ET516	PE I :Lab: Discrete Structures and Algorithms
7	5	PE	PC	22ET517	PE I : Optical Communication
8	5	PE	PC	22ET518	PE I :Lab: Optical Communication
9	5	PE	PC	22ET519	PE I : Digital Image Processing
10	5	PE	PC	22ET520	PE I :Lab: Digital Image Processing
11	5	PE	PC	22ET521	PEI: Internet of Things
12	5	PE	PC	22ET522	PEI: Lab: Internet of Things

Open Electives -I

1	5	OE I	PC	22ET531	OE I : Principles of Communication
2	5	OE I	PC	22ET532	OE I : Industrial Automation
3	5	OE I	PC	22ET533	OE I :Medical Electronics
4	5	OE I	PC	22ET534	OE I : Fundamentals of Image Processing

Open Electives -II

1	5	OE II	PC	22ET551	OE II :Fundamentals of Computer Networks
2	5	OE II	PC	22ET552	OE II :Soft Computing
3	5	OE II	PC	22ET553	OE II : Microcontrollers & Embedded systems
4	5	OE II	PC	22ET554	OE II : Fundamentals of Internet of Things

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

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

Nagar Yuwak Shikshan Sanstha's
Yeshwantrao Chavan College of Engineering
(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)
B.TECH SCHEME OF EXAMINATION 2022
(Scheme of Examination w.e.f. 2022-23 onward)
(Department of Electronics & Telecommunication Engineering)
B. Tech in Electronics & Telecommunication Engineering

SoE No.
22ET-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	ET/ET	22ET601	Digital Signal Processing	T	3	0	0	3	3	30	20	50	3 Hours
2	6	PC	ET/ET	22ET602	Lab:Digital Signal Processing	P	0	0	2	2	1		60	40	
3	6	PC	ET/ET	22ET603	Antennas & Wave Propagation	T	3	0	0	3	3	30	20	50	3 Hours
4	6	PC	ET/ET	22ET604	Lab:Antennas & Wave Propagation	P	3	0	0	3	1	30	20	50	3 Hours
5	6	PE	ET/ET		**Professional Elective II**	T	3	0	0	3	3	30	20	50	3 Hours
6	6	PE	ET/ET		**Lab: Professional Elective II**	P	0	0	2	2	1		60	40	
7	6	PE	ET/ET		**Professional Elective III**	T	3	0	0	3	3	30	20	50	3 Hours
8	6	OE-III	ET/ET		**Open Elective - III ****	T	3	0	0	3	3	30	20	50	3 Hours
9	6	OE-IV	ET/ET		**Open Elective - IV ****	T	3	0	0	3	3	30	20	50	3 Hours
10	6	PR	ET/ET	22ET605	Project Phase I	P	0	0	4	4	2		60	40	
					TOTAL SIXTH SEM		21	0	8	29	23				

				List of Mandatory Learning Course (MLC)									
1	6	HS		MLC126	YCCE Communication Aptitude Preparation (YCAP6)	A	3	0	0	3	0	

Professional Electives -II

1	6	PE II	PC	22ET611	PE II : Analog VLSI Design
2	6	PE II	PC	22ET612	PE II : Lab: Analog VLSI Design
3	6	PE II	PC	22ET613	PE II : Machine Learning
4	6	PE II	PC	22ET614	PE II : Lab : Machine Learning
5	6	PE II	PC	22ET615	PE II : Embedded System Design
6	6	PE II	PC	22ET616	PE II :Lab Embedded System Design
7	6	PE II	PC	22ET617	PE II : Multimedia Communication
8	6	PE II	PC	22ET618	PE II : Lab Multimedia Communication
9	6	PE II	PC	22ET619	PE II : Digital Image Analysis for Remote Sensing Application
10	6	PE II	PC	22ET620	PE II : Lab Digital Image Analysis for Remote Sensing Application
11	6	PE II	PC	22ET621	PEII: Radio Frequency Circuit Design
12	6	PE II	PC	22ET622	PEII:Lab Radio Frequency Circuit Design

Professional Electives -III

1	6	PE III	PC	22ET641	PE III : Introduction to Photonics
2	6	PE III	PC	22ET642	PE III : Wireless Mobile Communication
3	6	PE III	PC	22ET643	PE III : Soft Computing & Application
4	6	PE III	PC	22ET644	PE III : Power Electronics
5	6	PE III	PC	22ET645	PE III : Information Theory and coding
6	6	PE III	PC	22ET646	PE III : VLSI Testing and Verification

Open Electives -III

1	6	OE III	PC	22ET661	OE III : Principles of Communication
2	6	OE III	PC	22ET662	OE III : Industrial Automation
3	6	OE III	PC	22ET663	OE III :Medical Electronics
4	6	OE III	PC	22ET664	OE III : Fundamentals of Image Processing

Open Electives -IV

1	6	OE IV	PC	22ET681	OE IV :Fundamentals of Computer Networks
2	6	OE IV	PC	22ET682	OE IV :Soft Computing
3	6	OE IV	PC	22ET683	OE IV : Microcontrollers & Embedded systems
4	6	OE IV	PC	22ET684	OE IV : Fundamentals of Internet of Things

MSEs* = Three MSEs of 15 Marks each will be conducted and marks of better 2 of these 3 MSEs will be considered for Continuous Assessment

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

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

Nagar Yuwak Shikshan Sanstha's
Yeshwantrao Chavan College of Engineering
(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)
B.TECH SCHEME OF EXAMINATION 2022
(Scheme of Examination w.e.f. 2022-23 onward)
(Department of Electronics & Telecommunication Engineering)
B. Tech in Electronics & Telecommunication Engineering

SoE No.
22ET-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
Seventh Semester
1	7	PC	ET/ET	22ET701	Microwave Theory and Techniques	T	3	0	0	3	3	30	20	50	3 Hours
2	7	PC	ET/ET	22ET702	Lab:Microwave Theory and Techniques	P	0	0	2	2	1		60	40	
3	7	PC	ET/ET	22ET703	Computer Network	T	3	0	0	3	3	30	20	50	3 Hours
4	7	PC	ET/ET	22ET704	Lab: Computer Network	P	0	0	2	2	1		60	40	
5	7	PE	ET/ET		**Professional Elective IV**	T	3	0	0	3	3	30	20	50	3 Hours
6	7	PE	ET/ET		**Professional Elective V**	P	0	0	2	2	3		60	40	
7	7	PE	ET/ET		**Professional Elective VI**	T	3	0	0	3	3	30	20	50	3 Hours
8	7	PR	ET/ET	22ET705	Project Phase-II	P	0	0	10	10	5		60	40	
9	7	STR	ET/ET	22ET706	Campus Recruitment Training (CRT)	P	0	0	0	0	2		100		
	**TOTAL SEVENTH SEM**		12	0	16	28	24				

Professional Electives -IV

1	7	PE IV	PC	22ET711	PE IV :Satellite Communication
2	7	PE IV	PC	22ET712	PE IV : Error Correcting Codes
3	7	PE IV	PC	22ET713	PE IV : Switching Theory
4	7	PE IV	PC	22ET714	PE IV : Pattern Recognition
5	7	PE IV	PC	22ET715	PE IV : VLSI Mixed Signal Design
6	7	PE IV	PC	22ET716	PE IV: Advanced Embedded System Design

Professional Electives -V

1	7	PE V	PC	22ET731	PE V : Wireless Sensor Networks
2	7	PE V	PC	22ET732	PE V : Augmented Reality & Virtual Reality
3	7	PE V	PC	22ET733	PE V : Low Power VLSI
4	7	PE V	PC	22ET734	PE V : Biomedical Engineering
5	7	PE V	PC	22ET735	PE V :Data Compression and Encryption
6	7	PE V	PC	22ET736	PE V: RADAR Engineering

Professional Electives -VI

1	7	PE VI	PC	22ET751	PE VI : 5G Communications
2	7	PE VI	PC	22ET752	PE VI : Speech Processing
3	7	PE VI	PC	22ET753	PE VI : Deep Learning
4	7	PE VI	PC	22ET754	PE VI : Industrial Automation
5	7	PE VI	PC	22ET755	PE VI : Nano Electronics
6	7	PE VI	PC	22ET756	PE VI : Adhoc Networks

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

			1.02	**Applicable for AY 2022-23 Onwards**
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Nagar Yuwak Shikshan Sanstha's

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B.TECH SCHEME OF EXAMINATION 2022

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SoE No.
22ET-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	
					Eigth Semester										
1	8	STR		22ET801	Internship - training / Seminar & Report	P	0	0	12	12	3		60	40	
2	8	ER		22ET802	Extracurricular Activity Evaluation	P	0	0	0	0	2		100		
					TOTAL EIGHTH SEM		0	0	12	12	5				
					GRAND TOTAL		124	3	76	202	166				

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

Bachelor of Technology

SoE & Syllabus 2022

1st Semester

(Department of Electronics & Telecommunication Engineering)

B. Tech in Electronics & Telecommunication Engineering

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Yeshwantrao Chavan College of Engineering
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SoE No.
22ET-101

SN	Sem	Type	BoS/Deptt	Sub. Code	Subject	T/P	L	T	P	Hrs	Credits	MSEs*	TA**	ESE	ESE Duration Hours
FIRST SEMESTER															
1	1	BS	GE/MTH	22ET101	Differential and Integral Calculus	T	3	1	0	4	4	30	20	50	3 Hrs
2	1	BS	GE/CHE	22ET102	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3 Hrs
3	1	BS	GE/CHE	22ET103	Lab: Engineering Chemistry	P	0	0	2	2	1		60	40	
4	1	HS	GE/HUM	22ET104	Professional Communication	T	3	0	0	3	3	30	20	50	3 Hrs
5	1	BES	CV/CV	22ET105	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3 Hrs
6	1	BES	CV/CV	22ET106	Lab: Engineering Mechanics	P	0	0	2	2	1		60	40	
7	1	BES	EE/EE	22ET107	Basic Electrical and Electronics Engineering	T	3	0	0	3	3	30	20	50	3 Hrs
8	1	BES	IT/IT	22ET108	Programming for Problem Solving	T	3	0	0	3	3	30	20	50	3 Hrs
9	1	BES	IT/IT	22ET109	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)

SN	Sem	Type	BoS/Deptt	Sub. Code	Subject	T/P	L	T	P	Hrs	Credits	MSEs*	TA**	ESE	ESE Duration Hours
1	1	HS	GE/HUM	GE2131	Universal Human Value	A	2	0	0	2	0				
2	1	HS	GE/T&P	MLC2121	YCAP1-Get Set Go	A	2	0	0	2	0				

SN	Sem	Type	BoS/Deptt	Sub. Code	Subject	T/P	L	T	P	Hrs	Credits	MSEs*	TA**	ESE	ESE Duration Hours
SECOND SEMESTER															
1	2	BS	GE/MTH	22ET201	Differential Equation, Complex Variables & Matrices	T	3	1	0	4	4	30	20	50	3 Hrs
2	2	BS	GE/PHY	22ET202	Engineering Physics	T	3	0	0	3	3	30	20	50	3 Hrs
3	2	BS	GE/PHY	22ET203	Lab: Engineering Physics	P	0	0	2	2	1		60	40	
4	2	HS	GE/HUM	22ET204	Social Science	T	3	0	0	3	3	30	20	50	3 Hrs
5	2	BES	ME/ME	22ET205	Engineering Graphics	T	1	0	0	1	1	30	20	50	3 Hrs
6	2	BES	ME/ME	22ET206	Lab: Engineering Graphics	P	0	0	4	4	2		60	40	
7	2	BES	CT/CT	22ET207	Elements of AIML	T	3	0	0	3	3	30	20	50	3 Hrs
8	2	BES	EL/EL	22ET208	Electrical workshop	P	0	0	2	2	1		60	40	
9	2	BES	ET/ET	22ET209	Digital Logic Design	T	3	0	0	3	3	30	20	50	3 Hrs
10	2	BES	ET/ET	22ET210	Lab: Digital Logic Design	P	0	0	2	2	1		60	40	
						TOTAL	16	1	10	27	22				

List of Mandetory Learning Course (MLC)

SN	Sem	Type	BoS/Deptt	Sub. Code	Subject	T/P	L	T	P	Hrs	Credits	MSEs*	TA**	ESE	ESE Duration Hours
1	2	HS	GE/T&P	MLC2122	YCAP2 -Functional English	A	2	0	0	2	0				
2	2	BES	GE/CHE	GE2132	Environmental Science	A	2	0	0	2	0				

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

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

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

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

I SEMESTER
22ET101 : 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**

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22ET-101

B.Tech in Electronics & Telecommunication Engineering

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/

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

I SEMESTER
22ET102 : 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 Numerical. 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. H_2-O_2 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)**	

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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, chromo active, photoactive and magneto rheological materials. **(Contemporary Issues related to Topic)**	

	Total Lecture	39 Hours

Textbooks:

1.	S S. Dara , A Text book of Engineering Chemistry , S.Chand & Co New Delhi. Eleventh Edition.
2.	P.C. Jain and Monica Jain , Engineering Chemistry , Dhanpat Rai & sons New Delhi , Sixteenth Edition.
3.	P. W. Atkins, Physical Chemistry ,Oxford Publications,Eighth edition .

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

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I SEMESTER

22ET103 : 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

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	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.

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22ET-101

B.Tech in Electronics & Telecommunication Engineering

I SEMESTER
22ET104 : Professional Communication

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

Unit I: Basics of Communication	**(7 Hrs.)**
Language as a tool of communication & characteristics of language Process of Communication, Levels of Communication, Flow of Communication, Networks of Communication, Classification of Barriers (Intrapersonal, Interpersonal, Organizational). **(Contemporary Issues related to Topic)**	

Unit II: English Phonetics	**(6 Hrs.)**
Speech Mechanism, Organs of speech, Consonant and Vowels sounds, Word stress rules. **(Contemporary Issues related to Topic)**	

Unit III: Presentation & Visual Communication	**(7 Hrs.)**
Presentation and audience analysis, Organizing content, Nuances of presentation, Visual Communication – Introduction & importance, Role & Psychology of color in visual communication. **(Contemporary Issues related to Topic)**	

Unit IV: Verbal Skills	**(7 Hrs.)**
Listening Skills -definition types and traits. Group Communication- (Purpose, Different types of Group Communication, Organizational GD, GD as a part of selection process), Meeting (purposes, preparation, procedure and minutes of meeting). **(Contemporary Issues related to Topic)**	

Unit V: Interview Skills	**(6 Hrs.)**
Purpose, expectations of employer and preparation for Interview, Types, Types of Questions & Answering Techniques, Telephonic Interviews – preparation and guidelines, Reading Techniques (Exercise based on Complex Unseen passages. **(Contemporary Issues related to Topic)**	

Unit VI: Technical Written Communication	**(6 Hrs.)**
Memo, Email, Report -Types, Characteristics, prewriting aspects of report and preparing writing aspects of report), Types of paragraphs. **(Contemporary Issues related to Topic)**	

	Total Lecture	**39 Hours**

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

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

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

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I SEMESTER
22ET105 : 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**

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(Department of Electronics & Telecommunication Engineering)

SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

	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.
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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

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I SEMESTER
22ET106 : 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,

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22ET-101

B.Tech in Electronics & Telecommunication Engineering

I SEMESTER

22ET107 : Basic Electrical and Electronics Engineering

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

Unit I: CIRCUIT ELEMENTS AND ENERGY SOURCES	(7 Hrs.)
Circuit Elements, Series and Parallel Combination of Resistances, Inductance and Capacitances, Energy Sources, Source Transformation, Sources with Periodic Waveforms, A.C. in Inductance and Capacitance, Star-Delta Connection. **(Contemporary Issues related to Topic)**	

Unit II: ANALYSIS OF NETWORK	(7 Hrs.)
Kirchhof's Laws, Current Division, Voltage Division, Nodal and Mesh Analysis of Electric Circuits, Superposition Theorem, Thevenin's Theorem. **(Contemporary Issues related to Topic)**	

Unit III: TRANSFORMER AND MOTORS	(7 Hrs.)
Introduction to Transformer, Construction, Working principle, Types of transformers, Introduction to DC Motor, Working Principle of DC Motor, Types of Motors. **(Contemporary Issues related to Topic)**	

Unit IV: DIODE AND TRANSISTOR	(7 Hrs.)
Introduction to Semiconductor, P-N junction diodes, Biasing & Characteristics of diodes. Diode Circuits - Half wave rectifier, full wave rectifier, bridge rectifier. Introduction to BJT- NPN and PNP, Modes of operation, Configuration and its Characteristics. **(Contemporary Issues related to Topic)**	

Unit V: OPERATIONAL AMPLIFIER AND ITS APPLICATION	(7 Hrs.)
Introduction to Op-Amp, Inverting and Non-Inverting Amplifier, Linear Applications of OP-AMP like adder, Subtractor, integrator, differentiator and non-linear application using Comparator. **(Contemporary Issues related to Topic)**	

Unit VI: Electronics Measurement	(7 Hrs.)
Introduction to Measurement System, Generalized block diagram of Measurement System, Static & dynamic characteristics of measurement system, Types of errors & their sources, Statistical analysis. **(Contemporary Issues related to Topic)**	

	Total Lecture	42 Hours

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

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

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B.Tech in Electronics & Telecommunication Engineering

I SEMESTER
22ET108 : Programming for Problem Solving

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

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

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22ET-101

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

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

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

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

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B.Tech in Electronics & Telecommunication Engineering

I SEMESTER

22ET109 : 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.

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22ET-101

B.Tech in Electronics & Telecommunication Engineering

I SEMESTER
Audit Course
GE2131: Universal Human Value

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

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

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

	Total Lecture	**24 Hours**

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

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

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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	

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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

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Bachelor of Technology

SoE & Syllabus 2022

2nd Semester

(Department of Electronics & Telecommunication Engineering)

B. Tech in Electronics & Telecommunication Engineering

Nagar Yuwak Shikshan Sanstha's
Yeshwantrao Chavan College of Engineering
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B.TECH SCHEME OF EXAMINATION 2022
(Scheme of Examination w.e.f. 2022-23 onward)
(Department of Electronics & Telecommunication Engineering)
B. Tech in Electronics & Telecommunication Engineering

SoE No.
22ET-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	L	T	P	Hrs	Credits	MSEs*	TA**	ESE	ESE Duration Hours
							Contact Hours					**% Weightage**			
					FIRST SEMESTER										
1	1	BS	GE/MTH	22ET101	Differential and Integral Calculus	T	3	1	0	4	4	30	20	50	3 Hrs
2	1	BS	GE/CHE	22ET102	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3 Hrs
3	1	BS	GE/CHE	22ET103	Lab: Engineering Chemistry	P	0	0	2	2	1		60	40	
4	1	HS	GE/HUM	22ET104	Professional Communication	T	3	0	0	3	3	30	20	50	3 Hrs
5	1	BES	CV/CV	22ET105	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3 Hrs
6	1	BES	CV/CV	22ET106	Lab: Engineering Mechanics	P	0	0	2	2	1		60	40	
7	1	BES	EE/EE	22ET107	Basic Electrical and Electronics Engineering	T	3	0	0	3	3	30	20	50	3 Hrs
8	1	BES	IT/IT	22ET108	Programming for Problem Solving	T	3	0	0	3	3	30	20	50	3 Hrs
9	1	BES	IT/IT	22ET109	Lab: Programming for Problem Solving	P	0	0	2	2	1		60	40	
					TOTAL		18	1	6	25	22				

List of Mandetory Learning Course (MLC)

| 1 | 1 | HS | GE/HUM | GE2131 | Universal Human Value | A | 2 | 0 | 0 | 2 | 0 | | | | |
| 2 | 1 | HS | GE/T&P | MLC2121 | YCAP1-Get Set Go | A | 2 | 0 | 0 | 2 | 0 | | | | |

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	L	T	P	Hrs	Credits	MSEs*	TA**	ESE	ESE Duration Hours
					SECOND SEMESTER										
1	2	BS	GE/MTH	22ET201	Differential Equation, Complex Variables & Matrices	T	3	1	0	4	4	30	20	50	3 Hrs
2	2	BS	GE/PHY	22ET202	Engineering Physics	T	3	0	0	3	3	30	20	50	3 Hrs
3	2	BS	GE/PHY	22ET203	Lab: Engineering Physics	P	0	0	2	2	1		60	40	
4	2	HS	GE/HUM	22ET204	Social Science	T	3	0	0	3	3	30	20	50	3 Hrs
5	2	BES	ME/ME	22ET205	Engineering Graphics	T	1	0	0	1	1	30	20	50	3 Hrs
6	2	BES	ME/ME	22ET206	Lab: Engineering Graphics	P	0	0	4	4	2		60	40	
7	2	BES	CT/CT	22ET207	Elements of AIML	T	3	0	0	3	3	30	20	50	3 Hrs
8	2	BES	EL/EL	22ET208	Electrical workshop	P	0	0	2	2	1		60	40	
9	2	BES	ET/ET	22ET209	Digital Logic Design	T	3	0	0	3	3	30	20	50	3 Hrs
10	2	BES	ET/ET	22ET210	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 | 2 | HS | GE/T&P | MLC2122 | YCAP2 -Functional English | A | 2 | 0 | 0 | 2 | 0 | | | | |
| 2 | 2 | BES | GE/CHE | GE2132 | Environmental Science | A | 2 | 0 | 0 | 2 | 0 | | | | |

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

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

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

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22ET-101

B.Tech in Electronics & Telecommunication Engineering

II SEMESTER
22ET201: 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**

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B.Tech in Electronics & Telecommunication Engineering

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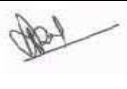
Reference Books:	
1.	G B Thomas and R L Finney, Calculus and Analytical Geometry, 9th edition, Addison-Wesley, 1999.
2.	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, 10th edition, Laxmi Prakashan.

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/

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B.Tech in Electronics & Telecommunication Engineering

II SEMESTER
22ET202: 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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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

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

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B.Tech in Electronics & Telecommunication Engineering

II SEMESTER
22ET203: 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.

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22ET-101

B.Tech in Electronics & Telecommunication Engineering

II SEMESTER
22ET204: 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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B.Tech in Electronics & Telecommunication Engineering

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

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II SEMESTER
22ET205: 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**

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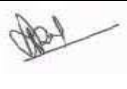## B.Tech in Electronics & Telecommunication Engineering

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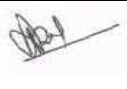
Reference Books:
1.	D. A. Jolhe Engineering Drawing , Tata McGraw Hill Publications , 2008,
2.	K. L. Narayana & P. Kannaiah , Engineering Drawing SciTech Publication , 2010
3.	R. K. Dhawan Engineering Drawing S. Chand Publication Multicolor revised edition 2015

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

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B.Tech in Electronics & Telecommunication Engineering

II SEMESTER
22ET206 : 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**

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II SEMESTER
22ET207: 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)**	
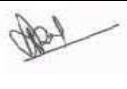
Unit VI: Applications of AI and ML	(6 Hrs.)
Working with software based AI Applications, Working with AI in hardware Applications, Health, Banking and Finance, Automobile, Surveillance, Social Media, Education, Space, etc. **(Contemporary Issues related to Topic)**	

	Total Lecture	**40 Hours**

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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

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II SEMESTER
22ET208: 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.

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II SEMESTER
22ET209: Digital Logic Design

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Represent the data numerically and detect and correct errors.
2. Develop the properties of partially ordered sets and lattices.
3. Simplify the logical functions using minimization techniques.
4. Design and analyse combinational Circuits
5. Design and analyse sequential Circuits and sequential machines.

Unit:1	Number system , codes, sets, relations and lattices	5 Hours
Number systems ,Binary codes , Error detection and correction, Introduction to :sets, relations, and lattices **(Contemporary Issues related to Topic)**		
Unit:2	**Switching algebra and its applications**	**5 Hours**
Switching algebra , Switching functions , Isomorphic systems , Electronic-gate network, Electronic-gate networks, Boolean algebras **(Contemporary Issues related to Topic)**		
Unit:3	**Minimization of switching functions**	**6 Hours**
Introduction , 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:4	**Logic design**	**7 Hours**
Logic design , Design with basic logic gates , Logic design with integrated circuits , NAND and NOR circuits , Design of high-speed adders , Metal-oxide semiconductor (MOS) transistor **(Contemporary Issues related to Topic)**		
Unit:5	**Introduction to synchronous sequential circuits and iterative networks**	**7 Hours**
Introduction to synchronous sequential circuits and iterative networks , Sequential circuits – introductory example , The finite-state model – basic definitions , Memory elements and their excitation functions , Synthesis of synchronous sequential circuits , An example of a computing machine , Iterative networks **(Contemporary Issues related to Topic)**		
Unit :6	**Capabilities, minimization, and transformation of sequential machines**	**6 Hours**
The finite-state model – further definitions ,Capabilities and limitations of finite-state machines ,State equivalence and machine minimization ,Simplification of incompletely specified machines , **(Contemporary Issues related to Topic)**		
Total Lecture Hours		**36 Hours**

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Textbooks	
1	Zvi Kohavi, Niraj K. Jha, Switching & Finite Automata Theory, 3rd Edition, 2010, Cambridge University Press.
Reference Books	
1	R.P Jain , Modern Digital Electronics, Tata McGraw Hill,3rd Edition
2	Morris Mano, Digital Design, 3rd edition, 2005, Pearson.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Digital%20logic%20Design-%20Morris%20Mano%20(mcsbzu.blogspot.com)-1.pdf
2	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Digital-Circuits-Anand-Kumar%20old%20edition-%20By%20EasyEngineering.net.pdf
MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.nptel.ac.in/noc21_ee75

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II SEMESTER
22ET210: Lab: Digital Logic Design

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Represent the data numerically and detect and correct errors.
2. Develop the properties of partially ordered sets and lattices.
3. Simplify the logical functions using minimization techniques.
4. Design and analyse combinational Circuits
5. Design and analyse sequential Circuits and sequential machines.

Sr. No.	Experiments based on
1	Implement basic gates using universal gates
2	Implement and verify truth table of Half and Full Adder.
3	Verify Binary to Gray conversion using XOR gates only.
4	Design a combinational circuit to produce the 2's complement of a 4-bit binary number
5	Realize the given function F=$\sum$m (0,1,2,3,4,10,11,14,15) using 8:1 Multiplexer.
6	Verify the truth table of 3:8 decoder using IC74138
7	Verify the truth table of SR flip-flop.
8	Verify the truth table of JK JK flip-flop.
9	Design of 4 bit Shift Registers
10	Design of MOD-9 Asynchronous counter
11	Design of state machine
12	Mini project

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(Department of Electronics & Telecommunication Engineering)

SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

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.**
Evaluation Scheme	EVAL-I	**To pass the exam a students must score 50% marks**
	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

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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

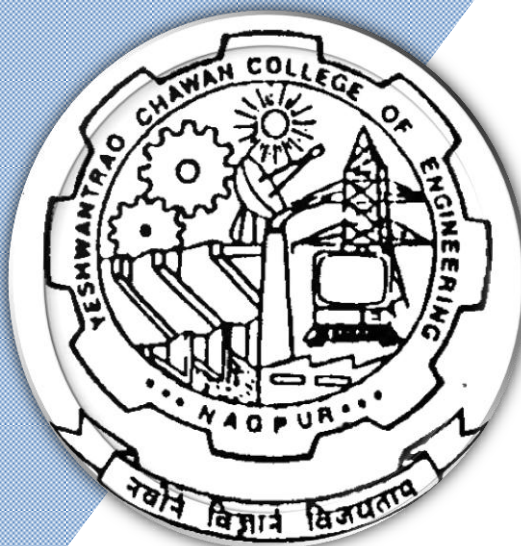| Chairperson	Dean (Acad. Matters)	Dean OBE	July 2022	1.00	Applicable for
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II SEMESTER
Audit Course
GE2132 : Environmental Science

Course Outcome :

Upon successful completion of the course the students will be able
To understand the basic concepts and problems and follow sustainable development practices

To enhance knowledge skills and attitude towards environment

To understand natural environment and its relationship with human activities.

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.

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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

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Bachelor of Technology

SoE & Syllabus 2022

3rd Semester

(Department of Electronics & Telecommunication Engineering)

B. Tech in Electronics & Telecommunication Engineering

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B.TECH SCHEME OF EXAMINATION 2022
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SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	L	T	P	Hrs	Credits	MSEs*	TA**	ESE	ESE Duration Hours
							Contact Hours					% Weightage			

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	L	T	P	Hrs	Credits	MSEs*	TA**	ESE	ESE Duration Hours
					Third Semester										
1	3	BS	ET/ET	22ET301	Signals & Systems	T	3	0	0	3	3	30	20	50	3 Hours
2	3	BS	ET/ET	22ET302	Lab:Signals & Systems	P	0	0	2	2	1		60	40	
3	3	HS	GE/HUM	22ET303	Fundamentals of Management and Economics	T	3	0	0	3	3	30	20	50	3 Hours
4	3	PC	ET/ET	22ET304	Electronic Devices and Circuits	T	3	1	0	4	4	30	20	50	3 Hours
5	3	PC	ET/ET	22ET305	Lab: Electronic Devices and Circuits	P	0	0	2	2	1		60	40	
6	3	PC	ET/ET	22ET306	Digital System Design	T	3	0	0	3	3	30	20	50	3 Hours
7	3	PC	ET/ET	22ET307	Lab: Digital System Design	P	0	0	2	2	1		60	40	
8	3	PC	ET/ET	22ET308	Computer Organization	T	3	0	0	3	3	30	20	50	3 Hours
9	3	PC	ET/ET	22ET309	Network Theory	T	3	0	0	3	3	30	20	50	3 Hours
10	3	PC	CV/ET	22ET310	Environmental Sustainability, Pollution and Management	T	3	0	0	3	3	30	20	50	3 Hrs
					TOTAL THIRD SEM		21	1	6	28	25				

List of Mandatory Learning Course (MLC)

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	L	T	P	Hrs	Credits				
1	3	HS	T&P	MLC2123	YCCE Communication Aptitude Preparation (YCAP3)	A	3	0	0	3	0				
2	3		ET/ET	MLC109	Exploring MATLAB	A	2	0	0	2	0				

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	L	T	P	Hrs	Credits	MSEs*	TA**	ESE	ESE Duration Hours
					Fourth Semster										
1	4	BS	GE/MTH	22ET401	Probability and Statistical Theory	T	3	0	0	3	3	30	20	50	3 Hours
2	4	PC	ET/ET	22ET402	Electromagnetic Fields	T	3	0	0	3	3	30	20	50	3 Hours
3	4	PC	ET/ET	22ET403	Microcontroller and Interfacing	T	3	0	0	3	3	30	20	50	3 Hours
4	4	PC	ET/ET	22ET404	Lab: Microcontroller and Interfacing	P	0	0	2	2	1		60	40	
5	4	PC	ET/ET	22ET405	Analog Communication	T	3	0	0	3	3	30	20	50	3 Hours
6	4	PC	ET/ET	22ET406	Lab.: Analog Communication	P	0	0	2	2	1		60	40	
7	4	PC	ET/ET	22ET407	Control Systems	T	3	1	0	4	3	30	20	50	3 Hours
8	4	PC	ET/ET	22ET408	Lab.: Control Systems	P	0	0	2	2	1		60	40	
9	4	PC	ET/ET	22ET409	Object Oriented Programming	T	3	0	0	3	3	30	20	50	3 Hours
10	4	PC	ET/ET	22ET410	Lab.: Object Oriented Programming	P	0	0	2	2	1		60	40	
					TOTAL FOURTH SEM		18	1	8	27	22				

List of Mandatory Learning Course (MLC)

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	L	T	P	Hrs	Credits				
1	4	HS	T&P	MLC2124	YCCE Communication Aptitude Prepartion (YCAP 4)	A	3	0	0	3	0				
2	4		ET/ET	MLC110	Embedded System & IoT	A	2	0	0	2	0				

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

TA ** = for Theory :12 marks on lecture quizzes, 12 marks on 2 Activities, 2 marks on class performance,4 marks on Common TA

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

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22ET-101

B.Tech in Electronics & Telecommunication Engineering

III SEMESTER
22ET301: Signals & Systems

Course Outcomes:

Upon successful completion of the course the students will be able to
1. Classify systems based on their properties and determine the response of LTI system.
2. Analyze system properties based on impulse response and Fourier analysis.
3. Sample and reconstruct the signals.
4. Apply the Laplace transform and Z- transform for analysis of continuous-time and discrete-time signals and systems.

Unit:1	Signals and Systems	7 Hours

Continuous-Time and Discrete-Time Signals. Transformations of the Independent Variable. Continuous-Time and Discrete-Time Systems. Basic System Properties.

Discrete-Time LTI Systems: The Convolution Sum. Continuous-Time LTI Systems: The Convolution Integral. Properties of Linear Time-Invariant Systems. Causal LTI Systems Described by Differential and Difference Equations. Singularity Functions.

Contemporary Issues related to Topic

Unit:2	Fourier Series Representation of Periodic Signals.	7 Hours

The Response of LTI Systems to Complex Exponentials. Fourier Series Representation of Continuous-Time Periodic Signals. Convergence of the Fourier series. Properties of Continuous-Time Fourier Series. Fourier Series Representation of Discrete-Time Periodic Signals. Properties of Discrete-Time Fourier Series. Fourier Series and LTI Systems. Filtering.

Contemporary Issues related to Topic

Unit:3	Fourier Transform.	6 Hours

The Continuous-Time Fourier Transform.

Representation of Aperiodic Signals: The Continuous-Time Fourier Transform. The Fourier Transform for Periodic Signals. Properties of the Continuous-Time Fourier Transform. The Discrete-Time Fourier Transform.

Representation of Aperiodic Signals: The Discrete-Time Fourier Transform. The Fourier Transform for Periodic Signals. Properties of the Discrete-Time Fourier Transform.

Contemporary Issues related to Topic

Unit:4	Time & Frequency Characterization of Signals and Systems.	6 Hours

The Magnitude-Phase Representation of the Frequency Response of LTI Systems. Concept of Frequency Response, Group Delay and Phase Delay. Time-Domain Properties of Ideal Frequency-Selective Filters. Time-Domain and Frequency-Domain Aspects of Non ideal Filters.

Representation of a Continuous-Time Signal by Its Samples: The Sampling Theorem. Reconstruction of a Signal from Its Samples Using Interpolation. Aliasing. Discrete-Time Processing of Continuous-Time Signals.

Contemporary Issues related to Topic

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Unit:5	The Laplace Transform.	6 Hours

The Laplace Transform. The Region of Convergence for Laplace Transforms. The Inverse Laplace Transform. Geometric Evaluation of the Fourier Transform from the Pole-Zero Plot. Properties of the Laplace Transform. Analysis and Characterization of LTI Systems Using the Laplace Transform. System Function Algebra and Block Diagram Representations. The Unilateral Laplace Transform.

Contemporary Issues related to Topic

Unit :6	The Z-Transform.	7 Hours

The z-Transform. The Region of Convergence for the z-Transform. The Inverse z-Transform. Geometric Evaluation of the Fourier Transform from the Pole-Zero Plot. Properties of the z-Transform. Analysis and Characterization of LTI Systems Using z-Transforms. System Function Algebra and Block Diagram Representations. The Unilateral z-Transform.

Contemporary Issues related to Topic

Total Lecture Hours	39 Hours

Textbooks	
1	Alan V. Oppenheim,Alan S. Willsky, with S. Hamid, Signals and Systems, 2nd edition, Prentice Hall. Publications
2	Hwei Hsu, Schaum's Outline of Signals and Systems, 4th edition 2002 McGraw-Hill
Reference Books	
1	B. P. Lathi, Principles of Signal Processing and Linear Systems, 1st edition, Oxford university
2	Simon Haykin and Van Veen, Wiley, Signals & Systems, 2nd Edition. 2005,TMH
3	Robert ,Signals & Systems Analysis Using Transformation Methods & MAT Lab, 1st edition 2003,McGraw-Hill Companies
4	C. L. Philips, J.M.Parr ,and Eve A.Riskin, Signals, Systems and Transforms, 3rd Edition,2004. Pearson education
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	https://eee.guc.edu.eg/Courses/Communications/COMM401%20Signal%20&%20System%20Theory/Alan%20V.%20Oppenheim,%20Alan%20S.%20Willsky,%20with%20S.%20Hamid-Signals%20and%20Systems-Prentice%20Hall%20(1996).pdf
2	http://people.disim.univaq.it/~costanzo.manes/EDU_stuff/Theory%20and%20Problems%20of%20Signals%20&%20Systems_Hsu_Schaum95.pdf
MOOCs Links and additional reading, learning, video material	
1	https://youtube.com/playlist?list=PLyqSpQzTE6M8KJ-XQ1m2vl3nd2ZUqKEN8

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YCCE-ET-2

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B.Tech in Electronics & Telecommunication Engineering

III Semester
22ET302 – Lab: Signals & Systems

Course Outcomes:
Upon successful completion of the course the students will be able to   1. Classify systems based on their properties and determine the response of LTI system.   2. Analyze system properties based on impulse response and Fourier analysis.   3. Sample and reconstruct the signals.   4. Apply the Laplace transform and Z- transform for analysis of continuous-time and discrete-time signals and systems.

Sr. No.	Experiments based on
1	Understanding the Basic Signals
2	Properties of signals and their transformations
3	Introduction to systems and their classification.
4	Characterizations of System.
5	Convolution of Continuous Time and Discrete Time Signals
6	Implementation of Fourier series
7	Implementation of Continuous time Fourier Transform
8	Implementation of Discrete time Fourier Transform
9	Implementation of Laplace Transform
10	Implementation of z-Transform
11	Sampling and reconstruction

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YCCE-ET-3

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22ET-101

B.Tech in Electronics & Telecommunication Engineering

III Semester
22ET303 - 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 the economy based on logical reasoning and estimate the economic outcomes.
4. Interprets comparative advantage of resources.

Unit:1	**Principles of Management**	**6 Hours**

Evolution of Management Thought: Scientific and Administrative Theory of Management, Definition and Concept of Management, Functions of Management: Planning, Organizing, Directing, Coordinating and Controlling, Motivational Theories, Concept of Leadership
Contemporary Issues related to Topic

Unit:2	**Marketing Management**	**6 Hours**

Marketing Management - Definition & scope, Selling & Modern Concepts of Marketing, Market Research, Customer Behaviors, Product Launching, Sales Promotion, Pricing, Channels of Distribution, Advertising, Market Segmentation, Marketing Mix, Positioning, Targeting
Contemporary Issues related to Topic

Unit:3	**Financial Accountancy and Management**	**7 Hours**

Definition & Functions of Finance department, Sources of finance, Types of capital, Types of Taxes, Introduction of Accountancy and its rules, Preparation of Books of Account- Jounal, Posting of transaction into ledger and preparation of trial balance, Introduction of trading account, profit and loss account and balance sheet
Contemporary Issues related to Topic

Unit:4	**Introduction to Economics and engineering Economy:**	**6 Hours**

Economics and engineering economy, Utility analysis- Cardinal, ordinal, Law of diminishing marginal utility, Laws of demand and supply, elasticity of demand, its measurement and application.
Contemporary Issues related to Topic

Unit:5	**Engineering Production and Costs**	**7 Hours**

Factors of Production: Land, Labour, Capital, Enterprise and their peculiarities, Concepts and types of costs, Law of Variable proportions (Law of diminishing marginal returns) and Return to Scale (Increasing, constant and decreasing), Economies and diseconomies of scale. Inflation: Meaning, types, causes and consequences, measures to control inflation, Concepts of deflation and Stagflation.
Contemporary Issues related to Topic

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

Total Lecture Hours	39 Hours

Textbooks	
1.	Principle of Management, 9th edition , Harold Koontz Ramchandra, Tata McGrow hills
2.	Marketing Management: Planning, Implementation and Control, 3rd Edition, Ramaswamy V.S. and Namakumari S, Macmillian
3.	Financial Services, 19th Edition, Khan M Y, Tata McGraw Hill, 19
4.	Modern Economics, 13th Edition, H. L. Ahuja, S. Chand Publisher, 2009
5.	Modern Economic Theory, 3rd edition, K. K. Devett, S. Chand Publisher,2007
6.	Principle of Economics, 7th edition, Mankiw N. Gregory, Thomson, 2013
Reference Books	
1.	Foundations of Financial Markets and Institutions, 3rd Edition, Fabozzi, Pretice Hall
2.	Fundamentals of Financial Instruments , 2nd Edition, Parameshwaran, Wiley India
3.	Marketing Management , 3rd Edition , RajanSaxena, Tata McGraw Hill
4.	Advance Economic Theory, 17th Edition, H. L. Ahuja, S. Chand Publisher, 2009
5.	International Trade, 12th edition, M. L. Zingan, Vindra Publication, 2007
6.	Macro Economics, 11th edition, M. L. Zingan, Vindra Publication, 2007
7.	Monitory Economics:, 1st Edition, M. L. Sheth, Himayalaya Publisher, 1995
8.	Economics of Development and Planning, 12th edition, S. K. Misra and V. K. Puri, Himalaya Publishing House, 2006.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://link.springer.com/openurl?genre=book&isbn=978-1-4613-6193-0
2	https://onlinelibrary.wiley.com/doi/book/10.1002/9780470168042
MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.nptel.ac.in/noc22_mg104/preview
2	https://nptel.ac.in/
3	https://onlinecourses.nptel.ac.in/noc20_mg31/preview
4	https://onlinecourses.nptel.ac.in/noc21_hs52/preview
5	https://onlinecourses.nptel.ac.in/noc22_hs67/preview

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III Semester
22ET304 - Electronic Devices and Circuits

Course Outcomes:

Upon successful completion of the course the students will be able to
1. Analyze the transistor circuits for different configurations.
2. Design transistor circuit with suitable biasing and stabilization techniques.
3. Analyze the response of transistors at low and high frequency
4. Analyze the effect of feedback on gain and frequency of amplifiers
5. Analyze power amplifier circuits.

Unit:1	Bipolar Junction Transistors	6 Hours

PN junction diode and its application ,Bipolar Junction Transistors : Physical structure and operation modes, Active region operation of transistor, DC analysis of transistor circuits, Ebor-Moll model ,Current voltage characteristics of CE, CB, CC configuration Transistor as an amplifier, Transistor as a switch.
Contemporary Issues related to Topic

Unit:2	Transistor Biasing Techniques	7 Hours

Transistor Biasing, The Operating Point, Bias Stability, Self-Bias, Fixed bias, collector to base bias, Emitter feedback bias, Stabilization against Variations in Ico, V_{BE}, AND β, Collector-Current Stability, Thermal Runaway
Contemporary Issues related to Topic

Unit:3	MOSFET and Biasing Techniques	7Hours

Field-effect Transistors -The Junction Field-effect Transistor, The Pinch-off Voltage Vp, The JFET Volt-Ampere Characteristics, MOSFET Device Structure and Physical Operation of MOSFET, Finite Output Resistance in Saturation, Characteristics of the MOSFET, Small Signal Equivalent Model, MOSFET Biasing by Fixing VGS, Biasing by Fixing VG and Connecting a Resistance in the Source, Biasing Using a Drain-to-Gate Feedback Resistor, Biasing Using a Constant-Current Source.
Contemporary Issues related to Topic

Unit:4	MOSFET Amplifiers and Small signal operation of MOSFET	7 Hours

MOSFET Amplifiers: Common Source, Common Drain and Common Gate Amplifiers. Small signal operation of MOSFET using π model and T model, Internal capacitances and high frequency model of MOSFET. Small signal operation of BJT.
Contemporary Issues related to Topic

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Unit:5	Feedback Amplifiers and Oscillators	6 Hours

Feedback Amplifier : The General Feedback Structure, Various properties of Negative and positive Feedback, The Four Basic Feedback Topologies. The series-shunt Feedback amplifier, The series-series Feedback amplifier, The shunt-shunt Feedback amplifier, The shunt-series Feedback amplifier, RC phase shift
Contemporary Issues related to Topic

Unit :6	Power Amplifier	6 Hours

Power Amplifier: Class A, Class B, Class AB and Class C, Class D. Power Efficiency, Power Dissipation, Cross-Over Distortion in Class AB Circuits, Class A Transformer Coupled Power Amplifier, and Harmonic Distortion due to Large Signal operation.
Contemporary Issues related to Topic

Total Lecture Hours	39 Hours

Textbooks	
1	Sedra Smith, Microelectronics Circuits , 5thEdition 2010-01-07, Oxford Uni. Press
2	MillMan Halkias, Integrated Electronics , 7th edition 2009, Tata McGraw Hills
Reference Books	
1	Electronic Devices and Theory, BoyleStad, Nashelsky, 9th. Edition May 2010, PHI
2	Electronic Devices and Circuits, S Salivahanan, N Suresh Kumar, 3rd Edition, Tata McGraw Hills
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/3.MillmanHalkias-ElectronicDevicesCircuits.pdf
2	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/ecopies%20of%20books/Electronics%20and%20Telecommunication/2.Microelectronic%20Circuits%20by%20Sedra%20Smith,5th%20edition.pdf
MOOCs Links and additional reading, learning, video material	
1	https://www.youtube.com/playlist?list=PL350612601E2DBFDE
2	https://onlinecourses.nptel.ac.in/noc21_ee80/preview

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22ET-101

B.Tech in Electronics & Telecommunication Engineering

III Semester
22ET305 – Lab: Electronic Devices and Circuits

Course Outcomes:

Upon successful completion of the course the students will be able to
1. Analyze the transistor circuits for different configurations.
2. Design transistor circuit with suitable biasing and stabilization techniques.
3. Analyze the response of transistors at low and high frequency
4. Analyze the effect of feedback on gain and frequency of amplifiers
5. Analyze power amplifier circuits.

Sr. No.	Experiments based on
1	V- I characteristics of PN junction diode (Silicon), Zener diode, LED.
2	Find the i) Voltage regulation ii) Load Regulation of a Zener shunt regulator
3	Design Half wave & Full Wave Rectifier with filter
4	I/P & O/P Characteristics of Common Base Transistor
5	I/P & O/P Characteristics of Common Emitter Transistor Configuration
6	Obtain Frequency Response of single stage CE Amplifier
7	Drain and Transfer characteristics of Field Effect Transistor (FET)
8	Drain and Transfer characteristics of Metal Oxide Semiconductor Field Effect Transistor (MOSFET)
9	The frequency response of Common Source amplifier.
10	Design Fixed Bias circuit and Self Bias circuit and observe the effect of temperature variation on transistor parameters
11	Design Class B Amplifier with Cross Over Distortion.
12	Orcad based simulation of class AB power Amplifier.
13	Design RC Phase Shift Oscillator.

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B.Tech in Electronics & Telecommunication Engineering

III Semester
22ET306 – Digital System Design

Course Outcomes:

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

1. Compare and contrast different FPGA and CPLD architectures.

2. Design, develop and analyze combinational circuits.

3. Design, develop and analyze sequential circuits.

4. Implement digital system using CAD tool.

Unit:1	Digital Design Fundamentals	7 Hours

Combinational & Sequential design issues, Introduction to finite state machines, Moore & Mealy Machine, 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

Unit:2	HDL Design Methodologies	6 Hours

Requirements of HDL, Design Methodologies, Different Modelling styles, Introduction to Verilog, Elements of Verilog, Verilog Module definition, Elements of Module
Contemporary Issues related to Topic

Unit:3	Introduction to Verilog	7 Hours

Basic Concepts in Verilog, Reserved Keywords, Syntax & Semantics, Comments, Identifiers, Number Representation, System Representation, Verilog Ports, Verilog Data Types, Wire & Variables, Physical & Abstract, Constants, Parameter, Verilog Data Operators, Design entry in Verilog & Test bench, Compilation and synthesis, Timing analysis
Contemporary Issues related to Topic

Unit:4	Data Flow Modelling	6 Hours

Delay, Continuous Assignment, Delayed Continuous assignment, Structural Modelling Feature, Module Instantiation, Gate level Primitives, Gate Delays, Switch Level Primitives, User Defined Primitives

Contemporary Issues related to Topic

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Unit:5	Behavioural Modelling	7 Hours

Initial, Always, Procedural Assignment, Blocking and Non-Blocking assignments, Sequential & Parallel Blocks, Race around Condition, Timing Control, Procedural Statements, Conditional Statements if case loop repeat forever etc, Zero Delay Control, Event Based Timing Control, Compiler Directives, Assign De-assign, Force Release, Latch Models, FF Models, State Machine Coding ,Moore and Mealy Machines

Contemporary Issues related to Topic

Unit :6	Combinational & sequential system Design	6 Hours

Shift Registers, Counters, LFSR, Stacks and Queues, Multi bit Adders & Multiplier, Huffman Coding, Processor and Memory Model, CPU, System Tasks and Functions, Design Verification

Contemporary Issues related to Topic

Total Lecture Hours	39 Hours

Textbooks	
1	Verilog Digital System Design" Zainalabedin Navabi Second Edition, Tata McGraw, Hill , 2009
2	Verilog HDL : A Guide to Digital Design and Synthesis Samir Palnitkar 2nd Edition , Prentice Hall India, 2003
Reference Books	
1	A Verilog HDL Primer"J. Bhaskar, 2nd Edition, Star Galaxy Press 1997
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/SERIES%20WISE%20BOOKS /ELECTRONICS%20AND%20TELE/
MOOCs Links and additional reading, learning, video material	
1	https://archive.nptel.ac.in/courses/106/105/106105165/
2	https://nptel.ac.in/courses/117105080

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22ET-101

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III Semester
22ET307 –Lab: Digital System Design

Course Outcomes:

Upon successful completion of the course the students will be able to
1. Compare and contrast different FPGA and CPLD architectures.
2. Design, develop and analyze combinational circuits.
3. Design, develop and analyze sequential circuits.
4. Implement digital system using CAD tool.

Sr. No.	Experiments based on
1	Study and design the equation z= ax+by+cxy by using Gate Level Modeling
2	Study and design the equation z= ax+by+cxy by using Operators of VERILOG
3	Study and design the equation z= ax+by+cxy by using UDP
4	Design Verilog Module for D Flip-Flop, T-FF , SR FF and J-K FF
5	Design Verilog Module for PIPO, PISO, SISO and SIPO Shift Register
6	Design Verilog Module for Binary and BCD Counters
7	Design Verilog Module for detection of Sequence (1101) by Moore FSM
8	Design Verilog Module for detection of Sequence (1011) by Mealy FSM.
9	Design Verilog Module for 4 bit Adder
10	Design Verilog Module for 4 bit Adder Subtractor
11	Activity -1 Project Based Learning /Mini Project based on Combinational logic Design
12	Activity -2 Project Based Learning /Mini Project based on Sequential logic Design.

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III Semester
22ET308 – Computer Organization

Course Outcomes:

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

1. Explain how computers work
2. Know basic principles of computer's working
3. Analyze the performance of computers
4. Know how computers are designed and built
5. Explain issues affecting modern processors (caches, pipelines etc.)

Unit:1	Introduction	7 Hours

Basic Structure of Computers, Functional units, software, performance issues software, machine instructions and programs, Types of instructions.
Contemporary Issues related to Topic

Unit:2	Instruction sets	6 Hours

Instruction sets: Instruction formats, Assembly language, Stacks, Ques, Subroutines ,Processor organization, Information representation, number formats.
Contemporary Issues related to Topic

Unit:3	Central Processing Unit	7 Hours

Multiplication & division, ALU design, Floating Point arithmetic, IEEE 754 floating point formats Control Design, Instruction sequencing, Interpretation, Hard wired control - Design methods, and CPU control unit.
Contemporary Issues related to Topic

Unit:4	Control Unit Design	6 Hours

Microprogrammed Control - Basic concepts, minimizing microinstruction size, multiplier control unit. Microprogrammed computers - CPU control unit
Contemporary Issues related to Topic

Unit:5	Memories and Subsystems	8 Hours

Memory organization, device characteristics, RAM, ROM, Memory management, Concept of Cache & associative memories, Virtual memory. System organization, Input - Output systems, Interrupt, DMA, Standard I/O interfaces
Contemporary Issues related to Topic

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Unit :6	Parallel Processing	5 Hours
Concept of parallel processing, Pipelining, Forms of parallel processing, interconnect network		
Contemporary Issues related to Topic		
Total Lecture Hours		**39 Hours**

Textbooks	
1	V.Carl Hammacher, ―Computer Organisation, Fifth Edition.
2	A.S.Tanenbum, ―Structured Computer Organisation, PHI, Third edition
3	Y.Chu, "Computer Organization and Microprogramming, II, Englewood Chiffs, N.J., Prentice Hall Edition
Reference Books	
1	Hayes J.P, ―Computer Architecture and Organization, PHI, Second edition
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/SERIES%20WISE%20BOOKS/ELECTRONICS%20AND%20TELE/
MOOCs Links and additional reading, learning, video material	
1	https://archive.nptel.ac.in/courses/106/105/106105163/#
2	https://nptel.ac.in/courses/106106166

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22ET-101

B.Tech in Electronics & Telecommunication Engineering

III Semester
22ET309 – Network Theory

Course Outcomes:
Upon successful completion of the course the students will be able to

1. Analyze electrical circuits using nodal and mesh analysis
2. Evaluate electrical circuit parameters using network theorems
3. Estimate steady state and transient response of electrical circuits using initial and final conditions
4. Analyze waveforms using Laplace transform
5. Evaluate parameters of two – port networks.

Unit:1	**Nodal Analysis of Electric Circuits**	**7 Hours**

Basics of electric circuits, circuit elements and their voltage – current relationship, classification of circuit elements, Series Circuit, Parallel circuit, Source shifting, sources - their types and characteristics, concept of equivalent sources, source transformation, nodal analysis of circuits containing resistors, inductors, capacitors 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**

Mesh analysis of circuits containing resistors, inductors, capacitors and both independent and dependent sources to determine current, voltage, power, and energy. Network equation for RLC network, Mutual inductance, coefficient of coupling, dot convention, dot marking in coupled coils.
Contemporary Issues related to Topic

Unit:3	**Network Theorem**	**6 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**	**7 Hours**

Review 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. Transient analysis.
Contemporary Issues related to Topic

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Unit:5	Transforms of other Signal Waveforms, Network Functions	6 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. **Contemporary Issues related to Topic**		

Unit :6	Two Port Parameters	6 Hours
Standard reference directions for the voltages and currents of a two – port network, defining equations for open circuit impedance, short circuit admittance, transmission, inverse transmission, hybrid and inverse hybrid parameters, relationships between parameter sets. **Contemporary Issues related to Topic**		
Total Lecture Hours		**39 Hours**

Textbooks	
1	Network Analysis, M.E. Van Valkenburg, 3rdEdition, Prentice Hall.
2	Engineering Circuit Analysis, William H. Hayt, Jack E. Kemmerly, Steven M. Durbin, 6th Edition, Tata McGraw– Hill Publishing Company Limited.
Reference Books	
1	Network Analysis with applications, William D. Stanley, 4th Edition, Pearson Education.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Network%20Analysis%20Book.pdf
MOOCs Links and additional reading, learning, video material	
1	https://archive.nptel.ac.in/courses/108/105/108105159/
2	http://www.nitttrc.edu.in/nptel/courses/video/108105159/L12.html

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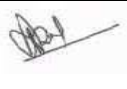(Department of Electronics & Telecommunication Engineering)

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22ET-101

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III SEMESTER
22ET310: Environmental Sustainability, Pollution and Management
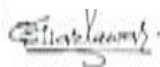
Course Outcomes:
Upon successful completion of the course, the students will be able to
The student will be able to
1. Gain insights into the efforts to safeguard the Earth's environment and resources.
2. Develop a critical understanding of the contemporary environmental issues of concern
3. Have an overview of pollution, climate change and national and global efforts to address adaptation and mitigation to changing environment through environmental management.
4. Learn about the major international treaties and our country's stand on and responses to the major international agreements.

Unit:1	Environment, Natural Resources and Sustainable Development	6 Hours
The man-environment interaction; Environmental Ethics and emergence of environmentalism; Overview of natural resources: Definition of resource; Classification of natural resources- biotic and abiotic, water, soil and mineral resources, renewable, and non-renewable energy resources; Introduction to sustainable development: Sustainable Development Goals (SDGs)- targets and indicators, challenges and strategies for SDGs		
Unit:2	**Environmental Issues, Conservation of Biodiversity and Ecosystems**	**6 Hours**
Environmental issues and scales: Land use and Land cover change, Global change; Biodiversity and its distribution, Ecosystems and ecosystem services, Threats to biodiversity and ecosystems, National and international policies for conservation.		
Unit:3	**Environmental Pollution and Health**	**7 Hours**
Understanding pollution: Production processes and generation of wastes, Air pollution, Water pollution, Soil pollution and solid waste, Noise pollution, Thermal and Radioactive pollution. Impact on human health		
Unit:4	**Climate Change: Impacts, Adaptation and Mitigation**	**7 Hours**
Understanding climate change, Impacts, vulnerability and adaptation to climate change, Mitigation of climate change		
Unit:5	**Environmental Management**	**7 Hours**
Environmental management system: ISO 14001, Concept of Circular Economy, Life cycle analysis; Cost-benefit analysis, Environmental audit and impact assessment; Waste Management and sustainability; Ecolabeling /Eco mark scheme		
Unit :6	**Environmental Treaties and Legislation**	**6 Hours**
Introduction to environmental laws and regulation, An overview of instruments of international cooperation, Major International Environmental Agreements, Major Indian Environmental Legislations, Major International organizations, and initiatives		
	Total Lecture	**39 Hours**

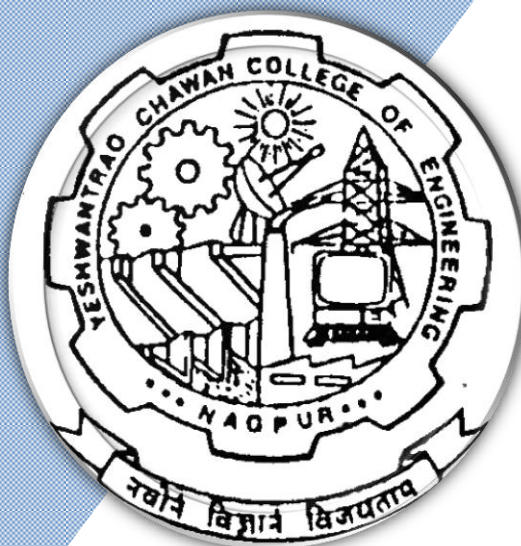|			July 2023	1.00	Applicable for AY 2022-23 Onwards
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Text books	
1	Chiras, D. D and Reganold, J. P. (2010). Natural Resource Conservation: Management for a Sustainable Future.10th edition, Upper Saddle River, N. J. Benjamin/Cummins/Pearson
2	Rajagopalan, 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

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III Semester
Audit Course
MLC2123 - YCCE Communication Aptitude Preparation (YCAP3)

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III Semester
MLC109- Exploring MATLAB

Course Outcomes:

Upon successful completion of the course the students will be able to
1. Know the fundamentals of MATLAB
2. Apply MATLAB Programming for problem solving
3. Apply Graph Visualizations techniques for data interpretation
4. Develop MATLAB functions for problem solving

Unit:1	Interacting with MATLAB	4 Hours

Data Types: Numeric, logical, characters, dates, structures, cell arrays, programming- variables, keywords, special values, symbols, Operators: Basic Calculation operators, Relational Operators, Logical Operators, Vectors, Colon Notations or Range Operator, MATLAB Toolboxes

Unit:2	Flow Control	3 Hours

For Loop, If Statement, While Loop, Switch & Case.

Unit:3	Matrices in MATLAB	4 Hours

Creating and Concatenating Matrices, Adding and Subtracting Matrices, Vector Products and Transpose, Multiplying Matrices, The Identity Matrix, Arithmetic Operators + - * / \ ^ ', Building Tables.

Unit:4	Data visualization I	4 Hours

Basic Plotting Functions, Creating a Plot, Multiple Data Sets in One Graph, Specifying Line Styles and Colors, Plotting Lines and Markers, Adding Plots to an Existing Graph, Figure Windows, Multiple Plots in One Figure, Setting Grid Lines, Saving Figures

Unit:5	Data visualization II	3 Hours

Creating specialized plots, Mesh, surface, feather plot, pie chart, bar graph

Unit :6	Functions in MATLAB	6 Hours

Types of Program Files, Script files, MATLAB Calling Priority, MATLAB Functions -- Basic Features, Types of MATLAB Functions, Functions, Workspaces In MATLAB, Structure of a Function M-File, Multiple Inputs and Outputs for a Function, Functions of Multiple Variables and sub function, Case Study.

	Total Lecture Hours	24 Hours

Textbooks	
1	Getting Started with MATLAB: A Quick Introduction for Scientists & Engineers by Rudra Pratap, Oxford, 2010
2	Understanding MATLAB: A Textbook for Beginners, by S. N. Alam, S. S. Alam, 2013, I K International Publishing House Pvt. Ltd
Reference Books	
1	https://www.mathworks.com/help/pdf_doc/matlab/matlab_prog.pdf
2	https://www.mathworks.com/content/dam/mathworks/mathworks-dot-com/moler/intro.pdf

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Bachelor of Technology
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B. Tech in Electronics & Telecommunication 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 & Telecommunication Engineering)
B. Tech in Electronics & Telecommunication Engineering

SoE No.
22ET-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	ET/ET	22ET301	Signals & Systems	T	3	0	0	3	3	30	20	50	3 Hours
2	3	BS	ET/ET	22ET302	Lab:Signals & Systems	P	0	0	2	2	1		60	40	
3	3	HS	GE/HUM	22ET303	Fundamentals of Management and Economics	T	3	0	0	3	3	30	20	50	3 Hours
4	3	PC	ET/ET	22ET304	Electronic Devices and Circuits	T	3	1	0	4	4	30	20	50	3 Hours
5	3	PC	ET/ET	22ET305	Lab: Electronic Devices and Circuits	P	0	0	2	2	1		60	40	
6	3	PC	ET/ET	22ET306	Digital System Design	T	3	0	0	3	3	30	20	50	3 Hours
7	3	PC	ET/ET	22ET307	Lab: Digital System Design	P	0	0	2	2	1		60	40	
8	3	PC	ET/ET	22ET308	Computer Organization	T	3	0	0	3	3	30	20	50	3 Hours
9	3	PC	ET/ET	22ET309	Network Theory	T	3	0	0	3	3	30	20	50	3 Hours
10	3	PC	CV/ET	22ET310	Environmental Sustainability, Pollution and Management	T	3	0	0	3	3	30	20	50	3 Hrs
					TOTAL THIRD SEM		21	1	6	28	25				

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		ET/ET	MLC109	Exploring MATLAB	A	2	0	0	2	0				

							Contact Hours					% Weightage			
						Fourth Semster									
1	4	BS	GE/MTH	22ET401	Probability and Statistical Theory	T	3	0	0	3	3	30	20	50	3 Hours
2	4	PC	ET/ET	22ET402	Electromagnetic Fields	T	3	0	0	3	3	30	20	50	3 Hours
3	4	PC	ET/ET	22ET403	Microcontroller and Interfacing	T	3	0	0	3	3	30	20	50	3 Hours
4	4	PC	ET/ET	22ET404	Lab: Microcontroller and Interfacing	P	0	0	2	2	1		60	40	
5	4	PC	ET/ET	22ET405	Analog Communication	T	3	0	0	3	3	30	20	50	3 Hours
6	4	PC	ET/ET	22ET406	Lab.: Analog Communication	P	0	0	2	2	1		60	40	
7	4	PC	ET/ET	22ET407	Control Systems	T	3	1	0	4	3	30	20	50	3 Hours
8	4	PC	ET/ET	22ET408	Lab.: Control Systems	P	0	0	2	2	1		60	40	
9	4	PC	ET/ET	22ET409	Object Oriented Programming	T	3	0	0	3	3	30	20	50	3 Hours
10	4	PC	ET/ET	22ET410	Lab.: Object Oriented Programming	P	0	0	2	2	1		60	40	
					TOTAL FOURTH SEM		18	1	8	27	22				

List of Mandatory Learning Course (MLC)

1	4	HS	T&P	MLC2124	YCCE Communication Aptitude Prepartion (YCAP 4)	A	3	0	0	3	0				
2	4		ET/ET	MLC110	Embedded System & IoT	A	2	0	0	2	0				

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

TA ** = for Theory :12 marks on lecture quizzes, 12 marks on 2 Activities, 2 marks on class performance,4 marks on Common TA

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

		June 2023	1.00	Applicable for AY 2022-23 Onwards
Chairperson	**Dean (Acad. Matters)**	**Date of Release**	**Version**	

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Yeshwantrao Chavan College of Engineering

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

IV SEMESTER
22ET401: 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.		
Contemporary Issues related to Topic		
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**

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Textbooks:	
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

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YCCE-ET-2

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

IV Semester
22ET402 - Electromagnetic Field

Course Outcomes:

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

1. Use appropriate co-ordinate systems for solving electromagnetic fields problems.
2. Apply the principles of electrostatics & magneto-statics for the solution of problems relating to electric and magnetic field.
3. Analyze static and time varying fields using Maxwell's equations.
4. Examine wave propagation in different medium·

Unit:1	Coordinate systems	6 Hours

Orthogonal coordinate systems: Cartesian, cylindrical, spherical and transformations, Gradient of a Scalar Field. Divergence of a Vector Field , Curl of a Vector Field , Laplacian Operator, Irrotational and solenoidal field.
Contemporary Issues related to Topic

Unit:2	Electric Field Intensity	7 Hours

Coulomb's law , Electric field intensity for different charge distribution : point , line surface , volume , Concept of electric flux , Gauss's law and it's application to field computation in symmetric structures and non symmetric structures , Divergence theorem
Contemporary Issues related to Topic

Unit:3	Concept of energy & work done	7 Hours

Concept of energy & work done in moving a point charge : linear and circular path , Electric scalar potential :Absolute Potential and potential difference , Conservative property of Potential field , Potential field of a system of charges : circular ring and disk   Dipole moment, electric field at a distant point due to electric dipole, Electrostatic energy density. Poisson's and Laplace's equation and its examples of solutions, Uniqueness of electrostatic solution
Contemporary Issues related to Topic

Unit:4	Magnetic Field Intensity	7 Hours

Biot –Savart law and applications to infinite and finite current filament, Ampere's Circuital law and applications to line charge, coaxial transmission cables, uniform current sheet charge, solenoid, toroid ,Stoke's Theorem Magnetic flux and magnetic flux density , Scalar and vector magnetic potential, Nature of magnetic materials , boundary conditions at interface of two magnetic fields , Potential energy.
Contemporary Issues related to Topic

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Unit:5	Maxwell's equations	6 Hours

Time varying fields and Maxwell's equations: Faradays law, Displacement current, Maxwell's equation in point form, Maxwell's equations in integral form.

Contemporary Issues related to Topic

Unit :6	Uniform plane wave	6 Hours

Uniform plane wave, wave propagation in free space, wave propagation in Dielectrics, Poynting's Theorem and wave equations

Contemporary Issues related to Topic

	Total Lecture Hours	**39 Hours**

Textbooks	
1	William H. Hayt,Engineering Electromagnetics,Seventh Edition,Tata McGraw – Hill.
2	J D Kraus,Electromagnetics,4ᵗʰedition1992,McGraw – Hill
3	David K. Cheng,Field and Wave Electromagnetics,Second Edition 21 Jan 2010,Addison Wesley.
Reference Books	
1	Ashutosh Pramanik,Electromagetism Theory and application,2ⁿᵈEdition2009,Prentice Hall
2	M. N. O. Sadku,Elements of Electromagnetis,Oxford Press
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/Electronics%20and%20Telecommunication/elements-of-electromagnetics-by-matthew-n-o-sadiku.pdf
2	chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Engineering%20Electromagnetics%20-%20William%20%20Hayt.pdf
3	chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/EM_Hayt_6th.pdf
MOOCs Links and additional reading, learning, video material	
1	https://youtube.com/playlist?list=PLuv3GM6-gsE3-hVNaw-YEb7EeY5XVPZdz
2	https://www.youtube.com/watch?v=pGdr9WLto4A https://www.youtube.com/watch?v=NNny9gMh_jo
3	https://www.youtube.com/watch?v=6FZusYyg0Po

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B.Tech in Electronics & Telecommunication Engineering

IV Semester
22ET403 - Microcontroller and Interfacing

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Elaborate 8051 microcontroller architecture.
2. Develop assembly language programs.
3. Develop embedded C language program
4. Interface peripherals with 8051 microcontroller to solve real life problems.

Unit:1	8051 ARCHITECTURE	6 Hours

Overview of 8051 Microcontroller family, Introduction to MCS 51 family, Architecture, Memory organization, Internal RAM, Flag Register, Register Banks, SFRs , Functional pin description and various resources of MCS 51. Hardware Overview.
Contemporary Issues related to Topic

Unit:2	ASSEMBLY LANGUAGE PROGRAMMING	7 Hours

Addressing modes, Instruction set and Assembly language programming Programs using look up table, Bit manipulation, 8051 I/O programming, Delay Programs.
Contemporary Issues related to Topic

Unit:3	EMBEDDED C PROGRAMMING	6 Hours

I/O Interfacing such as LED, switches, 7 segment display, 8051 programming in C: Data types and time delay, I/O programming, Logic operations, Data conversion programs, Lookup table access
Contemporary Issues related to Topic

Unit:4	TIMERS AND SERIAL COMMUNICATION	6 Hours

Timer programming in assembly and C: Various modes of operation, SFR related to timer operation. Serial Port programming in assembly and C: Basics of serial communication, 8051 connection to RS 232. Serial data transfer programs.
Contemporary Issues related to Topic

Unit:5	INTERRUPTS AND OFF-CHIP INTERFACING	7 Hours

8051 interrupts, Interrupts programming in assembly and C, programming timer interrupt, external interrupt, serial interrupt Interfacing and programming for LCD, Interfacing RTC.
Contemporary Issues related to Topic

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Unit :6	**INTERFACING OF OTHERS OFF- CHIP DEVICES**	**7 Hours**

Interfacing of ADC, DAC, stepper motor, DC motors.
Contemporary Issues related to Topic

	Total Lecture Hours	**39 Hours**

Textbooks	
1	Muhammad Ali Mazidi, The 8051 Microcontroller and Embedded systems using assembly & C, Pearson Education Asia LPE
2	Myke Predko, Programming and Customizing the 8051 Microcontroller, McGraw-Hill
3	Kenneth Ayala, The 8051 Microcontroller , CENGAGE Learning
Reference Books	
1	Douglas V Hall, Intel or Atmel MCS 51 Family Microcontrollers Data Sheets, Tata McGraw Hill
2	A. K. Ray, K. M. Bhurchandi Microprocessor & Interfacing, Tata McGraw Hill
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/1.(eBook)%20Delmar%20Thomson%20-%20The%208051%20Microcontroller%20Architecture,%20Programming%20and%20Applications%201991.pdf
2	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Book%208051microcontroller-ayala.pdf
3	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/the_8051_microcontroller_and_embedded_systems_using_assembly_and_c-2nd-ed_by_mazidi.pdf
MOOCs Links and additional reading, learning, video material	
1	https://archive.nptel.ac.in/courses/108/105/108105102/
2	https://archive.nptel.ac.in/courses/106/108/106108100/
3	https://archive.nptel.ac.in/courses/117/104/117104072/

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B.Tech in Electronics & Telecommunication Engineering

IV Semester
22ET404 - Lab: Microcontroller and Interfacing

Course Outcomes:

Upon successful completion of the course the students will be able to
1. Elaborate 8051 microcontroller architecture.
2. Develop assembly language programs.
3. Develop embedded C language program
4. Interface peripherals with 8051 microcontroller to solve real life problems.

Sr. No.	Experiments based on
1	Add data bytes in a internal RAM
2	Data block transfer
3	Find the maximum data byte in a block
4	Count even or odd numbers present in a data block
5	Conversion number to its equivalent another number
6	Toggle LED connected to port pin of micro-controller 8051
7	Display BCD no. on seven segment display or Display character on LCD.
8	Rotate stepper motor into clockwise /counter clockwise direction
9	Generate sawtooth waveform using DAC
10	Interfacing of RTC DS12887 with 8051 microcontroller & display current date & time serially
11	Read Analog signal from channel 2 of ADC and store it to internal RAM
12	Interfacing of servo motor with 8051

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

IV Semester
22ET405 - Analog Communication

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Analyze different analog modulation techniques.
2. Analyze communication receiver and Evaluate different parameters
3. Analyze and comprehend concept of television transmission and reception.
4. Describe and analyze noise, Pulse modulation techniques and wave propagation of signals

Unit:1	Amplitude Modulation	7 Hours

Block Diagram of Communication system, Need for modulation, Amplitude Modulation (AM), DSB-SC, SSB, VSB Transmissions, Mathematical Analysis, modulation index, frequency spectrum, power requirement of these Systems, AM Generation Method.
Contemporary Issues related to Topic

Unit:2	Angle Modulation	7 Hours

Frequency Modulation (FM), mathematical Analysis, modulation index, frequency spectrum, narrowband & wideband FM, noise triangle in FM, Pre-emphasis & De-emphasis techniques, Phase modulation, power contents of the carrier & the sidebands in angle modulation, FM Generation Method.
Contemporary Issues related to Topic

Unit:3	Radio Receivers	6 Hours

Basic TRF Receiver, Super heterodyne receiver, performance parameters for receiver such as sensitivity, selectivity, fidelity, image frequency rejection etc., AM Detectors, FM discriminators, AGC technique.
Contemporary Issues related to Topic

Unit:4	Composite Video Signal	7 Hours

Color Composite Video Signal, Horizontal sync and blanking pulses, Vertical sync and blanking pulses, color burst signal, Interlaced and Sequential scanning, Resolutions, CCIR-B Standards, TV Fundamentals, TV Transmitter and Receiver Block diagram. HDTV Introduction and definition, Digital TV receiver, Merits of digital TV receiver.
Contemporary Issues related to Topic

Unit:5	Noise	6 Hours

Sources of noise, External Noises, Internal Noises, Thermal noise, noise calculations, equivalent noise bandwidth, noise figure of an amplifier, effective noise temperature, calculation of noise figure for cascaded stages.
Contemporary Issues related to Topic

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Unit :6	Pulse Modulation, Radiation & Propagation of signals	6 Hours

Generation and Demodulation of PAM, PWM, PPM.

Basics of Radiation, Mechanisms of propagation, Ground wave, space wave and sky wave propagation, fading, diversity reception.

Contemporary Issues related to Topic

	Total Lecture Hours	36 Hours

Textbooks	
1	Gorge Kennedy,"Electronic Communication System", Tata McGraw-Hill, 4thEdition-(Year: 1999).
2	G. K. Mithal," Radio Engineering (Principles Of Communication Systems)", Edition, 15 ; Publisher, Khanna, 1988.
3	R. R. Gulati, "Modern Television Practice", New Age International publishers, 3rdEdition 2006.
Reference Books	
1	K. Sam Shanmugam,"Digital and Analog communication systems", John Wiley & Sons, 1st edition 1979.
2	Frenzel,"Communication Electronics", MGH. Third Edition 2001
3	Dhake. A. M," Television and Video Engineering" ,Tata McGraw Hill 2nd Edition MAY 2001.
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1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/KENNEDY%204th%20edition.pdf.
2	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/ANALOG%20COMMUNICATIONS%20-%20Dr.%20B.V.Raju%20Institute%20of%20(%20PDFDrive.com%20).pdf
3	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Analog%20and%20Digital%20Communication%20Systems%20(%20PDFDrive.com%20).pdf
4.	https://harshasnmp.files.wordpress.com/2017/11/monochrome-and-colour-television-r-r-gulati.pdf
MOOCs Links and additional reading, learning, video material	
1	NPTEL Course on Analog Communication by Prof. Goutam Das, IIT Kharagpur, https://nptel.ac.in/courses/117105143

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B.Tech in Electronics & Telecommunication Engineering

IV Semester
22ET406 – Lab: Analog Communication

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Analyze different analog modulation techniques.
2. Analyze communication receiver and Evaluate different parameters
3. Analyze and comprehend concept of television transmission and reception.
4. Describe and analyze noise, Pulse modulation techniques and wave propagation of signals

Sr. No.	Experiments based on
1	Amplitude Modulation. Calculate Modulation Index, Bandwidth and plot its frequency spectrum.
2	Amplitude Demodulation.
3	DSB-SC AM using Diode ring modulator. Calculate Bandwidth and plot its frequency spectrum.
4	Frequency Modulation. Calculate Modulation Index, Bandwidth and plot its frequency spectrum.
5	Frequency Demodulation.
6	Signal analysis of AM Super heterodynes Radio Receiver.
7	Analyze Composite Video Signal (CVS) and Color Composite Video Signal (CCVS)
8	Analyze various signals at the different stages of CTV.
9	Pulse Amplitude Modulation and Demodulation
10	Pulse Position Modulation and Demodulation
11	Pulse Width Modulation and Demodulation
12	Mini Project

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IV Semester
22ET407 - Control Systems

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Apply block diagram reduction technique and signal flow graph for transfer function
2. Analyze the characteristic of feedback control system
3. Explain and analyze time response of first and second order control systems for different standard test signals
4. Determine the stability of linear control system
5. Perform frequency domain analysis of linear control system using Bode plot and Nyquist stability criterion

Unit:1	Introduction to Control Systems	7 Hours

Basic Components of Control System, Open loop control and close loop control with examples, classification of control systems. Transfer Function, block diagram algebra & reduction techniques, signal flow graph, its constructions and Mason's gain formula.
Contemporary Issues related to Topic

Unit:2	Mathematical modelling and Characteristics of Feedback Control Systems	5 Hours

Mathematical modelling of physical system: Electrical, mechanical, electro-mechanical systems.
Characteristics of Feedback Control Systems: Effect of negative feedback compared to open loop system such as – sensitivity to parameter variation, speed of time response, bandwidth, disturbance rejection and linearizing effect, Effect of positive feedback.
Contemporary Issues related to Topic

Unit:3	Time Domain Analysis of Control Systems	7 Hours

Concept of transient response, Steady state response and time response, standard test signals, system type, dominant poles, steady state error (ess) analysis, static error constants, 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, Relation between roots of characteristic equation, damping ratio and transient response, Controllers (proportional, Integral and derivative).
Contemporary Issues related to Topic

Unit:4	Concept of stability	7 Hours

Concept of stability, stable, unstable, marginally, Absolutely and conditionally stable system, Necessary conditions for stability, method to determine stability, Routh - Hurwitz stability criterion with special cases, relative stability analysis and State Variable Analysis.
Contemporary Issues related to Topic

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Unit:5	Root Locus Technique	6 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. **Contemporary Issues related to Topic**		

Unit :6	Frequency domain analysis	7 Hours
Frequency domain analysis of control systems: Concept of frequency response and sinusoidal transfer function, resonant frequency, resonant peak, cut off frequency, bandwidth, correlation between time and frequency response, polar plot, inverse polar plot, bode plot, Stability in Frequency domain: Nyquist stability criterion, Assessment of relative stability using Nyquist criterion, concept of gain margin and phase margin and its computation using polar plot and log magnitude versus phase plot **Contemporary Issues related to Topic**		
	Total Lecture Hours	**39 Hours**

Textbooks	
1	I. J. Nagrath& M Gopal, Control system engineering, 5th Edition, New Age International, 2007.
2	Katsuhiko Ogata, Modern Control Engineering, Prentice-Hall of India Pvt Ltd., New Delhi, 3rd edition, 2000.
3	Norman S Nise, Control system engineering, 7th Edition, Wiley & sons, 2014.
Reference Books	
1	Ashok Kumar, Sigma Series: Control Systems, 1st Edition, McGraw – Hill.
2	M. Gopal, Control systems: Principles and design, 4th Edition, McGraw - Hill
3	B. C. Kuo, Automatic Control Systems, Prentice-Hall of India Pvt Ltd., New Delhi, 7th edition, 1991.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/yccelibrary.html
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1	https://nptel.ac.in/courses/107/106/107106081/
2	https://nptel.ac.in/courses/108/106/108106098/

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B. Tech SoE and Syllabus 2022
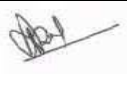**(Scheme of Examination w.e.f. 2022-23 onward)**
(Department of Electronics & Telecommunication Engineering)

SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

IV Semester
22ET408 – Lab: Control Systems

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Apply block diagram reduction technique and signal flow graph for transfer function
2. Analyze the characteristic of feedback control system
3. Explain and analyze time response of first and second order control systems for different standard test signals
4. Determine the stability of linear control system
5. Perform frequency domain analysis of linear control system using Bode plot and Nyquist stability criterion

Sr. No.	Experiments based on
1	Open loop and closed loop system
2	Effect of feedback on DC Servo system
3	TYPE 0, TYPE 1, TYPE 2, CONTROL SYSTEM
4	Step Impulse, Ramp response of a Transfer function
5	Time Response of a second order system
6	P, PI & PID controller
7	Transfer function from State model and state model from Transfer function
8	State from zeroes and Poles
9	Determine stability using Routh's criterion
10	Root locus from a Transfer function
11	Bode plot from a transfer Function
12	Polar plot from a transfer Function
13	Nyquist plot from a transfer Function

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**SoE No.
22ET-101**

B.Tech in Electronics & Telecommunication Engineering

IV Semester
22ET409 - Object Oriented Programming

Course Outcomes:

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

1. Explain the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.
2. Demonstrate the use of various OOPs concepts with the help of C++ programs.
3. Develop C++ programs for implementing data structures using array and linked list.
4. Apply the knowledge of BFS,DFS and Dijkstra`s algorithm   for traversal of Graph.
5. Develop C++ programs for implementing the concept of file handling, template and exception handling

Unit:1	Principles of Object Oriented Programming (OOP), Software Evaluation, OOP Paradigm, Basic Concepts of OOP, Benefits of OOP, Application of OOP. Introduction to C++, Tokens, Keywords, Identifiers, Variables, Operators, Manipulators. Expressions and Control Structures, Pointer, Arrays **Contemporary Issues related to Topic**	**6 Hours**
Unit:2	Functions, Function Prototyping Parameters Passing in Functions, Values Return by Functions, Inline Functions, Friend and Virtual Functions. Classes and Objects, Constructors and Destructors **Contemporary Issues related to Topic**	**7 Hours**
Unit:3	Operator overloading, Function Overloading, Inheritance, Types of Inheritance, Polymorphism, Friend and Virtual Functions. **Contemporary Issues related to Topic**	**7 Hours**
Unit:4	Definition of a data structure, Primitive and Composite data types, Asymptotic notations, Operations of Arrays, Order lists, Stacks, Applications of Stack, Infix to Postfix Conversion, Queues, Operations of Queues. **Contemporary Issues related to Topic**	**7 Hours**
Unit:5	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 **Contemporary Issues related to Topic**	**6 Hours**
Unit :6	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. **Contemporary Issues related to Topic**	**6 Hours**
	Total Lecture Hours	**39 Hours**

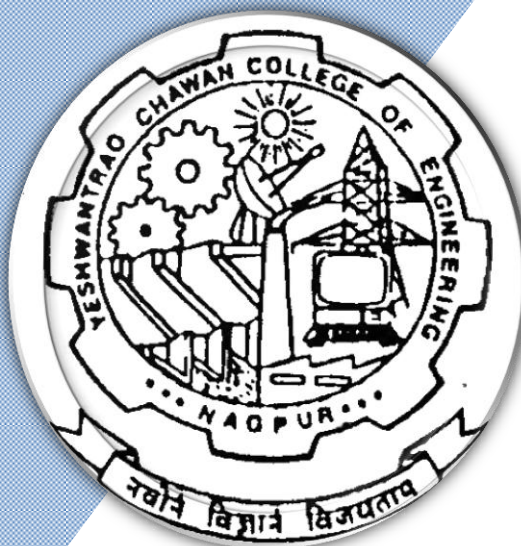| Chairperson	Dean (Acad. Matters)	Dean OBE	July 2023	1.00	Applicable for
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Textbooks	
1	Object Oriented programming with C++ ,3rd. Edition Year 2008, E. Balagurusamy McGraw-Hill Publication
Reference Books	
1	Object Oriented Programming in Microsoft C++,4th edition 2002, Robert Lafore ,
2	Fundamental of data structure in C++,5th edition, Horowitz and S.Shani, Galgotia Publication
3	Computer algorithms, 2nd Edition , Horowitz, S.Shani and S.Rajasekaran , Galgotia 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	https://onlinecourses.nptel.ac.in/noc21_cs02/preview
2	https://archive.nptel.ac.in/courses/106/105/106105151/

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IV Semester
22ET410 – Lab: Object Oriented Programming

Course Outcomes:

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

1. Explain the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.
2. Demonstrate the use of various OOPs concepts with the help of C++ programs.
3. Develop C++ programs for implementing data structures using array and linked list.
4. Apply the knowledge of BFS,DFS and Dijkstra`s algorithm   for traversal of Graph.
5. Develop C++ programs for implementing the concept of file handling, template and exception handling

Sr. No.	Experiments based on
1	Different Control Structures in C++
2	Function & Function overloading
3	Class, Object and Constructor.
4	Inheritance and Virtual function
5	Operator overloading.
6	Friend function.
7	Stack and Queue using array
8	Stack and Queue using link list.
9	File handling and template.
10	Command line arguments and exception handling

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B.Tech in Electronics & Telecommunication Engineering

IV Semester
MLC2124 - YCCE Communication Aptitude Preparation (YCAP4)

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YCCE-ET-17

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22ET-101

B.Tech in Electronics & Telecommunication Engineering

IV Semester
MLC110- Embedded System & IoT

Course Outcomes:
Upon successful completion of the course the students will be able to 1. Interface Arduino with peripherals. 2. Write a python programs. 3. Interface Raspberry pi with peripherals. 4. Design IoT based system.

Unit:1	Programming Arduino	4 Hours
Introduction to ARDUINO, ARDUINO Family, Arduino IDE, Programming in Embedded-C.		

Unit:2	Interfacing with Arduino - 1	4 Hours
Interfacing with LED's, Switches, Seven Segment Display, Relays (AC Appliance Control), LCD, Buzzer, IR Sensors.		

Unit:3	Interfacing with Arduino - 2	4 Hours
Interfacing Arduino with DC motor and serial devices GSM and GPS module.		

Unit:4	Python programming	4 Hours
Variables, data types, control statements, functions, file handling.		

Unit:5	Raspberry Pi	4 Hours
Introduction to Raspberry Pi, Interfacing with LED, switches, sensors, buzzer.		

Unit :6	IoT	4 Hours
Concept of IoT and its Applications, Introduction to the IoT cloud platforms. Transfer of sensor data to the cloud using Raspberry Pi.		
Total Lecture Hours		**24 Hours**

Textbooks	
1	Ashwin Pajankar , Arduino Made Simple, First Edition, BPB PUBLICATIONS, 2018
2	Muhammad Ali Mazidi, Shujen Chen, Eshragh Ghaemi, Arduino Programming From Beginning to Advanced , First Edition, MicroDigitalEd, 2019
3	Arsheep Bahga, Vijay Madisetti, INTERNET OF THINGS - A HANDS-ON APPROACH , First edition, Orient Blackswan Private Limited, 2015
Reference Books	
1	Kevin Spencer, Raspberry Pi: Learn The Basics Of Raspberry Pi Easily, 1st edition, CreateSpace Independent Publishing Platform, 2018.

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Bachelor of Technology
SoE & Syllabus 2022
5th Semester

(Department of Electronics & Telecommunication Engineering)
B. Tech in Electronics & Telecommunication Engineering

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Yeshwantrao Chavan College of Engineering

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B.TECH SCHEME OF EXAMINATION 2022

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

(Department of Electronics & Telecommunication Engineering)
B. Tech in Electronics & Telecommunication Engineering

SoE No.		
22ET-101		

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	L	T	P	Hrs	Credits	MSEs*	TA**	ESE	ESE Duration Hours
							contact					weightage			
Fifth Semester															
1	5	PC	ET/ET	22ET501	Digital Communication	T	3	0	0	3	3	30	20	50	3 Hours
2	5	PC	ET/ET	22ET502	Lab:Digital Communication	P	0	0	2	1	1		60	40	
3	5	PC	ET/ET	22ET503	Analog Circuits	T	3	0	0	3	3	30	20	50	3 Hours
4	5	PC	ET/ET	22ET504	Lab: Analog Circuits	P	0	0	2	2	1		60	40	
5	5	PC	ET/ET	22ET505	Fields & Radiating System	T	3	0	0	3	3	30	20	50	3 Hours
6	5	PE	ET/ET		**Professional Elective I**	T	3	0	0	3	3	30	20	50	3 Hours
7	5	PE	ET/ET		**Lab:Professional Elective I**	P	0	0	2	2	1		60	40	
8	5	OE-I	ET/ET		**Open Elective - I ***	T	3	0	0	3	3	30	20	50	3 Hours
9	5	OE -II	ET/ET		**Open Elective - II ***	T	3	0	0	3	3	30	20	50	3 Hours
10	5	PC	ET/ET	22ET506	Lab.: Electronics Design Workshop	P	0	0	2	2	1		60	40	
11	5	STR	ET/ET	22ET507	Industrial training, Seminar & Report	P	0	0	2	2	1		60	40	
TOTAL FIFTH SEM							18	0	10	27	23				

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		R&D	MLC125	Design thinking	A	2	0	0	2	0

Professional Elective-l

1	5	PE	PC	22ET511	PE I : CMOS VLSI Design
2	5	PE	PC	22ET512	PE I :Lab:CMOS VLSI Design
3	5	PE	PC	22ET513	PE I : Sensors & Wearable Device
4	5	PE	PC	22ET514	PE I :Lab: Sensors & Wearable Device
5	5	PE	PC	22ET515	PE I : Discrete Structures and Algorithms
6	5	PE	PC	22ET516	PE I :Lab: Discrete Structures and Algorithms
7	5	PE	PC	22ET517	PE I : Optical Communication
8	5	PE	PC	22ET518	PE I :Lab: Optical Communication
9	5	PE	PC	22ET519	PE I : Digital Image Processing
10	5	PE	PC	22ET520	PE I :Lab: Digital Image Processing
11	5	PE	PC	22ET521	PEI: Internet of Things
12	5	PE	PC	22ET522	PEI: Lab: Internet of Things
Coursera Electives					
1	5	PE	PC	22ET523	PE-I : Robotics
		PE	PC	22ET524	PE I : **Lab.:** Robotics

Open Electives -I

1	5	OE I	PC	22ET531	OE I : Principles of Communication
2	5	OE I	PC	22ET532	OE I : Industrial Automation
3	5	OE I	PC	22ET533	OE I :Medical Electronics
4	5	OE I	PC	22ET534	OE I : Fundamentals of Image Processing

Open Electives -II

1	5	OE II	PC	22ET551	OE II :Fundamentals of Computer Networks
2	5	OE II	PC	22ET552	OE II :Soft Computing
3	5	OE II	PC	22ET553	OE II : Microcontrollers & Embedded systems
4	5	OE II	PC	22ET554	OE II : Fundamentals of Internet of Things

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

TA ** = for Theory :12 marks on lecture quizzes, 12 marks on 2 Activities, 2 marks on class performance,4 marks on Common TA

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

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

V Semester
22ET501 – Digital Communication

Course Outcomes:

Upon successful completion of the course the students will be able to
1. Compare different source coding techniques.
2. Describe and analyze signal space concepts.
3. Distinguish various digital modulation techniques.
4. Describe & compare different channel coding techniques
5. Apply spread spectrum modulation for various applications of communication

Unit:1	Digital Communication basics	7 Hours

Fundamentals of Digital communication system, analog vs. digital communication, Block Diagram of Basic Digital Communication system, Sampling Process, PCM Generation and Reconstruction, Quantization Noise, Non-uniform Quantization, DPCM, Delta Modulation, adaptive delta modulation, Delta Sigma Modulation.
Contemporary Issues related to Topic

Unit:2	Digital Source Coding	6 Hours

Introduction to information theory, Shannon's channel capacity theorem, Channel Capacity of Binary Symmetric Channel, Huffman encoding, L-Z encoding algorithm.

Contemporary Issues related to Topic

Unit:3	Signal Space Concept	7Hours

Gram-Schmitt procedure, Signal space representation of modulated signals, Error probability and optimum receivers for AWGN channels, Matched filters.
Contemporary Issues related to Topic

Unit:4	Digital Modulation Methods	6 Hours

Data formats, Coherent and non-coherent binary modulation techniques , Generation and detection of Amplitude Shift Keying, Phase Shift Keying, , Frequency shift Keying, differential phase shift keying, , Quadrature Phase Shift Keying, Quadrate Amplitude shift keying (QASK), QAM and MSK, power spectra, bandwidth efficiency, BER ,Constellation diagram.
Contemporary Issues related to Topic

Unit:5	Channel Coding Techniques	7 Hours

Review of channel coding, Linear block codes, cyclic codes, convolution, encoding and decoding, Viterbi algorithm .
Contemporary Issues related to Topic

Unit :6	Spread Spectrum	6 Hours

Study of PN sequences, direct sequence methods, Frequency hop methods, digital spread spectrum, slow and fast frequency hop, synchronization methods for spread spectrum, application of spread spectrum
Contemporary Issues related to Topic

Total Lecture Hours	39 Hours

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Textbooks	
1	Digital Communication, 4th edition Date:2005, John G Prokis, McGraw Hill
2	Digital Communication, 3rd edition August 2007, Simon Haykin, JOHN WILEY & SONS

Reference Books	
1	Modern Communication systems (Principles and application), 1st edition Publication: 1994, Leon W. Couch II,PHI
2	Digital Communication, 1st edition, Shanmugham, CBS Publisher
3	Modern Digital & Analog Communication Systems, 4th edition Date: 2009, B.P.Lathi, Oxford Univ Pr Publication
4	Principles of Communication Systems, 2nd edition Pub Date: SEP-07, Taub Schilling, Publisher: Prentice Hall

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Analog%20and%20Digital%20Communication%20Systems%20(%20PDFDrive.com%20).pdf
2	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Digital%20and%20Analog%20Communication%20Systems%20(%20PDFDrive.com%20).pdf

MOOCs Links and additional reading, learning, video material	
1	NPTEL Course on Modern Digital Communication by Prof. Suvra Sekhar Das, IIT Kharagpur, https://nptel.ac.in/courses/117105144
2	NPTEL Course on Digital Communication IIT Bombay by Prof. Bikash Kumar Dey, https://nptel.ac.in/courses/117101051

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

V Semester
22ET502 – Lab Digital Communication

Course Outcomes:

Upon successful completion of the course the students will be able to
1. Analyze various source coding techniques.
2. Illustrate signal space concepts.
3. Elaborate digital modulation techniques.
4. Analyze different channel coding techniques
5. Apply spread spectrum modulation for various applications of communication systems.

Sr. No.	Experiments based on
1	To perform sampling and reconstruction of signal and observe its waveforms.
2	To perform Pulse Code Modulation and observe its waveform.
3	To perform ASK and observe its waveforms.
4	To perform FSK and observe its waveform.
5	To perform PSK and observe its waveforms.
6	To study and observe different type of digital data formats (RZ, NRZ and Manchester).
7	To perform delta modulation and observe its waveform.
8	To perform adaptive delta modulation and observe its waveforms.
9	To perform Linear block code.
10	To perform Convolutional code.
11	To perform simulation of modulation techniques using MATLAB

			July 2023	1.00	Applicable for AY 2022-23 Onwards
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YCCE-ET-3

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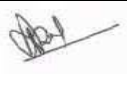(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)
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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

V Semester
22ET503 – Analog Circuits

Course Outcomes:

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

1. Design and analyze OP-AMP configurations.
2. Analyze OP-AMP circuit parameters and frequency response
3. Design linear and non- linear OP-AMP applications.
4. Explain special function ICs and design circuits using it.

Unit:1	Operational Amplifier Fundamentals	7 Hours

Ideal Op Amp, Basic Op Amp Configurations: Open loop, Feedback in OPAMP circuit: Inverting, Non-inverting, voltage follower
Contemporary Issues related to Topic

Unit:2	Op Amp Limitations- Static And Dynamic	6 Hours

Simplified Op Amp Circuit Diagram, OPAMP parameters, Input Bias and Offset Current, Input Bias and Offset voltages, input offset error Compensation, open loop and closed loop Frequency response, Transient response, gain bandwidth product (GBP) & its effect, frequency compensation.
Contemporary Issues related to Topic

Unit:3	Linear Applications	7 Hours

Summer, difference amplifier, integrator, differentiator, Current-to-Voltage Converter, Voltage-to-Current Converter, Instrumentation Amplifiers and Transducer Bridge amplifiers.
Contemporary Issues related to Topic

Unit:4	Active Filters	6 Hours

Transfer function, first order filter, standard frequency response, KRC Filters with variable gain and Unity Gain, Second order LPF & HPF Butterworth filter design, BPF and BRF
Contemporary Issues related to Topic

Unit:5	Nonlinear Circuits & Waveform Generators	7 Hours

Precision Rectifiers, clipper, clamper, Voltage Comparators, Schmitt Triggers, Sample-and-Hold Circuits, Log/Antilog amplifiers, Sinusoidal Oscillators based on Wein bridge and RC Phase shift, Square wave generation, Triangular wave generator
Contemporary Issues related to Topic

Unit :6	Special Function Ic's	6 Hours

PLL (IC 565), Monolithic timers (IC 555), Performance Specifications, D-A Converters (DACs), A-D Converters (ADCs).Voltage reference circuits, DC Dual Regulated Power supply for OP-AMP circuit
Contemporary Issues related to Topic

Total Lecture Hours		39 Hours

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Text books
1 Design with Operational Amplifiers and Analog Integrated Circuits 2002 - Sergio Franco, McGraw-Hill International
2 Linear Integrated Circuits 2015 - D. Roy Chaudhuri, New Age International
3 Op-Amps and Linear Integrated Circuits 2015- Ramakant A. Gayakwad, Pearson
Reference Books
1 Linear Integrated Circuits 2010- S. Salivahanan, V. S. Bhaaskaran, McGraw-Hill
2
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1 http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/ecopies%20of%20books/Electronics%20and%20Telecommunication/Analog%20Integrated%20Circuit%20Design,%202nd%20Edition%20(%20PDFDrive.com%20).pdf
MOOCs Links and additional reading, learning, video material
1 https://www.youtube.com/watch?v=9g9dowLjmCA&list=PLp6ek2hDcoNDAw1BehPFazZ5ogPV8UlQa

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YCCE-ET-5

Nagar Yuwak Shikshan Sanstha's
Yeshwantrao Chavan College of Engineering
(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)
B. Tech SoE and Syllabus 2022
(Scheme of Examination w.e.f. 2022-23 onward)
(Department of Electronics & Telecommunication Engineering)

SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

V Semester
22ET504 –Lab Analog Circuits

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Design and analyze OP-AMP configurations. 2. Analyze OP-AMP circuit parameters and frequency response 3. Design linear and non- linear OP-AMP applications. 4. Explain special function ICs and design circuits using it.

Sr. No.	Experiments based on
1	Verify gain and frequency response of Inverting amplifier / Non-inverting amplifier using IC 741 and simulation
2	Verify Op-amp parameters (a) CMRR (b) Slew Rate
3	Design and verify op-amp application as adder and subs tractor
4	Design and simulate gain and frequency response of Integrator and Differentiator circuit Using IC 741.
5	Design and simulate Second Order low pass filter / high pass filter. Also verify its frequency response characteristics.
6	A. Design and simulate Astable & Monostable Multivibrator circuits using IC 741 B. Design and verify Astable and Bistable Multivibrator circuits using IC 555
7	A. Verify and simulate Schmitt Trigger circuits using IC 741 B. Design of a Half Wave and Full Wave Rectifier using IC 741
8	To construct a RC Phase Shift oscillator and study its operation.
9	To verify the operation of various types of clippers and clampers like positive and negative using opamp 741.
10	To verify PLL IC 565
11.	Verification of Digital to Analog converter using R- 2R ladder circuit.
12	Mini Project

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Yeshwantrao Chavan College of Engineering

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B. Tech SoE and Syllabus 2022
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(Department of Electronics & Telecommunication Engineering)

SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

V Semester
22ET505 – Fields & Radiating Systems

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Estimate transmission lines parameters
2. Illustrate parallel plane waveguides, and rectangular waveguides
3. Analyze antenna parameters
4. Explain various types of antennas

Unit:1	Transmission Lines	7 Hours
Introduction to transmission line theory, Transmission line parameters, Characterized impedance, Propagation constant, Phase constant, Attenuation constant, Waveforms distortion, Distortion less transmission lines, Loading of transmission lines, Reflection coefficient and VSWR, Equivalent circuits of transmission lines, Open and short circuited lines.		
Contemporary Issues related to Topic		

Unit:2	The Line at Radio and Power Frequencies	6 Hours
Parameters of open wire line and Coaxial line at high frequencies; Line constants for dissipation less line -voltages and currents on dissipation less line - standing waves and standing wave ratio - input impedance of open and short circuited lines.		
Contemporary Issues related to Topic		

Unit:3	Parallel Planes Waveguide	7 Hours
Guided Waves between parallel planes, Derivation of TE wave, Derivation of TM wave Characteristics of TE and TM wave, TEM waves and its characteristics.		
Contemporary Issues related to Topic		

Unit:4	Rectangular Waveguide	7 Hours
Introduction to rectangular waveguide, TM wave in rectangular waveguide, TE wave in rectangular waveguide, Characteristics of TE and TM wave in rectangular waveguide, Velocity, Guide wave length, Wave impedance, Field configurations.		
Contemporary Issues related to Topic		

Unit:5	Antenna Terminology	6 Hours
Retarded potentials, Field due to a current elements, Power radiated and radiation resistance, Reciprocity theorem applied to an antennas gain, Radiation intensity, Directivity and antenna gain.		
Contemporary Issues related to Topic		

Unit:6	Types of Antenna	6 Hours
Log –periodic antennas, horn antennas& Lens Antennas,		
Contemporary Issues related to Topic		

Total Lecture Hours	**39 Hours**

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

Textbooks	
1	K.D.Prasad, Antenna Theory And Waveguide by SatyaPrakashan ,New Delhi
2	Jordan and Balmain, Electromagnetic wave And Radiating System by Prentice hall of India
Reference Books	
1	C.A.Balanis, Antenna Theory & Design, John Wiley & sons
2	John D. Krauss, Antennas, McGraw-Hill International edition
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/cmos_kang.pdf
2	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20Engineering/30.CMOS%20Logic%20Circuit%20Design%20-%20(John%20P%20Uyemera).PDF
MOOCs Links and additional reading, learning, video material	
1	https://www.youtube.com/watch?v=wKL6WsEOl00
2	https://www.youtube.com/watch?v=0OwmYAljz4A&list=PL0CD49F1FAD4E6FAA

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

V Semester
22ET506 – Lab Electronic Design Workshop

Course Outcomes:

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

1. Identify and test passive and active electronic components and devices.
2. Design regulated DC Power supply and PCB Layout.
3. Fabricate Assemble, Test and Troubleshoot mini project.

Sr. No.	Experiments based on
1	To study the safety precautions and use of an Analog and Digital Multimeter for the measurement of DC/AC Voltages and Currents.
2	Identification and Testing of Passive Electronic Components.
3	Identification and Testing of Active Electronic Components.
4	To Identify and Test wires, cables, connectors, Switches, Relays Interconnected components.
5	To study Operation and Testing of Microphones and Speakers.
6	To Design, Construct and Test Fixed DC regulated power supply of ± 5V and ± 12V/500mA on Zero PCB.
7	To Design PCB layout of a mini project.
8	To fabricate PCB of a mini project.
9	To Perform assembling of a mini project.
10	To Test and Troubleshoot a mini project.

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

V Semester
22ET511 – PE I : CMOS VLSI Design

Course Outcomes:
Upon successful completion of the course the students will be able to

1. Elaborate the characteristics of MOSFET, MOSFET based circuits and process of CMOS circuits fabrication
2. Design the MOSFET inverters, combinational and sequential circuits.
3. Design optimized CMOS circuits and layouts
4. Analyze switching characteristics and interconnection effects of MOS device, advance CMOS logic circuits.

Unit:1	**Basic MOS Device Physics**	**7 Hours**

MOS as a switch, MOS Structure & Symbols, MOS I/V Characteristics, MOS Enhancement Transistor, Second order effect of MOS: Body Effect, Junction Effect, Gate Leakage Effect, Channel Length Effect, Tunneling Effect, Velocity Modulation, Mobility Variation, Small Signal Modeling of MOSFETs

Contemporary Issues related to Topic

Unit:2	**MOSFET Inverter Characteristics**	**7 Hours**

Resistive Load Inverter, CMOS Inverter, Principle of operation & DC Characteristics, Tri-stated Inverter, Noise Margin Calculation, Logic Design with MOSFETs. Compound Gates in CMOS.

Contemporary Issues related to Topic

Unit:3	**Fabrication & Layout of CMOS IC**	**6 Hours**

Integrated circuit fabrication process: oxidation, diffusion, ion implantation, photolithography and twin-tub CMOS process. CMOS Technology: N-well, P-well, Twin Tub Process, Silicon on Insulator (SOI) Process, Layout Design Rules, Physical Design of Logic Gates, Euler's Path, Stick Diagram, Layout, Latch-up Effect.

Contemporary Issues related to Topic

Unit:4	**Switching Characteristics & Interconnection Effect**	**7 Hours**

MOS Device Capacitance Estimation, Switching Characteristics: Rise Time, Fall Time,

Propagation Delay, Delay Estimation: Propagation Delay, Contamination Delay, Power Dissipation in CMOS: Static & Dynamic Power Calculation, Charge Sharing, Fan-in, Fan-out.

Contemporary Issues related to Topic

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B.Tech in Electronics & Telecommunication Engineering

Unit:5	Combinational Circuit Design	6Hours
Circuit Families, Static CMOS, Ratioed Circuits, Cascode Voltage Switch Logic, Dynamic Circuits, Pass-Transistor Circuits, Pseudo NMOS Logic, Dynamic CMOS Logic, CMOS Domino Logic, Zipper Logic, Clocked CMOS Logic, CVSL, Bi-CMOS Logic Family		
Contemporary Issues related to Topic		

Unit :6	Sequential Circuit Design	6 Hours
Introduction, Sequencing Static Circuits. Sequencing Methods, Max-Delay Constraints, Min-Delay Constraints, Time Borrowing, Clock Skew, Circuit Design of Latches and Flip-Flops, Conventional CMOS Latches, Conventional CMOS Flip-Flops.		
Contemporary Issues related to Topic		

Total Lecture Hours	39 Hours

Textbooks	
1	Neil H. E. Weste and K.Eshraghian, Principle of CMOS VLSI Design, 2ndedition, 1994,Addison Wesley VLSI Series
2	John P. Uyemura, Introduction to VLSI Circuits and Systems, 1st edition, Wiley Publication
Reference Books	
1	Sung-Mo Kang and Yusuf Leblebici , CMOS Digital Integrated circuits Analysis and Design, 3rdedition, 2008,Tata Mc-Graw Hill
2	Pucknell and K. Eshraghian, CMOS VLSI Design, 3rd edition, 2005, Prentice Hall
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1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/cmos_kang.pdf
2	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20Engineering/30.CMOS%20Logic%20Circuit%20Design%20-%20(John%20P%20Uyemera).PDF
MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.nptel.ac.in/noc21_ee09

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

V Semester
22ET512 – PE I: Lab CMOS VLSI Design

Course Outcomes:

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

1. Elaborate the characteristics of MOSFET, MOSFET based circuits and process of CMOS circuits fabrication
2. Design the MOSFET inverters, combinational and sequential circuits.
3. Design optimized CMOS circuits and layouts
4. Analyze switching characteristics and interconnection effects of MOS device, advance CMOS logic circuits.

Sr. No.	Experiments based on
1	DC and Transient analysis of NMOS and PMOS Transistor
2	DC and Transient analysis of CMOS Inverter
3	Design of combinational circuit using CMOS logic
4	Design of combinational circuit using pass transistor logic
5	Design of Sequential circuit using CMOS logic
6	Design of sequential circuit using pass transistor logic
7	Circuit design using CMOS Domino Logic
8	Circuit design using Zipper Logic
9	Circuit design using Clocked CMOS Logic
10	Mini Project

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

V Semester
22ET513 – PE I : Sensors & Wearable Devices

Course Outcomes:

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

1. Explore the basic idea of measurements, characteristics and the errors associated with measurements.
2. Realize the concept of resistive sensors and reactive sensors which can be employed for real life applications
3. Explain the working principle of special purpose sensors and the need for developing smart sensors.
4. Describe the taxonomy of the wearable devices and its design constraints for measuring physical and biological signals.
5. Design and perform experiments on the sensors and develop the projects based on the customer needs.

Unit:1	**Introduction to Measurements and**	**7 Hours**

Functional Elements of a Measurement System and Instruments, Statistical Analysis, Units and standards, Calibration and errors.

Contemporary Issues related to Topic

Unit:2	**Introduction to Transducer/ Sensors**	**6 Hours**

General concepts and terminology of Sensor systems, Transducers classification-sensors and actuators, General input-output configurations, Static and dynamic characteristics of measurement system

Contemporary Issues related to Topic

Unit:3	**Resistive and reactive Sensors**	**6 Hours**

Resistive sensors- Potentiometers, strain gages (piezo-resistive effect), resistive temperature detectors (RTD), thermistors, light dependent resistor (LDR), resistive hygrometers, resistive gas sensors, Linear variable differential transformers (LVDT), Capacitive sensors- variable capacitor, differential capacitor.

Contemporary Issues related to Topic

Unit:4	**Self generating Sensors**	**6 Hours**

Thermoelectric sensors, piezoelectric sensors, pyroelectric sensors, photovoltaic sensors, LM35.

Accelerometers: Characteristics and working principle, Types- Capacitive, Piezoresistive, piezoelectric; Gyroscopes: Characteristics and working principle

Contemporary Issues related to Topic

Unit:5	**Smart Sensors**	**7 Hours**

Overview of various smart sensors: Digital temperature sensor (DS1621, TMP36GZ), Humidity sensor, IR sensor

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(FC51), Gas sensor (MQ2,MQ8), Pressure sensors (BMP180), Introduction to MEMS and Flexible sensors.

Contemporary Issues related to Topic

Unit :6	Scope of Wearable Devices	7 Hours

Role of Wearables, Attributes of Wearables, The Meta Wearables – Textiles and clothing, Social Aspects: Interpretation of Aesthetics, Adoption of Innovation, On-Body Interaction; Case Study: Google Glass, health monitoring, Wearables: Challenges and Opportunities.

Contemporary Issues related to Topic

Total Lecture Hours	39 Hours

Textbooks	
1	B. C. Nakra, K.K. Choudhury, "Instrumentation, Measurement and Analysis" -3 rd Edition, Tata McGraw, 2009
2	Jacob Fraden, "Hand Book of Modern Sensors: physics, Designs and Applications", 3rd ed., Springer, 2010
3	Edward Sazonov, Michael R Neuman, "Wearable Sensors: Fundamentals, Implementation and Applications" Elsevier, 2014
Reference Books	
1	A.K. Sawhney, "Electrical and Electronic Measurements and Instrumentation", DhanpatRai
2	Er. R.K. Rajput, "Electronic Measurements and Instrumentation", S. Chand & Company Ltd. 3rd Edition.
3	Subhas C. Mukhopadhyay, "Wearable Electronics Sensors-For Safe and Healthy Living", Springer International Publishing, 2015.
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1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/cmos_kang.pdf
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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

V Semester

22ET514 –PE I : Lab Sensors & Wearable Devices

Course Outcomes:

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

1. Explore the basic idea of measurements, characteristics and the errors associated with measurements.
2. Realize the concept of resistive sensors and reactive sensors which can be employed for real life applications
3. Explain the working principle of special purpose sensors and the need for developing smart sensors.
4. Describe the taxonomy of the wearable devices and its design constraints for measuring physical and biological signals.
5. Design and perform experiments on the sensors and develop the projects based on the customer needs.

Sr. No.	Experiments based on
1	Strain gauge sensors for measurement of normal strain.
2	Displacement measurement using LVDT
3	Displacement measurement using Hall effect sensor
4	Displacement measurement using LDR
5	Temperature measurement using RTD
6	Temperature measurement using LM35
7	Temperature measurement using Thermocouple
8	Level measurement using capacitive / resistive sensor
9	Distance measurement using IR / ultrasonic sensor

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

V Semester
22ET515 – PE I : Discrete Structures and Algorithms

Course Outcomes:

Upon successful completion of the course the students will be able to
1. Examine logic and proof concepts.
2. Use concepts of counting methods, and the pigeonhole principle.
3. Develop recursive algorithms, recurrence relations and search algorithms.
4. Understand hashing techniques, and group theory in computer science
5. Apply transport network and pumping network models for problem solving

Unit:1	LOGIC AND PROOFS, & Boolean Logic	7 Hours

Propositions, conditional propositions and logical equivalence, quantifiers, proofs, resolution proofs, mathematical induction, sets, sequences and strings, relations, equivalence relations, matrices of relations, functions, Boolean algebra, Boolean functions and synthesis of circuits.

Unit:2	COUNTING METHODS, AND THE PIGEONHOLE PRINCIPALE	6 Hours

Basic Principles, Permutation and Combination, Algorithms for Generating Permutations and Combinations, Introduction to Discrete Probability, Discrete Probability Theory, Generalized Permutation and Combinations, Binomial Coefficients and Combinatorial Identities, The Pigeonhole Principle.

Unit:3	ALGORITHMS	7 Hours

Overview and importance of algorithms and discrete structures. Fundamentals of algorithm analysis, Space and time complexity of an algorithm, Types of asymptotic notations and orders of growth, Algorithm efficiency – best case, worst case, average case, Analysis of non-recursive and recursive algorithms, Asymptotic analysis for recurrence relation – Recursive Tree Method. The Euclidean algorithm, Analysis of Euclidean Algorithm

Unit:4	RECURRENCE RELATIONS & SEARCH ALGORITHMS	6 Hours

Introduction, Solving Recurrence Relations, Application to the Analysis of Algorithms, Searching - Linear Search and binary search, Applications - Finding square root of 'n'-Longest, Common Prefix, Sorting – Insertion sort - Selection sort – Bubble sort – (Counting Sort) - Quick sort- Merge sort, Analysis, Applications - Finding the 'n' closest pair's

Unit:5	HASHING	7 Hours

Hash functions, open hashing-separate chaining, closed hashing - linear probing, quadratic probing, double hashing, random probing, rehashing, extendible hashing, Applications – Dictionary- Telephone directory
Heaps - Heap sort, Applications -Priority Queue using Heaps
AVL trees – Terminology - basic operations(rotation, insertion and deletion)

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Unit :6	ALGEBRIC STRUCTURES & NETWORK MODELS	6 Hours
Introduction, A Maximal Flow Algorithm, The Max Flow, Min Cut Theorem, Matching, Group & Ring Theory: Definition and examples of groups, subgroups & rings. New topic to be announced time to time.		
Total Lecture Hours		**39 Hours**

Textbooks	
1	Richard Johnsonbaugh Discrete Mathamatics, 5th Edition 2002, Pearson Education
2	C. L. Liu, D. P. Mohapatra Elements of Discrete Mathematics: A Computer Oriented Approach, 2017 TMH
3	Thomas H. Cormen, C.E. Leiserson, R L.Rivest and C. Stein, Introduction to Algorithms, Third edition, MIT Press, 2009
Reference Books	
1	Alan Doerr and Kenneth Levasseur, "Applied Discrete Structures for Computer Science", Galgotia Publications (P) Ltd, 1992
2	Tremblay J. P. and Manohar R., Discrete Mathematical Structures with applications to Computer Science, Tata Mc Graw Hill Publishing Co., 35th edition, 2008
3	T.Veerarajan, Discrete Mathematics with Graph Theory and Combinatorics, Tata McGraw Hill, 2009
4	Mark A. Weiss,Data Structures & Algorithm Analysis in C++, 3rd edition, 2008, PEARSON
5	Kurt Mehlhorn, and Peter Sanders – Algorithms and Data Sturctures The Basic Toolbox, Springer-Verlag Berlin Heidelberg, 2008
6	Alan Doerr and Kenneth Levasseur, "Applied Discrete Structures for Computer Science", Galgotia Publications (P) Ltd, 1992.
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1	
MOOCs Links and additional reading, learning, video material	
1.	https://www.coursera.org/specializations/data-structures-algorithms
2.	https://nptel.ac.in/courses/106106127
3.	https://nptel.ac.in/courses/106102064
4.	https://nptel.ac.in/courses/106105225
5.	https://onlinecourses.nptel.ac.in/noc22_cs26/preview
6.	http://ps-iiith.vlabs.ac.in/exp4/lab.html
7.	http://ps-iiith.vlabs.ac.in/List%20of%20experiments.html?domain=Computer%20Science
8.	http://cse01-iiith.vlabs.ac.in/List%20of%20experiments.html?domain=Computer%20Science
9.	https://d3gt.com/unit.html?bipartite
10.	https://www.cs.usfca.edu/~galles/visualization/DFS.html

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

V Semester
22ET516– PE I : Lab Discrete Structures and Algorithms

Course Outcomes:

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

1. Examine logic and proof concepts.
2. Use concepts of counting methods, and the pigeonhole principle.
3. Develop recursive algorithms, recurrence relations and search algorithms.
4. Understand hashing techniques, and group theory in computer science
5. Apply transport network and pumping network models for problem solving

Sr. No.	Experiments based on
1.	Propositional LOGIC
2.	PROOFS
3.	Boolean functions, implementation of combinational logic circuit
4.	The Euclidean algorithm, GCD Algorithm
5.	Permutation and Combination
6.	Recursive Algorithms
7.	Discrete Probability
8.	Second order homogeneous recurrence relation with initial conditions
9.	Sorting Algorithms
10.	Searching Algorithms
11.	Group Activity

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

V Semester
22ET517 – PE I : Optical Communication

Course Outcomes:
Upon successful completion of the course the students will be able to

1. Design and analyze an Optical Communication Systems with different types of losses.

2. Explore different types of sources and receivers in fiber optics.

3. Use different splicing techniques, connectors and coding.

4. Explore different methods of loss measurements in fiber optics.

Unit:1	**INTRODUCTION TO OPTICAL FIBERS**	**7 Hours**

Introduction of fiber Optic system. Principle of optical communication-Attributes and structures of various fibers such as step index, graded index mode and multi mode fibers. Propagation in fibers-Ray mode, Numerical aperture and multipath dispersion in step index and graded index fibers structure, Modes and Power flow in fibers.
Contemporary Issues related to Topic

Unit:2	**SIGNAL DEGRADATION IN OPTICAL FIBERS**	**7 Hours**

Attenuation, Scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave guides Group Delay , Material Dispersion, Wave guide Dispersion, Intermodal dispersion, Pulse Broadening , Mode Coupling
Contemporary Issues related to Topic

Unit:3	**FIBER OPTICAL SOURCES**	**6 Hours**

Direct and indirect Band gap materials – LED structures – Light source materials – Quantum efficiency and LED power, Modulation of a LED, External Quantum efficiency –Laser Diodes structures, Fabry Perot cavity
Contemporary Issues related to Topic

Unit:4	**FIBER OPTICAL RECEIVERS**	**6 Hours**

PIN and APD diodes – Photo detector noise, SNR, Detector Response time, Avalanche Multiplication Noise – Comparison of Photo detectors – Fundamental Receiver Operation – Amplifier**.**

Contemporary Issues related to Topic

Unit:5	**POWER LAUNCHING AND COUPLING IN DIGITAL TRANSMISSION SYSTEM**	**6Hours**

Source to fiber power launching –Fiber to Fiber Joints-Fiber Splicing and connectors, Mechanical Misalignment, line coding –error correction, Optical Fiber Topologies, Wavelength division Multiplexing.
Contemporary Issues related to Topic

Unit :6	**MEASUREMENT IN OPTICAL FIBERS**	**7 Hours**

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Attenuation measurement, Time domain dispersion and Frequency domain dispersion, NA measurement, Refractive index, Optical Time Domain Reflectrometry (OTDR), Eye pattern.
Contemporary Issues related to Topic

Total Lecture Hours	**39 Hours**

Textbooks	
1	Optical Fiber Communication 2008 - Gerd Keiser, McGraw-Hill International
2	Optical Communication, Principles and Practice - J.Senior, Prentice Hall of India
Reference Books	
1	Optical Communication System - S J. Gower, Prentice Hall of India
2	Fiber-Optic Communication System Third Edition - Govind Agrawal, John Willy & Sons
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	
MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.nptel.ac.in/noc22_ee88 Fiber Optic Communication Technology - Course (nptel.ac.in)

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V Semester
22ET518 – PE I : Lab Optical Communication

Course Outcomes:

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

1. Design and analyze an Optical Communication Systems with different types of losses.

2. Explore different types of sources and receivers in fiber optics.

3. Use different splicing techniques, connectors and coding.

4. Explore different methods of loss measurements in fiber optics.

Sr. No.	Experiments based on
1	To set fiber optic analog link using optical fiber.
2	To set fiber optic digital link using optical fiber.
3	To measure the attenuation of signal in optic fiber due to bending loss
4	To determine the attenuation due to propagation loss in optic fiber.
5	To estimate the numerical aperture of the given fiber.
6	To form fiber optic voice link using MIC and Speaker
7	To Study and perform PAM in optical fiber link
8	To Study and perform PWM in optical fiber link
9	To perform Time Division Multiplexing in optical fiber.
10	To study the eye pattern of optical fiber link.
11.	To measure reflection using OTDR in Optical fiber

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V Semester
22ET519 – PE I: Digital Image Processing

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Examine the concepts of image enhancement, restoration, segmentation, representation and description.
2. Apply basic image processing algorithms and filtering techniques for image enhancement.
3. Apply the algorithms for image restoration and segmentation
4. Apply the techniques for image representation and description
5. Extract the features for image representation and description

Unit:1	Digital Image fundamental	7 Hours

Digital Image fundamental steps and components of an image processing system, elements of visual perception, Image formation and acquisition, Image sampling and quantization, some basic relationship between the pixels, mathematical tools used in digital image processing

Contemporary Issues related to Topic

Unit:2	Intensity Transformation and Histogram Processing	6 Hours

Image Negative, Log Transformation, Power Law transformation, Linear Piecewise transformation, Histogram Equalization, Histogram Specification, Histogram Statistics

Contemporary Issues related to Topic

Unit:3	Filtering in spatial and frequency domain	7 Hours

Fundamentals of Spatial Filtering, Smoothing spatial filtering, Sharpening Spatial Filtering, Unsharp masking and High boost filtering, Filtering in Frequency Domain: Introduction to Fourier transform and frequency domain, Smoothing frequency domain filters, sharpening frequency domain filters

Contemporary Issues related to Topic

Unit:4	Image Restoration	6 Hours

Image Restoration Image degradation/restoration process, noise model, restoration in presence of noise, periodic noise reduction, linear, position invariant degradation, estimating degradation function, Inverse filtering, Wiener filtering

Contemporary Issues related to Topic

Unit:5	Image Segmentation	6 Hours

Fundamentals, Detection of discontinuities: Point, Line and Edge, Thresholding, Region based segmentation: Region Growing, Split and Merge, Morphology Operation

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Contemporary Issues related to Topic		
Unit :6	**Feature Extraction**	**7Hours**
Boundary Preprocessing: Chain Code, MPP, Signatures, Skeleton; Boundary Descriptors: Simple Descriptor, Shape Number, Fourier Descriptor, Statistical Moments; Region Feature descriptor: Basic descriptor, Topological Descriptor, Texture Descriptor		
Contemporary Issues related to Topic		
Total Lecture Hours		**39 Hours**

Textbooks	
1	Digital Image Processing by R.C. Gonzalez & R.E. Woods 4th Edition Pearson Education
Reference Books	
1	Digital Image processing using MATLAB by R.C. Gonzalez & R.E. Woods, Pearson Education
2	Digital Image processing by William K. Pratt 3rd Edition, 2004, John Wiley
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://link.springer.com/openurl?genre=book&isbn=978-3-642-34900-3
2	http://link.springer.com/openurl?genre=book&isbn=978-1-4613-6207-4
3	http://link.springer.com/openurl?genre=book&isbn=978-3-540-77071-8
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/117105079
2	https://onlinecourses.nptel.ac.in/noc19_ee55/preview

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V Semester
22ET520 – PE I : Lab Digital Image Processing

Course Outcomes:

Upon successful completion of the course the students will be able to
1. 1. Examine the concepts of image enhancement, restoration, segmentation, representation and description.
2. Apply basic image processing algorithms and filtering techniques for image enhancement.
3. Apply the algorithms for image restoration and segmentation
4. Apply the techniques for image representation and description
5. Extract the features for image representation and description

Sr. No.	Experiments based on
1	Basic Operations on Digital Images
2	Image enhancement using Gray level Transformation
3	Image Enhancement Using Piecewise linear transformation
4	Image Enhancement Using Histogram Processing
5	Spatial Domain Filtering Techniques for Image Enhancement
6	Frequency Domain Filtering Techniques for Image Enhancement
7	Noise modeling and Basic Restoration Techniques
8	Image Segmentation
9	Image Compression
10	Image Representation and Description

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V Semester
22ET521 – PE I : Internet of Things

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Explore the physical and Logical design of IoT.
2. Explore the M2M and NETCONF.
3. Explore python programming.
4. Apply basic skills of IoT to solve real life problems
5. Illustrate security for IoT.

Unit:1	Introduction & Concepts:	5 Hours
UNIT-1: Introduction to Internet of Things, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels		
Contemporary Issues related to Topic		
Unit:2	M2M & System Management with NETCONF-YANG	6 Hours
M2M, Difference between IoT and M2M, SDN and NFV for IoT, Software defined Networking, Network Function Virtualization, Need for IoT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IoT Systems management with NETCONF-YANG		
Contemporary Issues related to Topic		
Unit:3	Developing Internet of Things	7 Hours
Introduction, IoT Design Methodology, Python Data Types & Data Structures, Control Flow, Functions		
Contemporary Issues related to Topic		
Unit:4	Logical Design using Python	7 Hours
Python Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages, IoT Device-Raspberry Pi, Programming Raspberry pi with Python		
Contemporary Issues related to Topic		
Unit:5	IoT Security	7 Hours
Effect of security threats on user, authentication using OTP validation, Security Requirements for the Internet of Secure Things, Secure Solutions, Secure Framework of the IoT Related to Perceptual Layer, Challenges in IoT Security		
Contemporary Issues related to Topic		
Unit :6	Domain Specific IOTs	7 Hours
Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.		
Contemporary Issues related to Topic		
Total Lecture Hours		**39 Hours**

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Textbooks	
1	Arshdeep Bahga and Vijay Madisetti , "Internet of Things, a hands on approach" , Universities Press (India)Pvt. Ltd. 2017, ISBN: 978-81-7371-954-7.
Reference Books	
1	Internet of Things : Technologies, Applications, Challenges and Solution B.K.Tripathy & J.Anuradha by CRC press publication
2	From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence: By Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, 1 st Edition, Academic Press, 2014.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/UG%20COURSES/IIOT/IIOT%20(%20G%20Series).pdf
2	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/30.2019_Book_InternetOfThingsFromHypeToReal.pdf
MOOCs Links and additional reading, learning, video material	
1	https://archive.nptel.ac.in/courses/106/105/106105166/
2	https://onlinecourses.nptel.ac.in/noc21_ee85/preview

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V Semester
22ET521 – PE I : Lab Internet of Things

Course Outcomes:

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

1. Explore the physical and Logical design of IoT.
2. Explore the M2M and NETCONF.
3. Explore python programming.
4. Apply basic skills of IoT to solve real life problems
5. Illustrate security for IoT.

Sr. No.	Experiments based on
1	Implementation of Python Program to find the numbers which are divisible by 7 and multiples of 5 in a given range
2	To implement Function to perform various operations in python
3	Implementation of python program for String manipulation using
4	Controlling Blink Rate of LED with Raspberry pi.
5	Interfacing DHT11 sensor with Raspberry pi.
6	To develop dictionary and perform various operations on dictionary in python..
7	Uploading and Reading data from server.
8	Design of Smart Gardening system with IoT Technology
9	Design of Home Automation System with different sensor
10	Building Intrusion Detection System with Arduino and Ultrasonic Sensor
11	Mini-project

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V Semester
22ET531 – OE I : Principles of Communication

Course Outcomes:

Upon successful completion of the course the students will be able to
1. Describe analog communication systems and various modulation scheme.
2. Explain digital communication systems and various modulation scheme.
3. Analyse error correcting codes, including block codes.
4. Use the different application of satellite communication.

Unit:1	Analog Communication	**7 Hours**
Introduction to Communication Systems; Noise, Types of noise, sources of noise; Need for modulation, AM-Time domain representation, Frequency spectrum , power relations, DSB/SC, SSB**.**		
Contemporary Issues related to Topic		
Unit:2	Angle Modulation	**6 Hours**
Frequency Modulation (FM), mathematical Analysis, modulation index, frequency spectrum, FM Transmitter block diagram.		
Contemporary Issues related to Topic		
Unit:3	**Digital Communication**	**7 Hours**
Introduction Digital Communication System; Pulse modulations – concepts of sampling and sampling theorems, PAM, PWM, PPM; Waveform coding Techniques: Pulse code Modulation (PCM),Delta Modulation, Adaptive Delta modulation		
Contemporary Issues related to Topic		
Unit:4	Digital Modulation	**6 Hours**
Data formats ;Amplitude Shift Keying (ASK) – Frequency Shift Keying (FSK) Phase Shift Keying (PSK) – BPSK – QPSK– Quadrature Amplitude Modulation (QAM)		
Contemporary Issues related to Topic		
Unit:5	Information Theory	**6 Hours**
Entropy, Properties of entropy; source coding: Huffman coding**;** error control codes: Linear Block Code		
Contemporary Issues related to Topic		
Unit :6	**Satellite Communication**	**7 Hours**
Communication Satellite: Orbit and Description: A Brief history of satellite Communication, satellite Frequency Bands, Satellite Systems, Applications, frequency used link establishment Earth Station Technology: Transmitters, Receivers.		
Contemporary Issues related to Topic		
Total Lecture Hours		**39 Hours**

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Textbooks	
1	B.P.Lathi "Modern Digital and Analog Communication Systems" Oxford University Press, 1998.
2	J.Das "Principles of Digital Communication" New Age International, 1986

Reference Books	
1	Kennedy and Davis "Electronic Communication Systems" Tata McGraw hill, 4th Edition, 1993.
2	Sklar "Digital Communication Fundamentals and Applications" Pearson Education, 2001.
3	Bary le, Memuschmidt, Digital Communication, Kluwer Publication, 2004.
4	B.P.Lathi "Modern Digital and Analog Communication Systems" Oxford University Press, 1998. Taub & Schiling "Principles of Communication Systems" Tata McGraw Hill 2007

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1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Analog%20and%20Digital%20Communication%20Systems%20(%20PDFDrive.com%20).pdf
2	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Digital%20and%20Analog%20Communication%20Systems%20(%20PDFDrive.com%20).pdf

MOOCs Links and additional reading, learning, video material	
1	NPTEL Course on Principles of Communication Systems By Prof. Aditya K. Jagannatham IIT Kanpur, https:// nptel.ac.in/courses/108/104/108104091/

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V Semester
22ET532 – OEI: Industrial Automation

Course Outcomes:

Upon successful completion of the course the students will be able to
1. Analyse industrial need of automation and systems application.
2. Illustrate industrial automation components and hardware.
3. Impart the role of PLC in industry automation
4. Expose to various control techniques employed in process automation
5. Elaborate various applications of networking and communication systems.

Unit:1	Introduction to Industrial Automation	7 Hours

Automation overview, Requirement of automation systems, Architecture of Industrial Automation system, Introduction of PLC and Supervisory Control and Data Acquisition (SCADA).
Contemporary Issues related to Topic

Unit:2	Automation Components	6 Hours

Sensors for temperature, pressure, force, displacement, speed, flow, level, humidity and pH measurement. Actuators, process control valves. Introduction of DC and AC servo drives for motion control.
Contemporary Issues related to Topic

Unit:3	Automation in Process Industries	7Hours

Introduction to computer based industrial automation. Programming languages of PLC, Basic instruction sets. PLC programming, Ladder diagram, Sequential flow chart, PLC selection, PLC Installation.
Contemporary Issues related to Topic

Unit:4	Distributed Control System	6 Hours

Overview of DCS, DCS software configuration, DCS communication, DCS Supervisory Computer Tasks, DCS integration with PLC and Computers, Features of DCS, Advantages of DCS.
Contemporary Issues related to Topic

Unit:5	SCADA/ HMI System Development	7 Hours

SCADA and HMI systems, Different Systems in SCADA like Field Instrumentation, RTUs, Industrial Data Communication, HMI Development, Data Processing, Network Communications, Communication with RTUs, PLC as RTU.
Contemporary Issues related to Topic

Unit :6	Industrial Networking	6 Hours

SCADA and HMI systems, Different Systems in SCADA like Field Instrumentation, RTUs, Industrial Data Communication, HMI Development, Data Processing, Network Communications, Communication with RTUs, PLC as RTU.
Contemporary Issues related to Topic

Total Lecture Hours	39 Hours

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Textbooks	
1	Industrial Instrumentation and Control By. S.K. Singh The McGraw Hill Companies
2	Programmable logic controller, Dunning, Delmar
Reference Books	
1	Process Control Instrumentation Technology By. C.D. Johnson, PHI
2	Digital Communication, 1st edition, Shanmugham, CBS Publisher
3	Modern Digital & Analog Communication Systems, 4th edition Date: 2009, B.P.Lathi, Oxford Univ Pr Publication
4	Principles of Communication Systems, 2nd edition Pub Date: SEP-07, Taub Schilling, Publisher: Prentice Hall
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	NPTEL, online courses and certification, Learn for free
2	https://swayam.gov.in/
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V Semester
22ET533 – OEI: Medical Electronics

Course Outcomes:
Upon successful completion of the course the students will be able to
1.Describe various parameters of human anatomy and physiology.
2.Gain the knowledge of biopotential signals
3.Explain the functioning of different Measuring and Recording instruments
4.Elaborate the working of modern Imaging and Therapeutic Equipment

Unit:1	**Fundamentals of Medical Instrumentation**	**6 Hours**
Anatomy and physiology, biometrics, components of the man instrumentation , Physiological System of body, Sources of bioelectric potentials(Resting and action potential, Propagation of action potential and Bioelectric potential).		

Unit:2	**Physiological Transducer and Electrodes**	**7 Hours**
Classification of transducers, Performance characteristics of transducers, Displacement, Position and Motion transducers, Pressure transducers, Photoelectric transducers, transducers for body Temperature measurement Optical Fibre sensors, biosensors and smart sensors. Electrodes for ECG, EEG, EMG, and Microelectrodes.		

Unit:3	**Biochemical and Non Electrical Parameter Measurement**	**7Hours**
Blood pressure measurement, Blood flow meters and Cardiac output measurement , Plethysmography Heart sound, Measurement in Temperature ,Pulse and Respiratory system, Blood Cell Counters.		

Unit:4	**Biomedical Recorders**	**6 Hours**
Nature of biomedical signal, Example of biomedical signals with the functioning of the organs. EMG, ECG, EEG,PCG lead system and recording methods ,typical waveform and signals characteristics, other biomedical recorders.		

Unit:5	**Medical Imaging System**	**6 Hours**
X-ray imaging - Properties and production of X-rays, X-ray machine, applications of X-rays in medicine. Computed Tomography Principle, image reconstruction, scanning system and applications. Ultrasonic imaging systems: Basic pulse echo system, propagation of ultrasonic through tissues and reflections, display types, A-Scan, B-Scan, M-Scan, applications, real-time ultrasonic imaging systems and probes.		

Unit :6	**Therapeutic Equipment**	**7 Hours**
Cardiac pacemaker: Need of cardiac pacemaker, external pacemaker and implantable pacemaker. Cardiac		

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Defibrillators: Need of Defibrillator, DC Defibrillator and Implantable Defibrillator.

Ventilators: Types of ventilators, Ventilator Terms ,classification of ventilators, Modern and high Frequency Ventilators .

Total Lecture Hours	39 Hours

Textbooks	
1	Leslie Cromwell, ―Biomedical Instrumentation and Measurement‖, Prentice Hall of India, New Delhi, 2007.
2	Joseph J.Carr and John M.Brown, ―Introduction to Biomedical Equipment Technology‖, John Wiley and Sons, New York, 2004.
Reference Books	
1	Khandpur, R.S., ―Handbook of Biomedical Instrumentation‖, TATA Mc Graw-Hill, second edition New Delhi,2003
2	John G.Webster, ―Medical Instrumentation Application and Design‖, 3rd Edition, Wiley India Edition, 2007
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	https://www.pdfdrive.com/biomedical-instrumentation-and-measurements-d186986101.html
2	https://www.academia.edu/39250912/Handbook_of_Second_Edition_Biomedical_Instrumentation
MOOCs Links and additional reading, learning, video material	
1	

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

V Semester
22ET534 – OEI: Fundamentals of Image Processing

Course Outcomes:

Upon successful completion of the course the students will be able to
1. Examine the concepts of image enhancement, restoration, segmentation, representation and description
2. Apply basic image processing algorithms and filtering techniques for image enhancement.
3. Apply the algorithms for image restoration and segmentation
4. Apply the techniques for image representation and description

Unit:1	Introduction	7 Hours

Fundamental Steps in image processing, Component of Image processing system, Image formation Model, Sampling and quantization, Image Resolution, Interpolation Techniques, Concept of gray levels, Relationship between pixels.
Contemporary Issues related to Topic

Unit:2	Intensity Transformations	6 Hours

Basic intensity transformation techniques: Image negative, log transformation, power law transformation, piecewise
linear transformation, Histogram Equalization.

Contemporary Issues related to Topic

Unit:3	Spatial Domain Filtering	7 Hours

Mechanics of Spatial filtering, Smoothing spatial filters: Linear and Order statistic filters. Sharpening filters: Foundation, Laplacian and Gradient.

Contemporary Issues related to Topic

Unit:4	Image Restoration	6 Hours

Image Restoration: Image degradation/restoration process, noise model, restoration in presence of noise, periodic noise reduction.

Contemporary Issues related to Topic

Unit:5	Image Segmentation	7 Hours

Detection of discontinuities: Point, Line and Edge, Thresholding, Region based segmentation: Region Growing, Split and Merge.
Contemporary Issues related to Topic

Unit :6	Representation and Description	6 Hours

Representation, Simple Descriptor, Shape Number, Fourier Descriptor, Statistical Moments; Region Feature descriptor: Basic descriptor, Topological Descriptor, Texture Descriptor
Contemporary Issues related to Topic

Total Lecture Hours	39 Hours

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Nagar Yuwak Shikshan Sanstha's

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(Department of Electronics & Telecommunication Engineering)

SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

Text books	
1	R.C. Gonzalez & R.E. Woods, Digital Image Processing, 3nd/ 4th edition, PHI publication, 2009.
2	William K. Pratt, Digital Image Processing, 4th edition, A John Wiley & Sons, Inc., Publication, 2001.
Reference Books	
1	A. K. Jain, Fundamentals of Digital Image Processing, PHI publication.
2	S. Jayaraman, S. sakkirajan,T Veerakumar, Digital Image Processing, McGraw-Hill 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	http://nptel.iitm.ac.in/video.php?subjectId=117105079,
2	www.imageprocessingplace.com

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Yeshwantrao Chavan College of Engineering
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(Department of Electronics & Telecommunication Engineering)

SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

V Semester
22ET551 – OE II: Fundamentals of Computer Networks

Course Outcomes:

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

1. Compare data transmission protocols and understand the applications of communication network
2. Apply the knowledge of LAN structure to design data communication system.
3. Detect Data transmission errors in communication networks.
4. Compare different data security protocols

Unit:1	Computer Network and Internet	7 Hours
Internet, the network edge, ISPs, Protocols, standards, standards of organizations		
Contemporary Issues related to Topic		
Unit:2	Link Layer and Local Area Networks	6 Hours
Error detection and correction techniques, multiple access protocols, link layer addressing		
Contemporary Issues related to Topic		
Unit:3	Network Layer	7 Hours
Network layer design issues, IP packets, IP addressing, virtual circuit and datagram networks, TCP and UDP		
Contemporary Issues related to Topic		
Unit:4	Transport Layer	6 Hours
Transport layer design issues, transport service primitives, internet transport protocol TCP/IP architecture, TCP/IP protocol		
Contemporary Issues related to Topic		
Unit:5	Security in Communication Networks	7 Hours
Network Security, cryptography, public key and private key cryptography		
Contemporary Issues related to Topic		
Unit :6	Application Layer	6 Hours
HTTP, FTP, Email, DNS, WWW, POP3, IMAP		
Contemporary Issues related to Topic		
Total Lecture Hours		**39 Hours**

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22ET-101

B.Tech in Electronics & Telecommunication Engineering

	Textbooks
1	**Data Communication and Networking** Behrouz Forouzan Fifth Edition McGraw Hill
2	**Computer Networking A top down Approach Featuring and Internet** James F. Kurose Third Edition Pearson

	Reference Books
1	**Computer Networks** Andrew Tanenbaum Fourth Edition Prentice Hall PTR

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

	MOOCs Links and additional reading, learning, video material
1	NPTEL course link Computer Networks and Internet Protocol Prof Soumya Kanti Ghosh & Prof Sandip

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

V Semester
22ET552 – OE II: Soft Computing

Course Outcomes:
Upon successful completion of the course the students will be able to

1. Identify and describe genetic operators and genetic algorithms in problem solving
2. Apply Neural Network algorithm for pattern classification
3. Apply fuzzy logic and arithmetic to handle uncertainty and solve engineering problems
4. Understand fuzzy rule base and fuzzy controller

Unit:1	Genetic Algorithm	7 Hours

Basic terminologies used in Genetic Algorithm, Simple GA, General Genetic Algorithm, Encoding, Selection, Crossover, Mutation, Stopping Condition for GA, Constraint in GA

Contemporary Issues related to Topic

Unit:2	Neural Networks	6 Hours

Biological Neurons and Their Artificial Models, Models of Artificial Neural Networks, Learning Methods, Activation Functions, McCulloch-Pitts Neuron Model, Neural Network Learning Rules, Application of NN
Contemporary Issues related to Topic

Unit:3	Supervised Learning	7 Hours

Single Layer Perceptron, Back propagation algorithm, Associative Memory
Contemporary Issues related to Topic

Unit:4	Unsupervised learning	6 Hours

Hamming and Max net, Competitive Learning, Self-organizing feature maps, ART Networks, RBF
Contemporary Issues related to Topic

Unit:5	Fuzzy Sets and Operations	7 Hours

Concepts of Fuzzy sets, Extension Principle, Operation on fuzzy sets, Fuzzy numbers, Arithmetic operations, Lattice, Fuzzy equations
Contemporary Issues related to Topic

Unit :6	Fuzzy logic and Systems	6 Hours

Fuzzy relations, Fuzzy Logic, Approximate Reasoning Fuzzy controllers, Defuzzification Methods, Fuzzy Inference Techniques Applications, New topics to be announced time to time.

Contemporary Issues related to Topic

Total Lecture Hours	39 Hours

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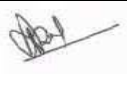
B. Tech SoE and Syllabus 2022
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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

Textbooks	
1	Soft Computing, 2011, Shivnandam, Wiley
2	Elements of Artificial Neural Network, 2009, K. Mehrotra, Penram
3	Fuzzy sets and Fuzzy logic, 2015, George Klir, Bo Yuan, Pearson
Reference Books	
1	Neural Networks, a comprehensive foundation, 1997, Simon Haykins, Person
2	Fuzzy Logic & Applications, 2011, T. Ross, Wiely
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://www.myreaders.info/html/soft_computing.html
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/106/105/106105173/

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(Department of Electronics & Telecommunication Engineering)

SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

V Semester
22ET553 – OE II: Microcontrollers & Embedded systems

Course Outcomes:

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

1. Elaborate 8051 microcontroller architecture.
2. Develop assembly and embedded C language program.
3. Interface 8051 microcontroller with different peripherals
4. Interface Arduino processor with different peripherals

Unit:1	**7 Hours**

Overview of 8051 Microcontroller family, Introduction to MCS 51 family, Architecture, Memory organization, Internal RAM, Flag Register, Register Banks, SFRs , Functional pin description and various resources of MCS 51. Hardware Overview

Contemporary Issues related to Topic

Unit:2	**6 Hours**

Addressing modes, Instruction set and Assembly language programming Programs using look up table, Bit manipulation, 8051 I/O programming, Delay Programs.

Contemporary Issues related to Topic

Unit:3	**7Hours**

I/O Interfacing such as LED, switches, 7segment display, keyboard matrix programming, 8051 programming in C: Data types and time delay, I/O programming, Logic operations, Data conversion programs, Lookup table access

Contemporary Issues related to Topic

Unit:4	**6 Hours**

Timer programming in assembly and C: Various modes of operation, SFR related to timer operation. Serial Port programming in assembly and C: Basics of serial communication, 8051 connection to RS 232. Serial data transfer programs.

Contemporary Issues related to Topic

Unit:5	**7 Hours**

Interfacing of LCD, ADC, DAC, stepper motor and DC motor with 8051 microcontroller **.**

Contemporary Issues related to Topic

Unit :6	**6 Hours**

Block diagram of Arduino, features of Arduino Architecture, Arduino pin description: digital pins, analog pins, Power pins and other pins, Interfacing of LED, 7-Segment display, LCD, Sensors, DC motor, switch and Serial communication.

Contemporary Issues related to Topic

Total Lecture Hours	**39 Hours**

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B.Tech in Electronics & Telecommunication Engineering

	Textbooks
1	The 8051 Microcontroller and Embedded systems using assembly & C, 2nd edition, Muhammad Ali Mazidi, Pearson Education Asia LPE
2	The 8051 Microcontroller, 3rd edition, CENGAGE Learning
3	Arduino Development Cookbook, Cornel Amariei, PACKT Publishing
	Reference Books
1	The 8051 Microcontroller, 3rd Edition, 2007,Kenneth Ayala,, Cengage
2	8051 Microcontroller-Internals ,Instructions ,Programming & Interfacing, 2002,Ghoshal, Pearson Education India
	YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]
1	
	MOOCs Links and additional reading, learning, video material
1	https://archive.nptel.ac.in/courses/108/105/108105102/

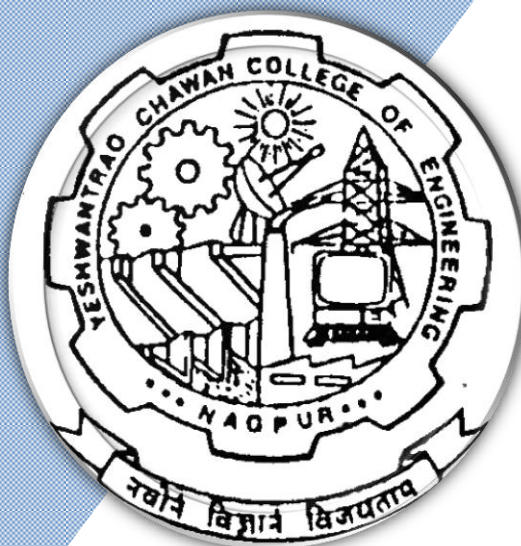| Chairperson	Dean (Acad. Matters)	Dean OBE	July 2023	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

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(Scheme of Examination w.e.f. 2022-23 onward)
(Department of Electronics & Telecommunication Engineering)

SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

V Semester
22ET554 – OE II: Fundamentals of Internet of Things

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Explore the physical and Logical design of IoT.
2. Explore the M2M and NETCONF.
3. Explore python programming.
4. Apply basic skills of IoT to solve real life problems.
5. Illustrate IoT Security

Unit:1	Introduction & Concepts:	5 Hours
UNIT-1: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels		
Contemporary Issues related to Topic		
Unit:2	**Sensing & Actuation**	**6 Hours**
Introduction to sensors & transducers, Introduction to electrodes & biosensors, Static and dynamic characteristics of sensors, Different types of sensors, Selection criteria's for sensors / transducers, Commercial IoT sensors / transducers, Signal conditioning modules of IoT system.		
Contemporary Issues related to Topic		
Unit:3	**M2M & System Management with NETCONF-YANG**	**7 Hours**
M2M, Difference between IOT and M2M, SDN and NFV for IOT, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF		
Contemporary Issues related to Topic		
Unit:4	**Developing Internet of Things & Logical Design using Python**	**7 Hours**
Introduction, IOT Design Methodology, Python Data Types & Data Structures, Control Flow, Functions , File Handling, Date/ Time Operations, IoT Device-Raspberry Pi, Programming Raspberry pi with Python		
Contemporary Issues related to Topic		
Unit:5	**IoT Security**	**7 Hours**
Effect of security threats on user, authentication using OTP validation, Security Requirements for the Internet of Secure Things, Secure Solutions, Secure Framework of the IoT Related to Perceptual Layer, Challenges in IoT Security		
Contemporary Issues related to Topic		
Unit :6	**Domain Specific IOTs**	**7 Hours**
Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.		
Contemporary Issues related to Topic		
Total LectureHours		**39 Hours**

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22ET-101

B.Tech in Electronics & Telecommunication Engineering

Textbooks	
1	Arshdeep Bahga and Vijay Madisetti , "Internet of Things, a hands on approach" , Universities Press (India)Pvt. Ltd. 2017, ISBN: 978-81-7371-954-7.
Reference Books	
1	Internet of Things : Technologies, Applications, Challenges and Solution B.K.Tripathy & J.Anuradha by CRC press publication
2	From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence: By Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, 1 st Edition, Academic Press, 2014.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/UG%20COURSES/IIOT/IIOT%20(%20G%20Series).pdf
2	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/30.2019_Book_InternetOfThingsFromHypeToReal.pdf
MOOCs Links and additional reading, learning, video material	
1	https://archive.nptel.ac.in/courses/106/105/106105166/
2	https://onlinecourses.nptel.ac.in/noc21_ee85/preview

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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 & Telecommunication Engineering)

B. Tech in Electronics & Telecommunication Engineering

Nagar Yuwak Shikshan Sanstha's
Yeshwantrao Chavan College of Engineering
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B.TECH SCHEME OF EXAMINATION 2022
(Scheme of Examination w.e.f. 2022-23 onward)
(Department of Electronics & Telecommunication Engineering)
B. Tech in Electronics & Telecommunication Engineering

SN	Sem	Type	BoS/Deptt	Sub. Code	Subject	T/P	L	T	P	Hrs	Credits	MSEs*	TA**	ESE	ESE Duration Hours
Sixth Semester															
1	6	PC	ET/ET	22ET601	Digital Signal Processing	T	3	0	0	3	3	30	20	50	3 Hours
2	6	PC	ET/ET	22ET602	Lab:Digital Signal Processing	P	0	0	2	2	1		60	40	
3	6	PC	ET/ET	22ET603	Antennas & Wave Propagation	T	3	0	0	3	3	30	20	50	3 Hours
4	6	PC	ET/ET	22ET604	Lab:Antennas & Wave Propagation	P	3	0	0	3	1	30	20	50	3 Hours
5	6	PE	ET/ET		**Professional Elective II**	T	3	0	0	3	3	30	20	50	3 Hours
6	6	PE	ET/ET		**Lab: Professional Elective II**	P	0	0	2	2	1		60	40	
7	6	PE	ET/ET		**Professional Elective III**	T	3	0	0	3	3	30	20	50	3 Hours
8	6	OE-III	ET/ET		**Open Elective - III ****	T	3	0	0	3	3	30	20	50	3 Hours
9	6	OE-IV	ET/ET		**Open Elective - IV ****	T	3	0	0	3	3	30	20	50	3 Hours
10	6	PR	ET/ET	22ET605	Project Phase I	P	0	0	4	4	2		60	40	
					TOTAL SIXTH SEM		21	0	8	29	23				

					List of Mandatory Learning Course (MLC)										
1	6	HS		MLC2126	YCCE Communication Aptitude Preparation (YCAP6)	A	3	0	**0**	3	0				

Professional Electives -II

1	6	PE II	PC	22ET611	PE II : Analog VLSI Design
2	6	PE II	PC	22ET612	PE II: Lab: Analog VLSI Design
3	6	PE II	PC	22ET613	PE II : Machine Learning
4	6	PE II	PC	22ET614	PE II : Lab : Machine Learning
5	6	PE II	PC	22ET615	PE II : Embedded System Design
6	6	PE II	PC	22ET616	PE II :Lab Embedded System Design
7	6	PE II	PC	22ET617	PE II : Multimedia Communication
8	6	PE II	PC	22ET618	PE II : Lab Multimedia Communication
9	6	PE II	PC	22ET619	PE II : Digital Image Analysis for Remote Sensing Application
10	6	PE II	PC	22ET620	PE II : Lab Digital Image Analysis for Remote Sensing Application
11	6	PE II	PC	22ET621	PEII: Radio Frequency Circuit Design
12	6	PE II	PC	22ET622	PEII: Lab Radio Frequency Circuit Design

Professional Electives -III

1	6	PE III	PC	22ET641	PE III : Introduction to Photonics
2	6	PE III	PC	22ET642	PE III : Wireless Mobile Communication
3	6	PE III	PC	22ET643	PE III : Soft Computing & Application
4	6	PE III	PC	22ET644	PE III : Power Electronics
5	6	PE III	PC	22ET645	PE III : Information Theory and coding
6	6	PE III	PC	22ET646	PE III : VLSI Testing and Verification

Open Electives -III

1	6	OE III	PC	22ET661	OE III : Principles of Communication
2	6	OE III	PC	22ET662	OE III : Industrial Automation
3	6	OE III	PC	22ET663	OE III :Medical Electronics
4	6	OE III	PC	22ET664	OE III : Fundamentals of Image Processing

Open Electives -IV

1	6	OE IV	PC	22ET681	OE IV :Fundamentals of Computer Networks
2	6	OE IV	PC	22ET682	OE IV :Soft Computing
3	6	OE IV	PC	22ET683	OE IV : Microcontrollers & Embedded systems
4	6	OE IV	PC	22ET684	OE IV : Fundamentals of Internet of Things

MSEs* = Three MSEs of 15 Marks each will be conducted and marks of better 2 of these 3 MSEs will be considered for Continuous Assessment

TA ** = for Theory :12 marks on lecture quizzes, 12 marks on 2 Activities, 2 marks on class performance,4 marks on Common TA
TA** = for Practical : MSPA will be 15 marks each

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

VI Semester
22ET601 – Digital Signal Processing

Course Outcomes:

Upon successful completion of the course the students will be able to
1. Apply discrete Fourier transform and fast Fourier transform on signals.
2. Implement digital filters in a variety of structures.
3. Design digital IIR and FIR filter.
4. Analyze the effects of finite word length on discrete time system.
5. Analyze multi-rate discrete time system with unequal sampling rates

Unit:1	Discrete Fourier transform	7 Hours

Frequency domain sampling: DFT, DFT as Linear transformation, Properties of DFT, Circular convolution, Use of DFT in Linear Filtering, DFT of long sequences

Contemporary Issues related to Topic

Unit:2	FFT Algorithm	6 Hours

FFT algorithms: Decimation in time, Decimation in Frequency, Radix-2 , Radix-4

Contemporary Issues related to Topic

Unit:3	Digital filter structures	7 Hours

Block diagram representation, Signal Flow Graph, Basic IIR structures, Basic FIR structures, IIR lattice structures, Linear Phase FIR, FIR lattice structure

Contemporary Issues related to Topic

Unit:4	IIR filter design	6 Hours

Bilinear transformation, Impulse invariant transformation, Low pass IIR digital filters, Butterworth and Chebyshev filter, Spectral transformations.

Contemporary Issues related to Topic

Unit:5	FIR filter design	6 Hours

FIR filter design using windowing techniques (Rectangular, Hann, Hamm, Blackmann, Bartlett and Kaiser), Frequency sampling technique, Finite Word length Effect

Contemporary Issues related to Topic

Unit :6	Multirate Digital Signal Processing	7 Hours

Basic sample rate alternation devices, Multirate structure for sampling rate conversion, Multirate Design of Decimator and Interpolator, The Ployphase Decomposition

Contemporary Issues related to Topic

Total Lecture Hours	39 Hours

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22ET-101

B.Tech in Electronics & Telecommunication Engineering

Textbooks	
1	"Digital Signal Processing - Principles, algorithms and applications" 4th edition, 2013 John G. Proakis McGraw-Hill
2	"Discrete time Signal Processing" 3rd edition 2010 Alan Oppenheim, Ronald Schafer and Buch Pearson
3	"Digital Signal Processing - A computer based approach," Publication. 4th edition, 2013 Sanjit K. Mitra, McGraw-Hill
Reference Books	
1	Digital Signal Processing 3rd Edition 2017 S Salivahanan A Vallavraj C Gnanapriya 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/Electronics%20and%20Telecommunication/Analog%20and%20Digital%20Communication%20Systems%20(%20PDFDrive.com%20).pdf
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/117/102/117102060/

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

VI Semester
22ET602 –Lab Digital Signal Processing

Course Outcomes:

Upon successful completion of the course the students will be able to
1. Apply discrete Fourier transform and fast Fourier transform on signals.
2. Implement digital filters in a variety of structures.
3. Design digital IIR and FIR filter.
4. Analyze the effects of finite word length on discrete time system.
5. Analyze multi-rate discrete time system with unequal sampling rates

Sr. No.	Experiments based on
1	To find Discrete Fourier Transform and Inverse Discrete Fourier Transform of discrete time signals
2	Verify the properties of DFT (Linearity, Time Reversal and Parsevals theorem)
3	To find circular convolution of two discrete time signals
4	To verify Circular time shift and Frequency shift Property
5	To design Butterworth IIR filters.
6	To design Chebyshev IIR filters.
7	To design FIR filters using windowing techniques
8	To Analyze Coefficient Quantization Effect
9	To Design Decimator
10	To design Interplotor

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

VI Semester
22ET603 – Antennas & Wave Propagation

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Elaborate the basic terminology and evaluate various parameters of antennas.   2. Analyse performance parameters of various antennas & antenna array.   3. Perform antenna measurements using different antenna measurement techniques.   4. Design and Analyse various antennas.

Unit :1	**ANTENNA FUNDAMENTALS**	**7 Hours**

Concepts of Propagation and types of propagations, Introduction to antenna , need of Antenna, Types of antennas, Radiation mechanism of single wire and two wire , Radiation Pattern, Antenna field zones, Beam solid angle, radiation power density , radiation intensity, Directivity, Gain, Antenna efficiency, Polarization, impedance, bandwidth.
Contemporary Issues related to Topic

Unit:2	**LINEAR WIRE ANTENNAS**	**6 Hours**

Vector potentials for electric current source, Vector potentials for Magnetic current source, Infinitesimal Dipole, Finite dipole, Half wavelength dipole.
Contemporary Issues related to Topic

Unit:3	**ANTENNA ARRAYS**	**7 Hours**

Two element array, N-element linear array with uniform amplitude and spacing, N-element array uniform spacing, Non-uniform amplitude**,** Binomial Array, Yagi - Uda array of linear Elements, broad side, end fire, phase array.
Contemporary Issues related to Topic

Unit:4	**HF, VHF, UHF AND MICROWAVE ANTENNAS**	**6 Hours**

Concept of Resonant and Non resonant antenna, V antenna, Rhombus, Reflector antenna, Helical Antennas – basic properties; Design considerations for helical antennas in Axial Mode and Normal Modes, Whip antenna.
Contemporary Issues related to Topic

Unit:5	**Special Antennas**	**7 Hours**

Babinet's principle, Rectangular Horn antenna, conical horn **,** Introduction to Microstrip Antenna , its types , Feeding network of patch antenna, Rectangular patch, Microstrip array and its feed network

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Unit:6	**Measurement techniques**	**6 Hours**
	Antenna Range- reflection and the free-space ranges - Elevated ranges, Slant ranges, Anechoic chambers, Compact ranges, Near-field ranges, , NF/FF method and its types, Radiation Pattern measurement system , Gain Measurement, Impedance measurement, current measurements	
	Contemporary Issues related to Topic	
Total Lecture Hours		**39Hours**

Textbooks	
1	Antenna Theory - C.A. Balanis, John Wiley and Sons
2.	Antennas and Wave Propagation – K.D. Prasad, Satya Prakashan,Tech India Publications, New Delhi, 2001.
Reference Books	
1	Antennas – John D. Kraus, McGraw-Hill,
2	Antennas and Radio Propagation- R.E. Collins, McGraw-Hill
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://link.springer.com/openurl?genre=book&isbn=978-1-4419-5338-4
2	http://link.springer.com/openurl?genre=book&isbn=978-1-4757-2760-9
3	http://link.springer.com/openurl?genre=book&isbn=978-1-4614-7998-7
4	http://link.springer.com/openurl?genre=book&isbn=978-0-7923-7241-7
5	http://link.springer.com/openurl?genre=book&isbn=978-1-4020-8417-1
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/108101092

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

VI Semester
22ET604 –Lab Antennas & Wave Propagation

Course Outcomes:

Upon successful completion of the course the students will be able to
1. To understand the basic terminology and Evaluate various parameters of antennas.
2. Analyze performance parameters of various antennas & antenna array.
3. Perform antenna measurements using different antenna measurement techniques.
4. Design and Analyze various antennas
5. Aware of the wave spectrum and respective band based antenna usage and also to know the propagation of the waves at different frequencies through different layers in the existing layered free space environment structure.

Sr. No.	Experiments based on
1	To design and Simulate Patch Antenna with Probe Feed using Simulation software.
2	To performed parametric analysis of Patch Antenna using Simulation software.
3	To design and Simulate Patch Antenna with Microstrip Feed line using Simulation software.
4	To design and Simulate Lambda/2 Dipole Antenna using Simulation software and study it's Characteristic.
5	To design and Simulate Yagi-Uda Antenna using Simulation software and study it's Characteristic.
6	To design and Simulate Horn Antenna using Stimulation software and study it's Characteristic.
7	To design and Simulate parabolic Reflector using Stimulation software and study it's Characteristic.
8	To measure radiation Pattern of Yagi-Uda Antenna and its Characteristic using Antenna trainer Kit.
9	Measurement of Antenna Parameter Using Vector Network Analyser.
10	Mini Project on antenna.

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VI Semester
22ET605 – Project Phase I

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SoE No.
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B.Tech in Electronics & Telecommunication Engineering

VI Semester
22ET611 – PE II: Analog VLSI Design

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Analyze small signal model of MOS transistor &Perform analysis of single stage amplifiers with or without load.
2. Analyze small signal parameters of Differ Amplifier.
3. Analyze Performance parameters of CMOS op amp.
4. Analyze Performance parameters of converters

Unit:1	**Basic MOS Device Physics**	**7 Hours**

Threshold voltage, Derivation of I/V characteristics, second order effects, MOS device capacitance, MOS small signal models, MOS SPICE models

Contemporary Issues related to Topic

Unit:2	**Single stage amplifiers**	**6 Hours**

Basic concept, common source, common source stage with resistive load, CS stage with source degeneration, source follower, common gate.

Contemporary Issues related to Topic

Unit:3	**Differential amplifiers**	**7Hours**

Single ended & differential operation, Basic differential pair, qualitative and quantitative analysis, Common mode response

Contemporary Issues related to Topic

Unit:4	**Operational amplifiers**	**6 Hours**

Performance parameters, one stage op amp, Gain boosting, Noise in op amp

Contemporary Issues related to Topic

Unit:5	**ADC converter and DAC converter**	**7 Hours**

Converting Analog Signals to Digital Signals, Sample and-Hold (S/H) Characteristics, Digital to Analog Converter (DAC) Specifications Analog -to-Digital Converter (ADC) Specifications

Contemporary Issues related to Topic

Unit :6	**Sigma Delta Converter**	**6 Hours**

The Oversampling ADC, The First-Order Sigma Delta Modulator, The Higher Order Sigma Delta modulator

Contemporary Issues related to Topic

Total Lecture Hours	**39 Hours**

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Textbooks	
1	Design of Analog CMOS Integrated Circuits, Nineteenth reprint2010, Behzad Razavi, 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://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20Engineering/14.Analog%20Design%20for%20CMOS%20VLSI%20Systems%20-%20(Franco%20Maloberti).pdf
MOOCs Links and additional reading, learning, video material	
1	https://archive.nptel.ac.in/courses/117/101/117101105/
2	https://archive.nptel.ac.in/courses/117/108/117108038/

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VI Semester
22ET612 – PE II: Lab Analog VLSI Design

Course Outcomes:

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

1. Analyze small signal model of MOS transistor &Perform analysis of single stage amplifiers with or without load.
2. Analyze small signal parameters of Differ Amplifier.
3. Analyze Performance parameters of CMOS op amp.
4. Analyze Performance parameters of converters

Sr. No.	Experiments based on
1	NMOS characteristic :- Vds Vs ID for various values of Vgs.
2	PMOS characteristic :- Vds Vs ID for various values of Vgs.
3	Common Source amplifier:- AC analysis Transient analysis
4	Common Drain amplifier:- AC analysis Transient analysis
5	Differential Amplifier :- AC analysis Transfer curve (Vin Vs Vout, DC condition)
6	Op-Amp Design: AC analysis Transient analysis DC analysis
7	SPICE simulation of basic Analog circuits, Analog Circuit simulation Verification of layouts.
8	Basic CMOS Comparator Design
9	Source Coupled Pair Differential Amplifier
10	Analysis of ADC, DAC , Sigma delta Convertor .

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VI Semester
22ET613 – PE II : Machine Learning

Course Outcomes:	
Upon successful completion of the course the students will be able to	

1) Apply and analyze the model using regression.
2) Apply and evaluate the performance of system for classification.
3) Apply Supervised and unsupervised learning for problem solving.
4) Apply neural network algorithms for classification.
5) Describe and evaluate deep neural network with computational complexity

Unit:1	Regression	6 Hours

Supervised and Unsupervised Learning, Regression, Model and Cost Function, Gradient Descent, Multivariate Linear Regression, Feature Scaling, Gradient Descent for multivariable

Contemporary Issues related to Topic

Unit:2	Classification	7 Hours

Classification, Hypothesis Representation, Decision Boundary, Cost function and Gradient Descent, Multi-classification, Regularization, Model Evaluation

Contemporary Issues related to Topic

Unit:3	Supervised Learning	7 Hours

KNN, SVM, Decision tree, Naive Bayes Classifiers, Random Forest

Contemporary Issues related to Topic

Unit:4	Unsupervised learning	6 Hours

K-means clustering, Hierarchical Clustering, DBSCAN Clustering, , Recommender System, Anomaly Detection

Contemporary Issues related to Topic

Unit:5	Artificial Neural Network	7 Hours

Introduction to neural network, Activation Functions, Perceptron rule, Backpropagation network

Contemporary Issues related to Topic

Unit :6	Deep Learning	6 Hours

Introduction to deep learning, building blocks of CNN, Computational Complexity, Case studies based on CNN architectures : Alexnet, Lenet, VGG Net

Contemporary Issues related to Topic

Total Lecture Hours	**39Hours**

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Textbooks	
1	Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997.
Reference Books	
1	Introduction to Machine Learning Edition 2, by Ethem Alpaydin
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	
MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.nptel.ac.in/noc22_cs73/preview
2	https://onlinecourses.nptel.ac.in/noc22_cs97/preview

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VI Semester

22ET614– PE II : Lab Machine Learning

Course Outcomes:

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

1) Apply and analyze the model using regression.

2) Apply and evaluate the performance of system for classification.

3) Apply Supervised and unsupervised learning for problem solving.

4) Apply neural network algorithms for classification.

5) Describe and evaluate deep neural network with computational complexity

Sr. No.	Experiments based on
1	Data Analysis
2	Prediction task using Linear Regression
3	Classification task using Logistic Regression
4	K Nearest Neighbour Classifier
5	Decision Tree
6	Support Vector Machine
7	Naïve Bays algorithm
8	K means Clustering
9	Recommender System
10	CNN

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VI Semester
22ET615 – PE II : Embedded System Design

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Explore the architectural features of ARM processors
2. Apply ARM instruction set in developing C-language programs.
3. Explore various versions of ARM processor and memory buses associated.
4. Develop programs in interfacing of different peripherals with ARM processors
5. Elaborate the concept of real time systems
6. Identify, design and implement applications-based Arduino system.

Unit:1	Introduction to Different Processors	**7 Hours**

Introduction to embedded system and ARM Processor Difference between RISC & CISC, Advantages of architectural features of ARM Processor, Processor modes, Register Organization, Exceptions and its handling. 3/5- stage pipeline ARM organization. LPC2148 ARM 7 microcontroller, Features of LPC2148, Block diagram of LPC2148.
Contemporary Issues related to Topic

Unit:2	Instruction Sets	**7 Hours**

Memory and memory-mapped I/Os 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
Contemporary Issues related to Topic

Unit:3	Architectures	**7 Hours**

ARM floating point architecture and DSP extensions ARM floating point architecture and DSP extensions, ARM co-processors. ARM 9 TDMI ARCHITECTURAL STUDY: - H/W architecture, Timing diagrams for various accesses, Memory buses: AMBA, ASB, & APB. Architectural support for system development.
Contemporary Issues related to Topic

Unit:4	Introduction of different services in Arduino	**6 Hours**

Basic embedded C programs Basic embedded C programs for GPIO and interfacing of different devices like LED, LCD. Introduction to NODE MCU ESp8266 and ESP 32, NODE MCU ESP8266 Features & Using It with Arduino IDE, NODE MCU ESP8266 Pinout, Power requirement.
Contemporary Issues related to Topic

Unit:5	Memory	**7 Hours**

memory Management Memory Hierarchy, memory size and speed, on-chip memory, caches, cache design, memory management
Contemporary Issues related to Topic

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Unit :6	RTOS	**7 Hours**
Architectural Support of Operating System Introduction of RTOS, RTOS issues, The shared Data Problem, Software Architectures (Round Robin, Round Robin with Interrupts, Function Queue Scheduling,) Selecting a software Architecture, Case for Real Time Operating System, Introduction to RTOS: tasks and task states, tasks and data, semaphores and shared data, message queues, mailboxes and pipes, events, RT Linux.		
Contemporary Issues related to Topic		
Total Lecture Hours		**39 Hours**

Textbooks	
1	Brian Evans, Beginning Arduino Programming (Technology in Action) , 2nd Edition, Apress; 1st ed. edition (2 October 2011)
Reference Books	
1	J. M. Hughes, Arduino: A Technical Reference , 3rd Edition, O'Reilly Media, Inc.
2	Michael J. Pont , "Embedded C", Pearson Education, 2nd Edition, 2008
3	Simon Monk, Programming Arduino: Getting Started with Sketches , 2nd Edition, O'Reilly Media, Inc.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	https://link.springer.com/book/10.1007/978-981-16-2761-3
2	https://link.springer.com/book/10.1007/978-981-16-9781-4
MOOCs Links and additional reading, learning, video material	
1	https://link.springer.com/book/9789811922541
2	https://link.springer.com/book/10.1007/978-3-030-92968-8
3	https://nptel.ac.in/courses/127/105/127105007

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VI Semester
22ET616 – PE II : Lab Embedded System Design

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Explore the architectural features of ARM processors
2. Apply ARM instruction set in developing C-language programs.
3. Explore various versions of ARM processor and memory buses associated.
4. Develop programs in interfacing of different peripherals with ARM processors
5. Elaborate the concept of real time systems
6. Identify, design and implement applications-based Arduino system.

Sr. No.	Experiments based on
1	Swap contents of two memory locations.
2	Add 16 bit and 32 bit numbers in memory locations.
3	Toggle LED connected to port pin of Atmega 328
4	Display message on LCD using Atmega 328
5	Serial communication using UART of Atmega 328
6	Generate square wave using DAC of Atmega 328
7	Toggle LED connected to port of Atmega 328. Genrate time delay using timer.
8	Interfacing ADC with Atmega 328
9	Interfacing Wi-Fi module with Atmega 328
10	Mini Project

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VI Semester
22ET617– PE II : Multimedia Communication

Course Outcomes:
Upon successful completion of the course the students will be able to

1. Explain the fundamental concepts of multimedia systems
2. Elaborate image, audio and video compression techniques
3. Implement Wavelet based image compression techniques
4. Illustrate various multimedia network protocols
5. Explain concepts of image retrieval from digital libraries

Unit:1		**7 Hours**
	Fundamental concepts in Text and Image: Multimedia and hypermedia, World Wide Web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video	
Contemporary Issues related to Topic		
Unit:2		**6 Hours**
	Fundamental concepts in video and digital audio: Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio	
Contemporary Issues related to Topic		
Unit:3	Multimedia data compression: Lossless compression algorithm: DCT, Wavelet- Based Coding, Embedded Zerotree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT), Basic Audio Compression Techniques	**7 Hours**
Contemporary Issues related to Topic		
Unit:4	Basic Video Compression Techniques: Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, MPEG2, MPEG4	**6 Hours**
Contemporary Issues related to Topic		
Unit:5	Multimedia Networks: Basics of Multimedia Networks, Multimedia Network Communications and Applications :Quality of Multimedia Data Transmission, Multimedia over IP, RTCP,RTP,SIP Transport of MPEG-4,DMIF, Media-on-Demand(MOD) ,Multimedia Broadcasting schemes	**7Hours**
Contemporary Issues related to Topic		
Unit :6	Content-Based Retrieval in Digital Libraries C-BIRD— A Case Study ,C-BIRD GUI Color Histogram Color Density Color Layout Texture Layout Search by Illumination Invariance Search by Object Model	**6 Hours**
Contemporary Issues related to Topic		
Total Lecture Hours		**39 Hours**

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Textbooks	
1	Fundamentals of Multimedia, Ze-Nian Li , Mark S Drew,2004, PHI/Pearson Education Publication
Reference Books	
1	Multimedia Applications, Steinmetz, Nahrst,2004, Springer Publication
2	Multimedia Communications: Applications, Networks, Protocols and Standars, Fred Halsall,2001, Addison-Wesley
3	Multimedia Systems ,Ralf Steinmetz and Klara Nahrstedt , Springer.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	
MOOCs Links and additional reading, learning, video material	
1	

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VI Semester
22ET618– PE II :Lab Multimedia Communication

Course Outcomes:

Upon successful completion of the course the students will be able to
1. Explain the fundamental concepts of multimedia systems
2. Elaborate image, audio and video compression techniques
3. Implement Wavelet based image compression techniques
4. Illustrate various multimedia network protocols
5. Explain concepts of image retrieval from digital libraries

Sr. No.	Experiments based on
1.	Convert given image from one color model to another using MATLAB functions and conversion formulae
2.	Implement Delta modulation and ADM
3.	Implement DCT image compression scheme.
4.	Convert given image to its dithered version using 2X2 dithered matrix**.**
5.	Implement the concept of Chroma Subsampling.
6.	Implement EZW encoder on given 4X4 matrix of Wavelet coefficient.
7.	Implement SPIHT encoder on given 4X4 matrix of Wavelet coefficient.
8.	Obtain motion vector using Sequential Search method
9.	Play video file and display any two frames from video.
10.	Implement the concept of Histogram matching

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22ET-101

B.Tech in Electronics & Telecommunication Engineering

VI Semester
22ET619– PE II : Digital Image Analysis for Remote Sensing Application

Course Outcomes:		
Upon successful completion of the course the students will be able to		
1. Elaborate image charactesistics and analysis methods for remote sensing.		
2. Apply the image enhancement, transforms and correction techniques on remote sensing images.		
3. Apply acquired knowledge and critical thinking skills to solve a real-world problem with appropriate remote sensing data and processing methods.		
Unit:1	**Review of Remote Sensing Concepts**	**7 Hours**
Spatial and radiometric characteristics – spectral and temporal characteristics, Optical Radiation Model: The wave/ particle models - energy/matter interaction – Radiometric Correction–Atmospheric Correction, Introduction to GIS.		
Contemporary Issues related to Topic		
Unit:2	**Digital Image Formation & Characteristics**	**6 Hours**
Point spread functions – sampling and quantization, Univariate and multivariate image statistics – noise models- power spectral density- co-occurrence matrix		
Contemporary Issues related to Topic		
Unit:3	**Image Enhancement and Spectral Transforms**	**7 Hours**
contrast enhancement – band rationing – principal component analysis – vegetation transforms – texture transforms, Spatial Transforms: convolution concept - low and high pass filtering – spatial transformations –Fourier transform – wavelet transforms.		
Contemporary Issues related to Topic		
Unit:4	**Geometric Correction**	**6 Hours**
Sensor geometry and empirical models for geometric corrections		
Contemporary Issues related to Topic		
Unit:5	**Thematic Information Extraction**	**7 Hours**
review of supervised and unsupervised Image classification – Maximum Likelihood and Bayesian classification, Non-parametric & parametric classification, Introduction of Microwave Remote Sensing and Applications in Disaster Management		
Contemporary Issues related to Topic		
Unit :6	**Subpixel classification & Hyperspectral Image Analysis**	**6 Hours**
Linear mixing model, fuzzy set classification, Hyperspectral Image Analysis: Feature extraction, classification algorithms for hyperspectral data		
Contemporary Issues related to Topic		
Total Lecture Hours		**39Hours**

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Textbooks	
1	Remote Sensing: Models and Methods for Image Processing, Third Edition, Robert A. Schowengerdt Elsevier
2	Remote Sensing Digital Image Analysis, 4th Edition, John A. Richards, Xiuping Jia, Springer
Reference Books	
1	Introductory Digital Image Processing: A Remote Sensing Perspective, Second Edition, Jhon R. Jensen Pearson Series
2	Physical Principles of Remote Sensing, Third Edition, W.G. Rees, Cambridge University Press
3	James B. Campbell and Randolph H. Wynne, "Introduction to Remote Sensing", (5th Ed.), The Guildford Press, New York, 2012
4	Lillesand, T.M., Kiefer, R.W. and Chapman, J.W., "Remote Sensing and Image Interpretation", (5th Ed.), John Wiley & Sons, 2007
5	Gonzalez, Rafael C. and Richard E. Woods "Digital Image Processing", (3rd Edition) Pearson Education, London
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://link.springer.com/openurl?genre=book&isbn=978-1-4419-8166-0
2	http://link.springer.com/openurl?genre=book&isbn=978-94-010-7501-5
3	http://link.springer.com/openurl?genre=book&isbn=978-3-540-79352-6
4	http://link.springer.com/openurl?genre=book&isbn=978-3-662-00522-4
MOOCs Links and additional reading, learning, video material	
1.	https://nptel.ac.in/courses/105107160
2.	https://onlinecourses.nptel.ac.in/noc19_ce38/preview
3.	https://archive.nptel.ac.in/courses/105/107/105107160/
4.	https://elearning.iirs.gov.in/syllabus_structure.html

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B.Tech in Electronics & Telecommunication Engineering

VI Semester
22ET620– PE II : Lab Digital Image Analysis for Remote Sensing Application

Course Outcomes:

Upon successful completion of the course the students will be able to
1. Elaborate image charactesistics and analysis methods for remote sensing.
2. Apply the image enhancement, transforms and correction techniques on remote sensing images.
3. Apply acquired knowledge and critical thinking skills to solve a real-world problem with appropriate remote sensing data and processing methods.

Sr. No.	Experiments based on
1.	Satellite Data Loading and conversion in different Formats
2.	Image rectification using different geometric models
3.	Image Enhancementof Multispectral and Panchromatic data and Plotting
4.	SPATIAL FILTERINGof Satellite data
5.	Band ratioing, NDVI and topographic corrections
6.	IMAGE CLASSIFICATION: Supervised, Unsupervised
7.	IMAGE FUSION TECHNIQUESand Pan-Sharpening
8.	Different satellite data and its Multispectral Images(High Resolution , Mid Resolution, Coarse Resolution Satellite Data) (Maxar, AIRBUS, LANDSAT, Thematic Mapper, IRS, RISAT, Radarsat)
9.	Vegetation Maps, Density Slice, and Masks
10.	Principal Componentsanalysis , Mosaicking
11.	Change Detectionof different seasons data
12.	Introduction to Image Analysis with ArcGIS 10/ ERDAS Imagine image processing software package/ QGIS

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B.Tech in Electronics & Telecommunication Engineering

VI Semester
22ET621– PE II : Radio Frequency Circuit Design

Course Outcomes:

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

1. Analyze the behavior of series and parallel RLC circuit at High Frequency.
2. Elaborate the MOSFET based circuit design and different bandwidth estimation techniques.
3. Design high frequency amplifier for RF applications.
4. Explain biasing of RF circuit.
5. Design RF power amplifiers and phase detectors.

Unit:1	Fundamentals of RF Circuits	7 Hours

Introduction, History of wireless Communication, Non cellular wireless Applications, Propagation, Parallel RLC Tank Circuit, Series RLC Circuit , RLC Network as Impedance Transformer, Skin Effect, Resistor, Capacitor, Inductor.

Contemporary Issues related to Topic

Unit:2	MOSFET and Transmission Lines	6 Hours

MOSFET Physics, MOS Device Physics in Short Channel Regime , Other Effects, Link Between Lumped and Distributed Regime ,Driving Point impedance at iterated structures , Transmission line , Behaviour of finite length Transmission line.

Contemporary Issues related to Topic

Unit:3	Bandwidth Estimation	7Hours

Review of Smith Chart and S-Parameter, Application of smith chart, Rise time, Delay, Bandwidth Estimation Techniques - Open Circuit Time Constant, Short Circuit Time constant.

Contemporary Issues related to Topic

Unit:4	HF RF Amplifier and Bandwidth Detection	6 Hours

Introduction to High Frequency Amplifier Design, Zeros as Bandwidth Enhancer , The shunt series Amplifier, Tuned Amplifiers, Neutralization and Unilateralization Cascaded Amplifiers.

Contemporary Issues related to Topic

Unit:5	Biasing of RF Circuit	7 Hours

Introduction to Voltage references and Biasing, Review of Diode Behavior, Diodes and Bipolar transistors in CMOS Technology Supply independent bias circuits, Band gap Voltage References, Amplifier linearity.

Contemporary Issues related to Topic

Unit :6	RF Power Amplifier and Phase Detectors	6 Hours

Introductions to RF Power Amplifiers, Classification of Power Amplifiers, Modulation of Power Amplifiers, Introduction to Phase lock loops , Linear zed PLL Model, Phase Detector, Sequential Phase Detector, Loop Filters and Charge Pumps.

Contemporary Issues related to Topic

Total Lecture Hours	39 Hours

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Textbooks	
1	The Design of CMOS Radio Frequency Integrated Circuits, 2nd Edition, Thomas H. Lee, Cambridge University Press.
2	RF Circuit Design Theory and Applications, 2nd Edition, R. Ludwig & P. Bretchko, Pearson Publication.
Reference Books	
1	Analysis and Design of Analog Integrated Circuits, 4th Edition, Paul R. Gray, Whiley India Publication.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20Engineering/43.design%20of%20analog%20cmos%20integrated%20circcuits.pdf
2	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20Engineering/81.microwave-devices-and-circuits-samuel-liao.pdf
MOOCs Links and additional reading, learning, video material	
1	NPTEL Course on CMOS RF Integrated Circuits by Dr. S. Chatterjee, IIT Delhi, https://www.youtube.com/playlist?list=PLbMVogVj5nJQdGDSx243YPnNeLMBrhNE8

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VI Semester
22ET622– PE II : Lab Radio Frequency Circuit Design

Course Outcomes:

Upon successful completion of the course the students will be able to
1. Analyze the behavior of series and parallel RLC circuit at High Frequency.
2. Elaborate the MOSFET based circuit design and different bandwidth estimation techniques.
3. Design high frequency amplifier for RF applications.
4. Explain biasing of RF circuit.
5. Design RF power amplifiers and phase detectors.

Sr. No.	Experiments based on
1	To import a Touchstone format data file and use it in simulations.
2	To design differential Amplifier.
3	To design the CMOS mixer.
4	To design the series RLC circuit.
5	To design parallel RLC circuit.
6	To design L-C Filter (Low Pass Filter by using lumped element).
7	To design of power BJT amplifier.
8	To design CLC circuit.
9	To design RF oscillator.
10	To design Power Amplifier for WiMAX Applications.

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VI Semester
22ET641– PE III : Introduction to Photonics

Course Outcomes:	
Upon successful completion of the course the students will be able to	
1.	
Unit:1	**7 Hours**
Science of light – evolution, ray/wave/statistical/quantum optics Wave phenomena – Interference, Diffraction	
Contemporary Issues related to Topic	
Unit:2	**6 Hours**
Statistical properties of light – Coherence. What are photons? Photon properties - energy, flux, statistics	
Contemporary Issues related to Topic	
Unit:3	**6 Hours**
Interaction of photons with atoms Light amplification	
Contemporary Issues related to Topic	
Unit:4	**7 Hours**
Laser fundamentals, Semiconductor junction characteristics	
Contemporary Issues related to Topic	
Unit:5	**7 Hours**
Semiconductor light sources Semiconductor light detectors	
Contemporary Issues related to Topic	
Unit :6	**6 Hours**
Interaction of light with RF and acoustic waves .Nonlinear optics	
Contemporary Issues related to Topic	
Total Lecture Hours	**39 Hours**
Textbooks	
1	Fundamentals of Photonics, Saleh & Teich.
Reference Books	
1	Photonics An Introduction, Georg A. Reider, Springer link
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	
MOOCs Links and additional reading, learning, video material	
1	https://archive.nptel.ac.in/courses/108/106/108106135/

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VI Semester
22ET642– PE III : Wireless Mobile Communication

Course Outcomes:
Upon successful completion of the course the students will be able to

1. Describe various generations of mobile communications and apply the concept of frequency reuse for design of cellular system.
2. Quantify causes and effects of path loss and signal fading on received signal characteristic and used various technique to improve signal quality.
3. Describe various types of equalization and diversity technique & Multiple access techniques for wireless communication..
4. Analyze GSM & Multiple access Technique and Understand the fundamentals of wireless networking

Unit:1	Introduction to Wireless Communication Systems & Cellular Concept	7 Hours

Evolution of Mobile Radio communication, Introduction to wireless networks, Differences Between Wireless & Fixed Telephone Networks, Cellular telephone system, frequency reuse, channel assignment and handoff strategies, interference and system capacity, Trunking and grade of service, improving capacity in cellular system.

Contemporary Issues related to Topic.

Unit:2	Mobile Radio Propagation: Large Scale Path Loss	7 Hours

Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, Reflection, Ground Reflection (2-ray) Model, Diffraction, Scattering, Practical Link Budget Design Using Path Loss Models, Outdoor Propagation Models.

Contemporary Issues related to Topic

Unit:3	Mobile Radio Propagation: Small-Scale Fading and Multi path	7 Hours

Small-Scale Multipath Propagation: Factors Influencing Small-Scale Fading, Factors Influencing Small-Scale Fading, Doppler Shift, Impulse Response Model of a Multipath Channel, Small-Scale Multipath Measurements, Parameters of Mobile Multipath Channels. Types of Small Scale Fading, Rayleigh and Ricean Distributions, Statistical Models for Multi path Fading Channels.

Unit:4	Equalization & Diversity:	6 Hours

Fundamentals of equalization, Equalizers in communication receiver, Survey of equalizer Technique, space diversity, polarization diversity, frequency and time diversity, RAKE Receiver .

Contemporary Issues related to Topic

Unit:5	GSM	7 Hours

Introduction to Multiple Access Technique, GSM - global system for mobile: services and 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), Routers 901, 920 and Switches, Case studies on latest Generation.

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Contemporary Issues related to Topic		
Unit:6	**Wireless Networking:**	**6 Hours**
Development of wireless networks, Traffic routing in wireless networks, Wireless data services, Common channel signalling, Signalling System No7. An Example of SS7, introduction to various generation of mobile communication. Wi-max Technology, Unlicensed Band Radio (UBR), Case studies on latest wireless data Networks. **Contemporary Issues related to Topic**		
Total Lecture Hours		**39 Hours**

Textbooks	
1	Wireless Communication Principlesand practice (2nd Edition), T. S.Rappaport, (Prentice Hall PTR, upper saddle river, New Jersey.)
Reference Books	
1	Wireless digital communication, KamiloFeher,PHI 1995
2	Mobile Communications Design fundamentals, William C. Y. Lee, John Willey 1993
3	Mobile Cellular Communication, W .C .Y. Lee, 2005 McGraw Hill
4	The Mobile Radio Propagation channel, J.D. Parson, 1996 John Willey
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Rappaport%20-%20Wireless%20Communications,Principles%20and%20Practice-ISBN%200130422320.pdf
MOOCs Links and additional reading, learning, video material	
1	https://www.digimat.in/nptel/courses/video/106106167/L01.html

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B.Tech in Electronics & Telecommunication Engineering

VI Semester
22ET643– PE III : Soft Computing & Application

Course Outcomes:

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

1. Examine fuzzy logic, neural network and deep learning models
2. Apply fuzzy logic for solving problems.
3. Apply supervised/unsupervised algorithms for pattern recognition
4. Analyze the concepts of deep learning models for computer vision analysis

Unit:1	Fuzzy Logic & Arithmetic Operations	7 Hours

Introduction to soft computing, Applications of Soft Computing, Operations on Fuzzy Sets, Membership Functions, fuzzy compliments, t-norms and t-conorm, extension principle, Fuzzy arithmetic operation on intervals and on fuzzy sets, lattice of fuzzy numbers, fuzzy equations, Problems
Contemporary Issues related to Topic

Unit:2	Fuzzy Relations & Decision Making	7 Hours

Fuzzy relations, projections and cylindric extensions, binary fuzzy relations, fuzzy equivalence, Fuzzy Rules and Fuzzy Reasoning, Fuzzy implications, Fuzzy Inference Systems, Fuzzy Decision Making, Fuzzy controllers, applications of Fuzzy logic, Problems
Contemporary Issues related to Topic

Unit:3	Neural Network Concepts	6Hours

Introduction to Biological neural network, and Artificial Neuron Models, Neural Network learning rules, NN architectures, single and multilayer Perceptron training algorithm, ADALINE, MADALINE NN, Problems
Contemporary Issues related to Topic

Unit:4	Supervised Neural Networks	6 Hours

Supervised Learning Neural Networks, Backpropagation algorithm, factors affecting back propagation training, Radial Basis Function Networks, Recurrent Networks, Adaptive Multilayer NN, Problems
Contemporary Issues related to Topic

Unit:5	Unsupervised Neural Networks	7 Hours

Unsupervised Learning Neural Networks, Winner take networks, Adaptive Resonance architectures, Self- Organizing Map, Associate memory models, Applications of ANNs to solve some real life problems, Problems
Contemporary Issues related to Topic

Unit:6	Deep learning	7 Hours

Deep Feed Forward network, regularizations, training deep models, dropouts, Convolutional Neural Network, Basic structure of Convolutional Network, Case studies: Alex net, VGGNet, GoogLeNet, Applications of CNN: Train deep neural networks for computer vision tasks, Applications of Soft computing to solve problems in varieties of application domains, Problems
Contemporary Issues related to Topic

Total Lecture Hours	39Hours

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Textbooks	
1.	Fuzzy Sets and Fuzzy Logic: Theory and Applications, George J. Klir and Bo Yuan, 1996, Prentice Hall
2.	Neural Networks, Fuzzy Systems and Evolutionary Algorithms: Synthesis and Applications, S. Rajasekaran and G. A. Vijayalakshmi Pai, 2017, Prentice Hall of India
3.	Elements Network of Artificial Neural, K. Mehrotra , 2009, Penram International Publishing Pvt Ltd, Second edition MIT, Cognet
4.	Neural Networks & Deep learning, Charu Aggarwal , 2018, Springer International Publishing
Reference Books	
1.	Fuzzy Logic with Engineering Applications, Timothy J. Ross, 2011, McGrawHill, New York
2.	Principles of Soft Computing, S. N. Sivanandam, S. N. Deepa, 2011, Wiley India Pvt Ltd
3.	"NeuralNetworksandDeepLearning",2015http://neuralnetworksanddeeplearning.com, MichaelNielsen, Determination Press
4.	Deep learning, Bengio,Yoshua, IanJ. Goodfellow, and Aaron Courville, 2015, An MIT Press book inpreparation
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	
MOOCs Links and additional reading, learning, video material	
1	http://link.springer.com/openurl?genre=book&isbn=978-3-642-21331-1
2	https://nptel.ac.in/courses/106105173
3	https://onlinecourses.nptel.ac.in/noc22_cs54/preview
4	https://archive.nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs23/
5	https://archive.nptel.ac.in/courses/106/105/106105173/

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VI Semester
22ET644– PE III : Power Electronics

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Design circuits using power semiconductor devices.
2. Analyze AC/DC , DC/DC and DC/AC and Cyclo-converters.
3. Design of Gate Drive and snubber circuits for SCR
4. Elaborate AC ,DC drives and SMPS

Unit:1	Power semiconductor devices (part A)	6 Hours
Power Semiconductor Diodes, classification, reverse recovery Characteristics, series and shunt connection of power diodes, Power Transistors, Switching characteristics of power transistor, Base drive control.		
Contemporary Issues related to Topic		
Unit:2	**Power semiconductor devices(part B)**	**6 Hours**
Power MOSFETs, IGBT, Silicon controlled rectifier (SCR), dynamic Turn ON and Turn OFF characteristics of SCR, Firing circuit,Diac, Triac.		
Contemporary Issues related to Topic		
Unit:3	**AC –DC Converter**	**7 Hours**
Commutation methods of SCR, Single phase half wave and full wave Controlled Rectifier with resistive and inductive load		
Contemporary Issues related to Topic		
Unit:4		**6 Hours**
DC-DC Converters (Chopper) Step up, step down Choppers, design of choppers AC Voltage Controllers. Principle of ON-OFF control, Phase control, single phase cyclo-converter		
Contemporary Issues related to Topic		
Unit:5	**DC –AC Converter**	**7Hours**
Inverters—Series resonant inverters, Modified series inverter, parallel inverter, single phase bride inverter, current source inverter, Three phase bridge Inverter: 120 degree and 180 degree mode, design of inverter. Applications		
Contemporary Issues related to Topic		
Unit :6		**7 Hours**
Solar converter, buck converter, boost converter, Cuk converter, Design of Gate Drive circuits for SCR, SCR protection circuits, design of snubber circuit, Introduction to AC and DC drives. SMPS		
Contemporary Issues related to Topic		
Total Lecture Hours		**39 Hours**

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Textbooks	
1	Power Electronics:Circuits,Devices and Applications, Fourth Edition by Muhammad H. Rashid, Academic press
2	Power Electronics, Second Edition 2008 by M. D. Singh,K. B. Khanchandani, TATA McGraw-Hill
3	Industrial and power electronics, Third Edition 2007 by Deodatta Y. Shinare, Electrotech Publication
Reference Books	
1	Power Electronics, Third Edition 2012 by Ned Mohan, John Wiley & sons
2	Fundamentals of power electronics, Third Edition 2020 by Erickson, Robert W., Maksimovic , Dragan
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electrical%20Engineering/Power%20Electronics/Muhammad%20H.%20Rashid-Power%20electronics%20_%20devices,%20circuits,%20and%20applications-Pearson%20(2014).pdf
2	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electrical%20Engineering/Power%20Electronics/Power%20Electronics%20by%20Ps%20bimbhra.pdf
3	http://link.springer.com/openurl?genre=book&isbn=978-1-4471-5537-9
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/108/102/108102145/
2	https://www.digimat.in/nptel/courses/video/108101126/L01.html
3	https://www.youtube.com/watch?v=fOZ8bUrFJGk
4	https://www.youtube.com/watch?v=P0MK7sWfs9k

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VI Semester
22ET645– PE III : Information Theory and Coding

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Analyze, measure of information, Entropy, Rate of information.
2. Illustrate information using Shannon Encoding, Shannon Fano, Prefix and Huffman Encoding Algorithms.
3. Elaborate the continuous and discrete communication channels using input, output and joint probabilities
4. Determine a codeword comprising of the check bits computed using Linear Block codes, cyclic codes & convolutional codes

Unit:1	**Information theory**	**7 Hours**

Concept of amount of information, information units Entropy: marginal, conditional, joint and relative entropies, relation among entropies Mutual information, information rate,
Contemporary Issues related to Topic

Unit:2	**Source Coding**	**6 Hours**

Encoding of the Source Output, Shannon's Encoding Algorithm, Shannon Fano Encoding Algorithm Source coding theorem, Prefix Codes, Kraft McMillan Inequality property KMI, Huffman codes .

Contemporary Issues related to Topic

Unit:3	**Information Channels**	**7Hours**

Communication Channels, Discrete Communication channels Channel Matrix, Joint probabilty Matrix, Binary Symmetric Channel, System Entropies., Channel Capacity, Channel Capacity of Binary Symmetric Channel, Binary Erasure Channel.

Contemporary Issues related to Topic

Unit:4	**Error Control Coding**	**6 Hours**

Introduction, Examples of Error control coding, methods of Controlling Errors, Types of Errors, types of Codes, Linear Block Codes: matrix description of Linear Block Codes, Error detection & Correction capabilities of Linear Block Codes, Single error correction Hamming code. Binary Cyclic Codes: Algebraic Structure of Cyclic Codes, Encoding using an (n-k) Bit Shift register, Syndrome Calculation, Error Detection and Correction

Contemporary Issues related to Topic

Unit:5	**Convolution Codes**	**7 Hours**

Convolution Encoder, Time domain approach, Transform domain approach, Code Tree, Trellis and State Diagram, The Viterbi Algorithm

Contemporary Issues related to Topic

Unit :6	**Interleaving techniques**	**6 Hours**

Block and convolutional interleaving, Coding and interleaving applied to CD digital audio system - CIRC encoding and decoding, interpolation and muting. ARQ – Types of ARQ, Performance of ARQ, Probability of error and throughput
Contemporary Issues related to Topic

Total Lecture Hours	**39 Hours**

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SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

Textbooks	
1	Digital and Analog Communication Systems,, 5th edition Date:2006, K. Sam Shanmugam, Wiley India Pvt. Ltd
2	Digital Communication, 3rd edition August 2007, Simon Haykin, JOHN WILEY & SONS
Reference Books	
1	Information Theory, Coding and Cryptography Ranjan Bose, McGraw Hill Education , II edition, 25 April 2008
2	Digital Conummications- Fundamentals and Applications, Bernard Sklar, Second Edition, Pearson Education, 2016,
3	Information Theory and Coding, HariBhat, Ganesh Rao,. Cengage India Private Limited, First Edition, 1 September 2017
4	Error Correction Coding, Todd K Moon,Wiley Std. Edition 2, 2006
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Analog%20and%20Digital%20Communication%20Systems%20(%20PDFDrive.com%20).pdf
2	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Digital%20and%20Analog%20Communication%20Systems%20(%20PDFDrive.com%20).pdf
MOOCs Links and additional reading, learning, video material	
1	NPTEL Course on Information Theory ,Coding and Cryptography ,IIT Delhi by Prof.Ranjan Bose, https://nptel.ac.in/courses/108102117

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VI Semester
22ET646– PE III : VLSI Testing and Testability

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Explain VLSI Design Verification and Testing Issues
2. Generate test pattern for Faults in a system and design system for Testability
3. Apply different faults and carry out fault simulation in Digital Circuits
4. Elaborate the importance of Testing and its types in VLSI Circuits.

Unit:1	Overview of Testing	7 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	Design Representation	6 Hours
Graphical representation, Graphs, Binary Decision diagrams, Netlists, VLSI Design Flow: CAD tools, Design Methodologies, Semicustom Design			

Unit:3	Simulation	7 Hours
Logic Simulation, Approaches to Simulation, Fault Simulation & Their Results. Automatic Test Pattern Generation: D-Algorithm, Critical Path Extensions to D-Algorithm PODEM, FAN			

Unit:4	Ad Hoc Techniques	6 Hours
Ad Hoc Techniques, Scan–Path Design, Test pattern generation, Test Pattern Application, Scan architectures, multiple scan chains, Partial Scan Testing			

UNIT:5	Boundary-Scan Testing	7Hours
Boundary Scans Architecture, Test Access Port, Registers, Tap Controller, Modes of Operation. Built In Self Test: Pseudorandom Test Pattern Generation, Response Compaction, BIST Architectures			

Unit :6	Memory Testing:	6 Hours
Types of Memory Testing, Functional Testing Schemes, Testing FPGAs and Microprocessors: Testability Of FPGAs, Testing RAM- Based FPGAs, Testing Microprocessors, Synthesis For Testability.			

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B.Tech in Electronics & Telecommunication Engineering

Textbooks	
1	"Principles of Testing Electronic Systems", 2nd edition Samiha Mourad, Yervant Zorian
2	. "Essentials of Electronic Testing for Digital, Memory, and Mixed-Signal VLSI Circuits",Michael L. Bushnell and Vishwani D. Agrawal, B.S.Publications, 2000
3	"Digital Systems Testing and Testable Design" ,MironAbramovici, Melvin Breuer and Arthur Friedman, IEEE press,
Reference Books	
1	"A Guide to VHDL" by Stanley Mazor,2nd Edition, Kluwer Academic Press, 2007
2	"HDL Chip Design" by Douglas Smith, 3rd Edition, Doone Publications, 2008 6. "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/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20Engineering/
2	http://103.152.199.179/YCCE/NPTEL%20VIDEOS%20PHASE%20I%20%20-%20PART3/Electronics%20and%20Communication%20Engineering/VLSI%20Design/
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VI Semester
22ET661 – OE III : Principles of Communication

Course Outcomes:
Upon successful completion of the course the students will be able to   1. Describe analog communication systems and various modulation scheme.   2. Explain digital communication systems and various modulation scheme.   3. Analyse error correcting codes, including block codes.   4. Use the different application of satellite communication.

Unit:1	Analog Communication	**7 Hours**

Introduction to Communication Systems; Noise, Types of noise, sources of noise; Need for modulation, AM-Time domain representation, Frequency spectrum , power relations, DSB/SC, SSB**.**
Contemporary Issues related to Topic

Unit:2	Angle Modulation	**6 Hours**

Frequency Modulation (FM), mathematical Analysis, modulation index, frequency spectrum, FM Transmitter block diagram.
Contemporary Issues related to Topic

Unit:3	**Digital Communication**	**7 Hours**

Introduction Digital Communication System; Pulse modulations – concepts of sampling and sampling theorems, PAM, PWM, PPM; Waveform coding Techniques: Pulse code Modulation (PCM),Delta Modulation, Adaptive Delta modulation
Contemporary Issues related to Topic

Unit:4	Digital Modulation	**6 Hours**

Data formats ;Amplitude Shift Keying (ASK) – Frequency Shift Keying (FSK) Phase Shift Keying (PSK) – BPSK – QPSK– Quadrature Amplitude Modulation (QAM)
Contemporary Issues related to Topic

Unit:5	Information Theory	**6 Hours**

Entropy, Properties of entropy; source coding: Huffman coding**;** error control codes: Linear Block Code
Contemporary Issues related to Topic

Unit :6	**Satellite Communication**	**7 Hours**

Communication Satellite: Orbit and Description: A Brief history of satellite Communication, satellite Frequency Bands, Satellite Systems, Applications, frequency used link establishment Earth Station Technology: Transmitters, Receivers.
Contemporary Issues related to Topic

Total Lecture Hours	**39 Hours**

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B.Tech in Electronics & Telecommunication Engineering

Textbooks	
1	B.P.Lathi "Modern Digital and Analog Communication Systems" Oxford University Press, 1998.
2	J.Das "Principles of Digital Communication" New Age International, 1986
Reference Books	
1	Kennedy and Davis "Electronic Communication Systems" Tata McGraw hill, 4th Edition, 1993.
2	Sklar "Digital Communication Fundamentals and Applications" Pearson Education, 2001.
3	Bary le, Memuschmidt, Digital Communication, Kluwer Publication, 2004.
4	B.P.Lathi "Modern Digital and Analog Communication Systems" Oxford University Press, 1998. Taub & Schiling "Principles of Communication Systems" Tata McGraw Hill 2007
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Analog%20and%20Digital%20Communication%20Systems%20(%20PDFDrive.com%20).pdf
2	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Digital%20and%20Analog%20Communication%20Systems%20(%20PDFDrive.com%20).pdf
MOOCs Links and additional reading, learning, video material	
1	NPTEL Course on Principles of Communication Systems By Prof. Aditya K. Jagannatham IIT Kanpur, https:// nptel.ac.in/courses/108/104/108104091/

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VI Semester
22ET662 – OE III: Industrial Automation

Course Outcomes:

Upon successful completion of the course the students will be able to
1. Analyse industrial need of automation and systems application.
2. Illustrate industrial automation components and hardware.
3. Impart the role of PLC in industry automation
4. Expose to various control techniques employed in process automation
5. Elaborate various applications of networking and communication systems.

Unit:1	Introduction to Industrial Automation	7 Hours

Automation overview, Requirement of automation systems, Architecture of Industrial Automation system, Introduction of PLC and Supervisory Control and Data Acquisition (SCADA).
Contemporary Issues related to Topic

Unit:2	Automation Components	6 Hours

Sensors for temperature, pressure, force, displacement, speed, flow, level, humidity and pH measurement. Actuators, process control valves. Introduction of DC and AC servo drives for motion control.
Contemporary Issues related to Topic

Unit:3	Automation in Process Industries	7Hours

Introduction to computer based industrial automation. Programming languages of PLC, Basic instruction sets. PLC programming, Ladder diagram, Sequential flow chart, PLC selection, PLC Installation.
Contemporary Issues related to Topic

Unit:4	Distributed Control System	6 Hours

Overview of DCS, DCS software configuration, DCS communication, DCS Supervisory Computer Tasks, DCS integration with PLC and Computers, Features of DCS, Advantages of DCS.
Contemporary Issues related to Topic

Unit:5	SCADA/ HMI System Development	7 Hours

SCADA and HMI systems, Different Systems in SCADA like Field Instrumentation, RTUs, Industrial Data Communication, HMI Development, Data Processing, Network Communications, Communication with RTUs, PLC as RTU.
Contemporary Issues related to Topic

Unit :6	Industrial Networking	6 Hours

SCADA and HMI systems, Different Systems in SCADA like Field Instrumentation, RTUs, Industrial Data Communication, HMI Development, Data Processing, Network Communications, Communication with RTUs, PLC as RTU.
Contemporary Issues related to Topic

Total Lecture Hours	39 Hours

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B.Tech in Electronics & Telecommunication Engineering

Textbooks	
1	Industrial Instrumentation and Control By. S.K. Singh The McGraw Hill Companies
2	Programmable logic controller, Dunning, Delmar
Reference Books	
1	Process Control Instrumentation Technology By. C.D. Johnson, PHI
2	Digital Communication, 1st edition, Shanmugham, CBS Publisher
3	Modern Digital & Analog Communication Systems, 4th edition Date: 2009, B.P.Lathi, Oxford Univ Pr Publication
4	Principles of Communication Systems, 2nd edition Pub Date: SEP-07, Taub Schilling, Publisher: Prentice Hall
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	NPTEL, online courses and certification, Learn for free
2	https://swayam.gov.in/
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VI Semester

22ET663 – OEIII: Medical Electronics

Course Outcomes:	
Upon successful completion of the course the students will be able to	
1. Describe various parameters of human anatomy and physiology.	
2.Gain the knowledge of biopotential signals	
3.Explain the functioning of different Measuring and Recording instruments	
4.Elaborate the working of modern Imaging and Therapeutic Equipment	
Unit:1 **Fundamentals of Medical Instrumentation**	**6 Hours**
Anatomy and physiology, biometrics, components of the man instrumentation, Physiological System of body, Sources of bioelectric potentials(Resting and action potential, Propagation of action potential and Bioelectric potential).	
Unit:2 **Physiological Transducer and Electrodes**	**7 Hours**
Classification of transducers, Performance characteristics of transducers, Displacement, Position and Motion transducers, Pressure transducers, Photoelectric transducers, transducers for body Temperature measurement Optical Fibre sensors, biosensors and smart sensors. Electrodes for ECG, EEG, EMG, and Microelectrodes.	
Unit:3 **Biochemical and Non Electrical Parameter Measurement**	**7Hours**
Blood pressure measurement, Blood flow meters and Cardiac output measurement , Plethysmography Heart sound, Measurement in Temperature ,Pulse and Respiratory system, Blood Cell Counters.	
Unit:4 **Biomedical Recorders**	**6 Hours**
Nature of biomedical signal, Example of biomedical signals with the functioning of the organs. EMG, ECG, EEG,PCG lead system and recording methods ,typical waveform and signals characteristics, other biomedical recorders.	
Unit:5 **Medical Imaging System**	**6 Hours**
X-ray imaging - Properties and production of X-rays, X-ray machine, applications of X-rays in medicine. Computed Tomography Principle, image reconstruction, scanning system and applications. Ultrasonic imaging systems: Basic pulse echo system, propagation of ultrasonic through tissues and reflections, display types, A-Scan, B-Scan, M-Scan, applications, real-time ultrasonic imaging systems and probes.	
Unit :6 **Therapeutic Equipment**	**7 Hours**
Cardiac pacemaker: Need of cardiac pacemaker, external pacemaker and implantable pacemaker. Cardiac Defibrillators: Need of Defibrillator, DC Defibrillator and Implantable Defibrillator. Ventilators: Types of ventilators, Ventilator Terms ,classification of ventilators, Modern and high Frequency Ventilators .	
Total Lecture Hours	**39 Hours**

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B.Tech in Electronics & Telecommunication Engineering

	Textbooks
1	Leslie Cromwell, ―Biomedical Instrumentation and Measurement‖, Prentice Hall of India, New Delhi, 2007.
2	Joseph J.Carr and John M.Brown, ―Introduction to Biomedical Equipment Technology‖, John Wiley and Sons, New York, 2004.
	Reference Books
1	Khandpur, R.S., ―Handbook of Biomedical Instrumentation‖, TATA Mc Graw-Hill, second edition New Delhi,2003
2	John G.Webster, ―Medical Instrumentation Application and Design‖, 3rd Edition, Wiley India Edition, 2007
	YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]
1	https://www.pdfdrive.com/biomedical-instrumentation-and-measurements-d186986101.html
2	https://www.academia.edu/39250912/Handbook_of_Second_Edition_Biomedical_Instrumentation
	MOOCs Links and additional reading, learning, video material
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VI Semester

22ET664 – OEIII: Fundamentals of Image Processing

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Examine the concepts of image enhancement, restoration, segmentation, representation and description
2. Apply basic image processing algorithms and filtering techniques for image enhancement.
3. Apply the algorithms for image restoration and segmentation
4. Apply the techniques for image representation and description

Unit:1	Introduction	7 Hours
Fundamental Steps in image processing, Component of Image processing system, Image formation Model, Sampling and quantization, Image Resolution, Interpolation Techniques, Concept of gray levels, Relationship between pixels.		
Contemporary Issues related to Topic		

Unit:2	Intensity Transformations	6 Hours
Basic intensity transformation techniques: Image negative, log transformation, power law transformation, piecewise linear transformation, Histogram Equalization.		
Contemporary Issues related to Topic		

Unit:3	Spatial Domain Filtering	7 Hours
Mechanics of Spatial filtering, Smoothing spatial filters: Linear and Order statistic filters. Sharpening filters: Foundation, Laplacian and Gradient.		
Contemporary Issues related to Topic		

Unit:4	Image Restoration	6 Hours
Image Restoration: Image degradation/restoration process, noise model, restoration in presence of noise, periodic noise reduction.		
Contemporary Issues related to Topic		

Unit:5	Image Segmentation	7 Hours
Detection of discontinuities: Point, Line and Edge, Thresholding, Region based segmentation: Region Growing, Split and Merge.		
Contemporary Issues related to Topic		

Unit :6	Representation and Description	6 Hours
Representation, Simple Descriptor, Shape Number, Fourier Descriptor, Statistical Moments; Region Feature descriptor: Basic descriptor, Topological Descriptor, Texture Descriptor		
Contemporary Issues related to Topic		

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Text books	
1	R.C. Gonzalez & R.E. Woods, Digital Image Processing, 3nd/ 4th edition, PHI publication, 2009.
2	William K. Pratt, Digital Image Processing, 4th edition, A John Wiley & Sons, Inc., Publication, 2001.
Reference Books	
1	A. K. Jain, Fundamentals of Digital Image Processing, PHI publication.
2	S. Jayaraman, S. sakkirajan,T Veerakumar, Digital Image Processing, McGraw-Hill 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	http://nptel.iitm.ac.in/video.php?subjectId=117105079,
2	www.imageprocessingplace.com

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VI Semester

22ET681 – OE IV: Fundamentals of Computer Networks

Course Outcomes:

Upon successful completion of the course the students will be able to
1. Compare data transmission protocols and understand the applications of communication network
2. Apply the knowledge of LAN structure to design data communication system.
3. Detect Data transmission errors in communication networks.
4. Compare different data security protocols

Unit:1	Computer Network and Internet	7 Hours

Internet, the network edge, ISPs, Protocols, standards, standards of organizations

Contemporary Issues related to Topic

Unit:2	Link Layer and Local Area Networks	6 Hours

Error detection and correction techniques, multiple access protocols, link layer addressing

Contemporary Issues related to Topic

Unit:3	Network Layer	7 Hours

Network layer design issues, IP packets, IP addressing, virtual circuit and datagram networks, TCP and UDP

Contemporary Issues related to Topic

Unit:4	Transport Layer	6 Hours

Transport layer design issues, transport service primitives, internet transport protocol TCP/IP architecture, TCP/IP protocol

Contemporary Issues related to Topic

Unit:5	Security in Communication Networks	7 Hours

Network Security, cryptography, public key and private key cryptography

Contemporary Issues related to Topic

Unit :6	Application Layer	6 Hours

HTTP, FTP, Email, DNS, WWW, POP3, IMAP

Contemporary Issues related to Topic

Total Lecture Hours	39 Hours

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B.Tech in Electronics & Telecommunication Engineering

Textbooks	
1	Data Communication and Networking Behrouz Forouzan Fifth Edition McGraw Hill
2	Computer Networking A top down Approach Featuring and Internet James F. Kurose Third Edition Pearson
Reference Books	
1	Computer Networks Andrew Tanenbaum Fourth Edition Prentice Hall PTR
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
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MOOCs Links and additional reading, learning, video material	
1	NPTEL course link Computer Networks and Internet Protocol Prof Soumya Kanti Ghosh & Prof Sandip

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VI Semester

22ET682 – OE IV: Soft Computing

Course Outcomes:
Upon successful completion of the course the students will be able to

1. Identify and describe genetic operators and genetic algorithms in problem solving
2. Apply Neural Network algorithm for pattern classification
3. Apply fuzzy logic and arithmetic to handle uncertainty and solve engineering problems
4. Understand fuzzy rule base and fuzzy controller

Unit:1	Genetic Algorithm	7 Hours

Basic terminologies used in Genetic Algorithm, Simple GA, General Genetic Algorithm, Encoding, Selection, Crossover, Mutation, Stopping Condition for GA, Constraint in GA

Contemporary Issues related to Topic

Unit:2	Neural Networks	6 Hours

Biological Neurons and Their Artificial Models, Models of Artificial Neural Networks, Learning Methods, Activation Functions, McCulloch-Pitts Neuron Model, Neural Network Learning Rules, Application of NN

Contemporary Issues related to Topic

Unit:3	Supervised Learning	7 Hours

Single Layer Perceptron, Back propagation algorithm, Associative Memory
Contemporary Issues related to Topic

Unit:4	Unsupervised learning	6 Hours

Hamming and Max net, Competitive Learning, Self-organizing feature maps, ART Networks, RBF

Contemporary Issues related to Topic

Unit:5	Fuzzy Sets and Operations	7 Hours

Concepts of Fuzzy sets, Extension Principle, Operation on fuzzy sets, Fuzzy numbers, Arithmetic operations, Lattice, Fuzzy equations

Contemporary Issues related to Topic

Unit :6	Fuzzy logic and Systems	6 Hours

Fuzzy relations, Fuzzy Logic, Approximate Reasoning Fuzzy controllers, Defuzzification Methods, Fuzzy Inference Techniques Applications, New topics to be announced time to time.

Contemporary Issues related to Topic

			Total Lecture Hours	**39 Hours**

			July 2023	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

B. Tech SoE and Syllabus 2022
(Scheme of Examination w.e.f. 2022-23 onward)
(Department of Electronics & Telecommunication Engineering)

SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

Textbooks	
1	Soft Computing, 2011, Shivnandam, Wiley
2	Elements of Artificial Neural Network, 2009, K. Mehrotra, Penram
3	Fuzzy sets and Fuzzy logic, 2015, George Klir, Bo Yuan, Pearson
Reference Books	
1	Neural Networks, a comprehensive foundation, 1997, Simon Haykins, Person
2	Fuzzy Logic & Applications, 2011, T. Ross, Wiely
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://www.myreaders.info/html/soft_computing.html
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/106/105/106105173/

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B.Tech in Electronics & Telecommunication Engineering

VI Semester

22ET683 – OE IV: Microcontrollers & Embedded systems

Course Outcomes:

Upon successful completion of the course the students will be able to
1) Elaborate 8051 microcontroller architecture.
2) Develop assembly and embedded C language program.
3) Interface 8051 microcontroller with different peripherals
4) Interface Arduino processor with different peripherals

Unit:1		7 Hours

Overview of 8051 Microcontroller family, Introduction to MCS 51 family, Architecture, Memory organization, Internal RAM, Flag Register, Register Banks, SFRs , Functional pin description and various resources of MCS 51. Hardware Overview **Contemporary Issues related to Topic**

Unit:2		6 Hours

Addressing modes, Instruction set and Assembly language programming Programs using look up table, Bit manipulation, 8051 I/O programming, Delay Programs. **Contemporary Issues related to Topic**

Unit:3		7Hours

I/O Interfacing such as LED, switches, 7segment display, keyboard matrix programming, 8051 programming in C: Data types and time delay, I/O programming, Logic operations, Data conversion programs, Lookup table access **Contemporary Issues related to Topic**

Unit:4		6 Hours

Timer programming in assembly and C: Various modes of operation, SFR related to timer operation. Serial Port programming in assembly and C: Basics of serial communication, 8051 connection to RS 232. Serial data transfer programs. **Contemporary Issues related to Topic**

Unit:5		7 Hours

Interfacing of LCD, ADC, DAC, stepper motor and DC motor with 8051 microcontroller **.**
Contemporary Issues related to Topic

Unit :6		6 Hours

Block diagram of Arduino, features of Arduino Architecture, Arduino pin description: digital pins, analog pins, Power pins and other pins, Interfacing of LED, 7-Segment display, LCD, Sensors, DC motor, switch and Serial communication.

Contemporary Issues related to Topic

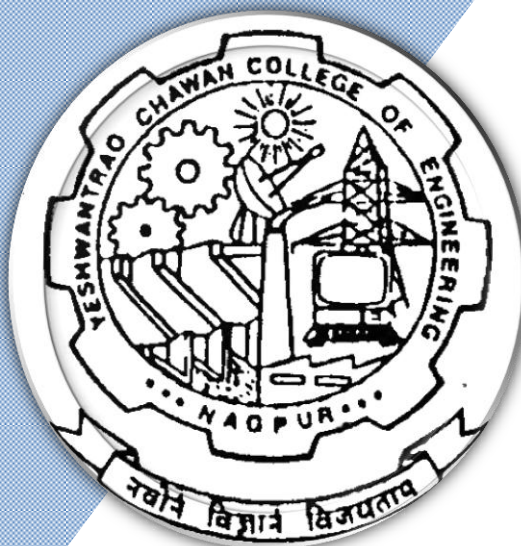|	**Total Lecture Hours**	**39 Hours**

Nagar Yuwak Shikshan Sanstha's

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B.Tech in Electronics & Telecommunication Engineering

Textbooks	
1	The 8051 Microcontroller and Embedded systems using assembly & C, 2nd edition, Muhammad Ali Mazidi, Pearson Education Asia LPE
2	The 8051 Microcontroller, 3rd edition, CENGAGE Learning
3	Arduino Development Cookbook, Cornel Amariei, PACKT Publishing
Reference Books	
1	The 8051 Microcontroller, 3rd Edition, 2007,Kenneth Ayala,, Cengage
2	8051 Microcontroller-Internals ,Instructions ,Programming & Interfacing, 2002,Ghoshal, Pearson Education India
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	
MOOCs Links and additional reading, learning, video material	
1	https://archive.nptel.ac.in/courses/108/105/108105102/

			July 2023	1.00	Applicable for AY 2022-23 Onwards
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(Department of Electronics & Telecommunication Engineering)

SoE No.
22ET-101

B.Tech in Electronics & Telecommunication Engineering

VI Semester

22ET684 – OE II: Fundamentals of Internet of Things

Course Outcomes:	
Upon successful completion of the course the students will be able to	
1. Explore the physical and Logical design of IoT.	
2. Explore the M2M and NETCONF.	
3. Explore python programming.	
4. Apply basic skills of IoT to solve real life problems.	
5. Illustrate IoT Security	
Unit:1 **Introduction & Concepts:**	**5 Hours**
UNIT-1: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels **Contemporary Issues related to Topic**	
Unit:2 **Sensing & Actuation**	**6 Hours**
Introduction to sensors & transducers, Introduction to electrodes & biosensors, Static and dynamic characteristics of sensors, Different types of sensors, Selection criteria's for sensors / transducers, Commercial IoT sensors / transducers, Signal conditioning modules of IoT system. **Contemporary Issues related to Topic**	
Unit:3 **M2M & System Management with NETCONF-YANG**	**7 Hours**
M2M, Difference between IOT and M2M, SDN and NFV for IOT, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF **Contemporary Issues related to Topic**	
Unit:4 **Developing Internet of Things & Logical Design using Python**	**7 Hours**
Introduction, IOT Design Methodology, Python Data Types & Data Structures, Control Flow, Functions , File Handling, Date/ Time Operations, IoT Device-Raspberry Pi, Programming Raspberry pi with Python **Contemporary Issues related to Topic**	
Unit:5 **IoT Security**	**7 Hours**
Effect of security threats on user, authentication using OTP validation, Security Requirements for the Internet of Secure Things, Secure Solutions, Secure Framework of the IoT Related to Perceptual Layer, Challenges in IoT Security **Contemporary Issues related to Topic**	
Unit :6 **Domain Specific IOTs**	**7 Hours**
Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style. **Contemporary Issues related to Topic**	
Total LectureHours	**39 Hours**

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22ET-101

B.Tech in Electronics & Telecommunication Engineering

Textbooks	
1	Arshdeep Bahga and Vijay Madisetti , "Internet of Things, a hands on approach" , Universities Press (India)Pvt. Ltd. 2017, ISBN: 978-81-7371-954-7.
Reference Books	
1	Internet of Things : Technologies, Applications, Challenges and Solution B.K.Tripathy & J.Anuradha by CRC press publication
2	From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence: By Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, 1 st Edition, Academic Press, 2014.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/UG%20COURSES/IIOT/IIOT%20(%20G%20Series).pdf
2	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/30.2019_Book_InternetOfThingsFromHypeToReal.pdf
MOOCs Links and additional reading, learning, video material	
1	https://archive.nptel.ac.in/courses/106/105/106105166/
2	https://onlinecourses.nptel.ac.in/noc21_ee85/preview

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B.Tech in Electronics & Telecommunication Engineering

VI Semester
MLC126 – YCCE Communication Aptitude Preparation (YCAP6)

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YCCE-ET-53

Bachelor of Technology

SoE & Syllabus 2022

7th Semester

(Department of Electronics & Telecommunication Engineering)

B. Tech in Electronics & Telecommunication 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 & Telecommunication Engineering)
B. Tech in Electronics & Telecommunication Engineering

SoE No.
22ET-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	L	T	P	Hrs	Credits	MSEs*	TA**	ESE	ESE Duration Hours
							\multicolumn{4}{c}{Contact Hours}		\multicolumn{3}{c}{% Weightage}		
Seventh Semester															
1	7	PC	ET/ET	22ET701	Microwave Theory and Techniques	T	3	0	0	3	3	30	20	50	3 Hours
2	7	PC	ET/ET	22ET702	Lab:Microwave Theory and Techniques	P	0	0	2	2	1		60	40	
3	7	PC	ET/ET	22ET703	Computer Network	T	3	0	0	3	3	30	20	50	3 Hours
4	7	PC	ET/ET	22ET704	Lab: Computer Network	P	0	0	2	2	1		60	40	
5	7	PE	ET/ET		**Professional Elective IV**	T	3	0	0	3	3	30	20	50	3 Hours
6	7	PE	ET/ET		**Professional Elective V**	P	0	0	2	2	3		60	40	
7	7	PE	ET/ET		**Professional Elective VI**	T	3	0	0	3	3	30	20	50	3 Hours
8	7	PR	ET/ET	22ET705	Project Phase-II	P	0	0	10	10	5		60	40	
9	7	STR	ET/ET	22ET706	Campus Recruitment Training (CRT)	P	0	0	0	0	2		100		
\multicolumn{6}{r}{**TOTAL SEVENTH SEM**}		12	0	16	28	24				

Professional Electives -IV

1	7	PE IV	PC	22ET711	PE IV :Satellite Communication
2	7	PE IV	PC	22ET712	PE IV : Error Correcting Codes
3	7	PE IV	PC	22ET713	PE IV : Switching Theory
4	7	PE IV	PC	22ET714	PE IV : Pattern Recognition
5	7	PE IV	PC	22ET715	PE IV : VLSI Mixed Signal Design
6	7	PE IV	PC	22ET716	PE IV: Advanced Embedded System Design

Professional Electives -V

1	7	PE V	PC	22ET731	PE V : Wireless Sensor Networks
2	7	PE V	PC	22ET732	PE V : Augmented Reality & Virtual Reality
3	7	PE V	PC	22ET733	PE V : Low Power VLSI
4	7	PE V	PC	22ET734	PE V : Biomedical Engineering
5	7	PE V	PC	22ET735	PE V :Data Compression and Encryption
6	7	PE V	PC	22ET736	PE V: RADAR Engineering

Professional Electives -VI

1	7	PE VI	PC	22ET751	PE VI : 5G Communications
2	7	PE VI	PC	22ET752	PE VI : Speech Processing
3	7	PE VI	PC	22ET753	PE VI : Deep Learning
4	7	PE VI	PC	22ET754	PE VI : Industrial Automation
5	7	PE VI	PC	22ET755	PE VI : Nano Electronics
6	7	PE VI	PC	22ET756	PE VI : Adhoc Networks

MSEs* = Three MSEs of 15 Marks each will be conducted and marks of better 2 of these 3 MSEs will be considered for Continuous Assessment

TA ** = for Theory :12 marks on lecture quizzes, 12 marks on 2 Activities, 2 marks on class performance,4 marks on Common TA
TA = for Practical : MSPA will be 15 marks each**

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

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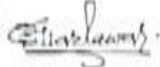**Yeshwantrao Chavan College of Engineering**

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B.TECH SCHEME OF EXAMINATION 2022

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

(Department of Electronics & Telecommunication Engineering)
B. Tech in Electronics & Telecommunication Engineering

SoE No.
22ET-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	
					Eigth Semester										
1	8	STR		22ET801	Internship - training / Seminar & Report	P	0	0	12	12	3		60	40	
2	8	ER		22ET802	Extracurricular Activity Evaluation	P	0	0	0	0	2		100		
					TOTAL EIGHTH SEM		0	0	12	12	5				
					GRAND TOTAL		124	3	76	202	166				

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

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B. Tech SoE and Syllabus 2022
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Electronics and Telecommunication Engineering

SoE No.
22ET-101

VII Semester

22ET701 – Microwave Theory and Techniques

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Analyze the behaviour of linear beam and cross field tubes.
2. Analyze behaviour of different passive components using s-matrix.
3. Measure performance parameters of microwave devices.
4. Explore various microwave solid state devices.
5. Realize the importance of Microwave Integrated circuit.

Unit:1	Linear Beam Tubes	7 Hours

High frequency limitations of conventional vacuum tubes, Two cavity Klystron, Reflex Klystron – Mechanism and mode of operation, Applegate diagram, Power output and efficiency, applications.

Contemporary Issues related to Topic

Unit:2	Cross- Field Tubes	6 Hours

Magnetron Oscillator – Hull cut-off voltage, Mechanism of Operation, Mode separation, Phase focusing effect, Tuning of magnetron, Applications

Contemporary Issues related to Topic

Unit:3	Microwave Passive Devices	7 Hours

Introduction to Scattering matrix, properties of S-matrix, E-plane tee, H-plane tee, magic tee, attenuators, directional couplers, gyrator, isolator, circulators, scattering matrix derivation for all components.

Contemporary Issues related to Topic

Unit:4	Microwave Measurements	6 Hours

Introduction, Power sensitive elements, Low and High power measurement, Attenuation measurement, VSWR measurement – Low and High VSWR, Impedance measurement, Frequency measurement, Measurement of cavity Q, overview of spectrum analyzer, Various measurements using spectrum analyzer

Contemporary Issues related to Topic

Unit:5	Microwave solid-state devices	7 Hours

Microwave diodes – Gunn diode – Mode of operation, Crystal diode, PIN diode, IMPATT diodes, Varactor diode, Parametric amplifier, Microwave transistors

Contemporary Issues related to Topic

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Unit :6	**Micro-Strip Lines**	**6 Hours**

Introduction on Micro strip lines, characteristic impedance of micro strip lines, losses in micro strip lines, quality factor of micro strip, parallel strip lines, coplanar strip lines and shielded strip lines.

Contemporary Issues related to Topic

Total Lecture Hours	**39 Hours**

Textbooks	
1	Samuel Y. Liao ,Microwave Devices and Circuits, 3rd edition, Pearson Education
2	Robert E. Collin ,Foundations for Microwave Engineering, 2nd edition, McGraw Hill
Reference Books	
1	Annapurna Das, Sisir K. Das, Microwave Engineering, McGraw Hill
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	microwave-devices-and-circuits-samuel-liao.pdf
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/108/103/108103141/
2	https://nptel.ac.in/courses/108/101/108101112/

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Electronics and Telecommunication Engineering

SoE No.
22ET-101

VII Semester

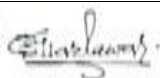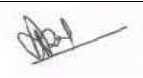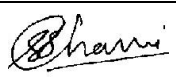## 22ET702 – Lab Microwave Theory and Techniques

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Analyze the behaviour of linear beam and cross field tubes.
2. Analyze behaviour of different passive components using s-matrix.
3. Measure performance parameters of microwave devices.
4. Explore various microwave solid state devices.
5. Realize the importance of Microwave Integrated circuit.

SN	List of Experiments
1	To determine frequency of reflex klystron & determine its electronic tuning range
2	To verify power Vs repellar voltage characteristics of Reflex Klystron.
3	To verify frequency Vs repellar voltage characteristics of Reflex Klystron.
4	To verify performance of waveguide tees- E-Plane tee & H-plane Tee.
5	To verify performance of E-H plane tee (Magic Tee)
6	To verify performance of Directional Coupler.
7	To verify performance of Cross-hole Coupler.
8	To verify performance of 3-port circulator
9	To verify performance of isolator.
10	To find relationship between Cut-off wavelength, free space wavelength & guide wavelength using slotted line section
11	To verify V-I characteristics of Gunn diode.

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Electronics and Telecommunication Engineering

SoE No.
22ET-101

VII Semester

22ET703 – Computer Network

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Compare data transmission protocols and understand the applications of communication network
2. Apply the knowledge of LAN structure to design data communication system.
3. Detect Data transmission errors in communication networks.
4. Compare different data security protocols

Unit:1	Computer Network and Internet	7 Hours
Internet, the network edge, ISPs and Internet backbone, Protocol layers and their service models, History of Computer network and Internet **Contemporary Issues related to Topic**		
Unit:2	Link Layer and Local Area Networks	6 Hours
Services, error detection and correction techniques, multiple access protocols, and link layer addressing, Ethernet, Hubs and Switches, PPP **Contemporary Issues related to Topic**		
Unit:3	Network Layer	7 Hours
Network layer design issues, IP packets, IP addressing, virtual circuit and datagram networks, router and routing algorithms, congestion, internetworking, UDP, routers and gateways **Contemporary Issues related to Topic**		
Unit:4	Transport Layer	8 Hours
Transport layer design issues, transport service primitives, internet transport protocol TCP/IP architecture, TCP/IP protocol, TCP/IP utilities, wireless TCP **Contemporary Issues related to Topic**		
Unit:5	Security in Communication Networks	6 Hours
Network Security, cryptography, authentication, Integrity, firewalls, attacks and countermeasures, **Contemporary Issues related to Topic**		
Unit :6	Application Layer	5 Hours
Principles of Network Applications, the web and HTTP, FTP, Email, DNS **Contemporary Issues related to Topic**		
Total Lecture Hours		**45 Hours**

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Textbooks	
1	Data Communication and Networking Behrouz Forouzan Fifth Edition McGraw Hill
2	Computer Networking A top down Approach Featuring and Internet James F. Kurose Third Edition Pearson
Reference Books	
1	**Computer Networks** Andrew Tanenbaum Fourth Edition Prentice Hall PTR
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	
MOOCs Links and additional reading, learning, video material	
1	NPTEL course link Computer Networks and Internet Protocol Prof Soumya Kanti Ghosh & Prof Sandip

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Electronics and Telecommunication Engineering

SoE No.
22ET-101

VII Semester

22ET704 –Lab Computer Network

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Compare data transmission protocols and understand the applications of communication network 2. Apply the knowledge of LAN structure to design data communication system. 3. Detect Data transmission errors in communication networks. 4. Compare different data security protocols
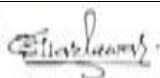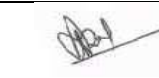
SN	Experiments based on
1	Perform network utility commands
2	How to bring two computers in a network
3	To study LAN structures
4	To implement LAN topology cluster network
5	To configure DNS server
6	To perform stuffing and de-stuffing operation on a given array
7	To Perform data encryption and data decryption
8	Write a program for simple stop n wait protocol
9	Write a program for go back n protocol
10	Write a program for selective repeat ARQ protocol
11	Implement LAN using star topology. Also study the LAN structure of **YCCE**

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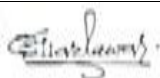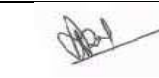(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)
B. Tech SoE and Syllabus 2022
(Scheme of Examination w.e.f. 2022-23 onward)
Electronics and Telecommunication Engineering

SoE No.
22ET-101

VII Semester

22ET711 –PE IV: Satellite Communication

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Elaborate satellite orbits and satellite system, propagation of satellites
2. Illustrate the Space craft subsystem, and effect of various weather conditions on satellite
3. Illustrate Earth station technology and tracking of satellites.
4. Elaborate Satellite Broadcast system in application of satellite system.

Unit:1	Introduction To Satellite Communication	7 Hours

Introduction: Origin of Satellite communication, Kepler's Laws, Current state of satellite communication. Orbital aspect of satellite communication: Orbital mechanism, equation of orbit, locating satellite in orbit, orbital elements, and orbital perturbation.

Contemporary Issues related to Topic

Unit:2	Orbit Dynamics	6 Hours

LEO,MEO,Geo stationary and Non Geo-stationary orbits, station keeping, frequency allocation, frequency co-ordination and regulatory services, sun transit outrages, limits of visibility, launching vehicles and propulsion.

Contemporary Issues related to Topic

Unit:3	Space craft subsystem	7 Hours

Space craft subsystem: Attitude and orbit control system, Telemetry tracking and command power system, and communication subsystem. Propagation on satellite.

Contemporary Issues related to Topic

Unit:4	Earth's path	6 Hours

Earth's path – propagation effects, atmospheric absorption, Scintillation effects, Land and Sea multipath, Rain and ice effects, Rain drop distribution, calculation of attenuation. Rain effects on Antenna noise temperature , Design aspects of satellite uplink and downlink.

Contemporary Issues related to Topic

Unit:5	Earth Station technology	6 Hours

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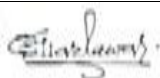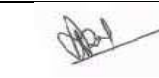
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Earth Station technology: Earth Station design; antennas tracking, LNA, HPA, RF multiplexing, factors affecting orbit utilization, equipment for earth station.

Contemporary Issues related to Topic

Unit :6	Direct Broadcast	7 Hours

Direct Broadcast satellites (DBS), Digital Video,Digital audio broadcast (DAB), Business TV(BTV), GRAMSAT, Specialized service- Video conferencing, internet, Case Study on trends in satellite communication.

Contemporary Issues related to Topic

Total Lecture Hours	39 Hours

Textbooks	
1	Satellite Communication ,Fourth edition, 2017, Dennis Roddy, McGraw-Hill.
2	Satellite Communications ,second edition. Timothy Pratt, Wiley.
Reference Books	
1	Satellite Communication Systems Engineering, Wilbur L. Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, Second Edition, PEARSON
2	Satellite Communications,2015 , Seventh edition, Dr D C Agrawal, Khanna Publishers.
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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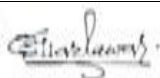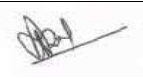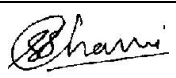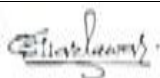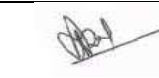
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VII Semester

22ET712 –PE IV: Error Correcting Code

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Elaborate the various codes for error detection & correction
2. Apply the concepts of information theory for source and channel coding/decoding.
3. Determine error detecting and correcting capability of linear & block codes
4. Analyze error control capability for cyclic, BCH and Convolutional codes

Unit:1	CHANNEL CAPACITY AND CODING	6 Hours
Introduction, Channel Models, Channel Capacity, Channel Coding, Information Capacity Theorem, The Shannon Limit, Random Selection Of Codes, Hamming Distance, Few Points of Information Theory	
Contemporary Issues related to Topic	

Unit:2	BLOCK CODES	7 Hours
Coding for reliable digital transmission and storage. Groups, Rings, Vector Spaces, Galois Fields, Polynomial rings The Digital Communication Channel, Introduction To Block Codes, Single Parity Check Codes, Product Codes, Repetition Codes, Hamming Codes, Minimum Distance Of Block Codes, Soft – Decision Decoding, Automatic Repeat Request Schemes	
Contemporary Issues related to Topic	

Unit:3	LINEAR CODES	7Hours
Definition of Linear Codes, Generator Matrices, The Standard Array, Parity - Check Matrices, Error Syndromes, Error Detection And Correction, Shortened And Extended Linear Codes	
Contemporary Issues related to Topic	

Unit:4	CYCLIC CODES	6 Hours
Definition Of Cyclic Codes, Polynomials, Generator Polynomials, Encoding Cyclic Codes, Decoding Cyclic Codes, Factors Of XN +1, Parity-Check Polynomials, Dual Cyclic Codes, Generator And Parity-Check Matrices Of Cyclic Codes	
Contemporary Issues related to Topic	

Unit:5	BCH CODES	6 Hours
Linear Algebra, Galois Field, Definition and Construction of Binary BCH Codes, Error Syndromes In Finite Fields, Decoding SEC and DEC, Reed- Solomen Codes, LDPC codes	
Contemporary Issues related to Topic	

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Unit :6	**CONVOLUTION CODES**	**7 Hours**
Convolution, Encoding Convolutional Codes, Generator Matrices For Convolutional Codes, Generator Polynomials For Convolutional Codes, Graphical Representation Of Convolutional Codes, The Viterbi Decoder. Concept Of Interleaver and Puncture Coding, Applications of error control coding **Contemporary Issues related to Topic**		
Total Lecture Hours		**39 Hours**

Textbooks	
1	Gravano Salvatore, Introduction to Error Control Codes, 1st Ed., 2007. Oxford University Press,
2	Moon Tood K, Error Correction Coding Mathematical Methods and Algorithms, 1st Ed., 2006, Wiley-Interscience
3	Sklar Bernard, Digital Communications - Fundamentals and Applications, 2nd Ed., 2009., Pearson Education-LPE,
Reference Books	
1	Bose Ranjan, Information Theory, Coding and Cryptography, 1st Ed., 2007, Tata McGraw-Hill
2	Shu Lin, Daniel J. Costello, Error Control Coding- Fundamentals and Applications ,Prentice Hall, Inc
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/KENNEDY%204th%20edition.pdf
2	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Simon%20Haykin%20-%20Communication%20Systems%204th%20Edition%20(2000,%20Wiley).pdf
MOOCs Links and additional reading, learning, video material	
1	www.digimat.in/nptel/courses/video/117108044/L01.html

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VII Semester

22ET713 –PE IV: Switching Theory

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 sequential circuits. and test the sequential machines with experiments   4. Design and analyze the asynchronous sequential circuits

Unit:1	Multi-level logic synthesis	**7 Hours**
Technology-independent synthesis: Factoring, Decomposition, Extraction, Substitution, and Technology mapping: steps in technology mapping **Contemporary Issues related to Topic**		

Unit:2	Threshold logic for nanotechnologies	**6 Hours**
Threshold elements, synthesis of threshold networks: Unate function, Identification & Realization of threshold function **Contemporary Issues related to Topic**		

Unit:3	Testing of combinational circuits	**7 Hours**
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 and iterative networks	**7 Hours**
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	State-identification experiments and testing of sequential circuits	**6 Hours**
Experiments, Uncertainties, the successor tree, Homing experiments, Distinguishing experiments, Machine identification, Checking experiments, Built-in self-test (BIST). **Contemporary Issues related to Topic**		

Unit :6	Asynchronous sequential circuits	**6 Hours**

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Modes of operation, Hazards, Design of SIC hazard-free circuits, Design of MIC hazard-free circuits,Synthesis of SIC fundamental-mode circuits

Contemporary Issues related to Topic

Total Lecture Hours	39 Hours

Textbooks	
1	Switching & Finite Automata Theory, Zvi Kohavi, Niraja K. Jha Third Edition 2010 Cambridge University Press
2	Fundamentals of Digital Logic With VHDL Design ,Stephen Brown,Second Edition, 2007 TMH
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/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/KENNEDY%204th%20edition.pdf
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/106/105/106105185/
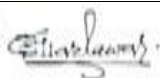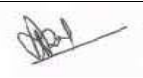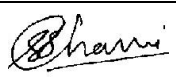
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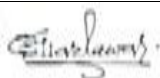
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VII Semester

22ET714 –PE IV: Pattern recognition

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Identify and describe pattern recognition techniques and their roles in building intelligent machines.
2. Recognize the feasibility of applying pattern recognition methodology for a particular problem in pattern classification and regression.
3. Apply clustering and probability theory to handle uncertainty and solve engineering problems.
4. Evaluate and compare solutions by various pattern recognition approaches for a given problem

Unit:1	**Introduction**	**6 Hours**

Applications of Pattern Recognition, Statistical Decision Theory, Feature Detection, Classification, Problems.

Contemporary Issues related to Topic

Unit:2	**Probability Theory**	**7 Hours**

Probabilities of Events, Random Variables, Joint Distributions and Densities Moments of Random Variables ,Estimation of Parameters from Samples, Minimum Risk Estimators, Problems

Contemporary Issues related to Topic

Unit:3	**Statistical Decision Making**	**6 Hours**

Introduction, Bayes' Theorem, Multiple Features, Conditionally Independent Features, Decision Boundaries ,Unequal Costs of Error ,Estimation of Error Rates, The Leaving-One-Out Technique, Characteristic Curves, Estimating the Composition of Populations, Problems

Contemporary Issues related to Topic

Unit:4	**Nonparametric Decision Making**	**7 Hours**

Introduction, Histograms, Kernel and Window Estimators, Nearest Neighbor Classification Techniques, Adaptive Decision Boundaries, Adaptive Discriminant Functions , Minimum Squared Error Discriminant Functions, Choosing a Decision Making Technique, Problems

Contemporary Issues related to Topic

Unit:5	**Clustering**	**6 Hours**

Introduction, Hierarchical Clustering, Partitional Clustering, Problems

Contemporary Issues related to Topic

Unit :6	**Neural Networks**	**7 Hours**

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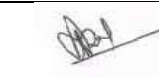# Yeshwantrao Chavan College of Engineering

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Artificial Neural Networks: Single layer and multilayer NN, The Back- Propagation Algorithm, Introduction to deep learning, convolutional neural networks, Recent trends in Pattern Recognition.

Contemporary Issues related to Topic

Total Lecture Hours	**39 Hours**

Textbooks	
1	Pattern Recognition and Image Analysis, Earl Gose,Richard Johnsonbaugh, Printice Hall
2	Pattern Classification, Richard O. Duda, Peter E. Hart and David G. Stork, 2nd Edition, John Wiley, 2006
Reference Books	
1	Pattern Recognition and Machine Learning, 2009, C. M. Bishop,Springer,
2	Pattern Recognition, 2009, Theodoridis and K. Koutroumbas, 4th Edition, Academic Press
3	RobertJ, Schalkoff, "Pattern Recognition: Statistical, Structural and Neural Approaches", John Wiley & SonsInc.,New York, Reprint2014.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://link.springer.com/openurl?genre=book&isbn=978-3-540-24121-8
2	http://link.springer.com/openurl?genre=book&isbn=978-3-642-36529-4
3	http://link.springer.com/openurl?genre=book&isbn=978-3-540-85129-5
MOOCs Links and additional reading, learning, video material	
1.	https://nptel.ac.in/courses/117105101
2.	https://nptel.ac.in/courses/106106046
3.	https://nptel.ac.in/courses/117108048
4.	https://onlinecourses.nptel.ac.in/noc19_ee56/preview
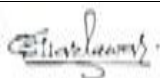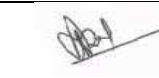
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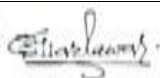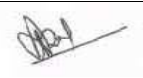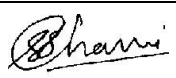**B. Tech SoE and Syllabus 2022**
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Electronics and Telecommunication Engineering

VII Semester
22ET715–PE IV: VLSI Mixed Signal Design

Course Outcomes:
Upon successful completion of the course the students will be able to

1. Explain metal-oxide-semiconductor field-effect transistors and the relationship of process technology with models used for analog IC.
2. Apply mixed signal VLSI concepts to design MOS circuits.
3. Analyze CMOS digital circuits and provide exposure to the complex, non-digital behaviour of the devices and circuits

Unit:1	**Introduction to Mixed Signal**	**7 Hours**

Introduction to Mixed Signal VLSI System, Signal and Filters, digital comb filter, the z-plane, simple digital filters, Sampling and Aliasing
Contemporary Issues related to Topic

Unit:2	**Data Converter**	**6 Hours**

Data Converter SNR: Effective number of bits Clock jitter, Interpolating filters for DACs, Band pass and High pass Sync filters, Using feedback to improve SNR.

Contemporary Issues related to Topic

Unit:3	**Sub-Micron CMOS circuit design**	**6 Hours**

Sub-Micron CMOS circuit design : Process flow, capacitors and resistors, MOSFET Switch, Delay and Adder elements
Contemporary Issues related to Topic

Unit:4	**Implementing Data converters**	**7 Hours**

Current mode and voltage mode R-2R DAC, Using Op-Amps in data converters, Implementing ADCs, Cyclic ADC, Introduction to Sigma Delta ADC and Line Drivers.
Contemporary Issues related to Topic

UNIT:5	**Integrator Based CMOS Filters**	**6 Hours**

Integrator Building Blocks, Low pass and Active R-C filters, MOSFET-C integrators, gm-C Integrators

Contemporary Issues related to Topic

Unit :6	**Bilinear and Bi-quadratic transfer functions**	**7 Hours**

Active R-C Transconductor-C and Switched Capacitor implementations both transfer functions, Canonic form of a digital filter.
Contemporary Issues related to Topic

Total Lecture Hours	**39 Hours**

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Textbooks	
1	"CMOS – Mixed signal circuit design, layout and simulation",R.Jacob Baker, "2nd Edition a. IEEE Press and Wiley Interscience, 2002.
2	"CMOS Circuit Design, Layout, and Simulation", Third Edition, R. Jacob Baker
Reference Books	
1	"Design of Analog CMOS Integrated circuits", B. Razavi, 1st Edition, McGraw Hill, 2001
2	"CMOS Analog Circuit Design", P.E. Allen and D.R. Holberg, 2nd Edition, Oxford University Press, 2002.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20Engineering/29.CMOS%20Circuit%20Design%20Layout%20and%20Simulation_2nd_Baker.pdf
MOOCs Links and additional reading, learning, video material	
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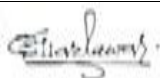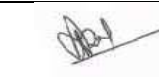(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

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Electronics and Telecommunication Engineering

SoE No.
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VII Semester

22ET716–PE IV: Advanced Embedded System Design

Course Outcomes:		
Upon successful completion of the course, the students will be able to		

1. Analyze various advanced concepts of Embedded System Design.
2. Understand Embedded Processor and its software simulator.
3. Elaborate Embedded systems with different modeling techniques.
4. Design an Embedded system using processors, memory I/O devices, and peripherals.
5. Know the operation of multitasking in an Embedded System and implementation strategies of Embedded networks.

Unit:1	**Introduction to Embedded System**	**7 Hours**

Different Embedded system processors, respective hardware units, software embedded into a system, Examples of an embedded system, Embedded Design life cycle, Layers of Embedded Systems.

Contemporary Issues related to Topic

Unit:2	**Different Types of Instructions of Embedded System**	**6 Hours**

Memory and memory-mapped I/Os 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, and simple assembly language programs.

Contemporary Issues related to Topic

Unit:3	**System design using a general-purpose processor**	**7 Hours**

Microcontroller architectures (RISC, CISC), Embedded Memory, Strategic selection of processor and memory, Memory Devices and their Characteristics, Cache Memory and Various mapping techniques, DMA.

Contemporary Issues related to Topic

Unit:4	**I/O Devices & Networks**	**7 Hours**

Review of ADC, DAC, Timers / Counters, LED, Switches, LCD, Interrupt Controllers, Networks for Embedded systems- USB, PCI, PCI Express, UART, SPI, I2C, CAN, Wireless Applications - Bluetooth, Zigbee.

Contemporary Issues related to Topic

Unit:5	**Evolution of the Internet of Things (IoT) in Embedded Systems**	**6 Hours**

Basic embedded C programs Basic embedded C programs for GPIO and interfacing of different devices like LED, and LCD. Introduction to NODE MCU ESP8266 and ESP 32, NODE MCU ESP8266 Features & Using It with Arduino IDE, NODE MCU ESP8266 Pinout, Power requirement.

Contemporary Issues related to Topic

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Unit:6	Operating Systems	6 Hours

Architectural Support of Operating System Introduction of RTOS, RTOS issues, The shared Data Problem, Software Architectures, Introduction to Linux and Linux Utilities, Unix File Structure, File Mangement.
Contemporary Issues related to Topic

Total Lecture Hours	39 Hours
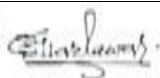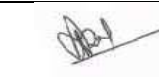
Textbooks	
1	Embedded Linux, Hardware, Software and Interfacing, 2nd Edition 2002, by Craig Hallab augh, Pearson Education Asia.
2	Exploring Arduino: Tools and Techniques for Engineering Wizardry 2nd Edition, 2nd Edition October 24, 2019, by Jeremy Blum, Wiley; 2 edition (October 24, 2019)
Reference Books	
1	System Developer's Guide: Designing and Optimizing, Publish Date: 2004, Sloss Andrew N, Symes Dominic, Wright Chris Morgan Kaufman Publication.
2	Arduino: A Technical Reference, Publish Date: May 2016, J. M. Hughes, O'Reilly Media, Inc.
3	4. Sriram V Iyer, Pankaj Gupta " Embedded Real Time Systems Programming", Tata McGraw-Hill, 2012 5.
4	Steve Heath, "Embedded Systems Design", EDN Series, 2013.
YCCE e-library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Analog%20and%20Digital%20Communication%20Systems%20(%20PDFDrive.com%20).pdf
2	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Electronics%20and%20Telecommunication/Digital%20and%20Analog%20Communication%20Systems%20(%20PDFDrive.com%20).pdf
MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.nptel.ac.in/noc20_ee98/preview

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**SoE No.
22ET-101**

Electronics and Telecommunication Engineering

VII Semester

22ET731 –PE V: Wireless Sensor Networks

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Elaborate common wireless sensor networks.
2. Compare wireless sensor networks with Adhoc networks.
3. Elaborate MAC and physical layer for WSN.
4. Describe Localization and positioning system for WSN
5. Design topology, and clustering methods for WSN

Unit:1	Characteristics Of WSN	7 Hours
Characteristic requirements for WSN - Challenges for WSNs, Applications of WSN – WSN vs Adhoc Networks - Sensor node architecture – Commercially available sensor nodes –IRIS, Mica Mote, EYES nodes, BTnodes, TelosB, Sunspot .		
Contemporary Issues related to Topic		

Unit:2	Network architecture	6 Hours
Optimization goal and figure of merit-design principles for WSN, service interface of WSN, Gateway concept challenges of WSN, comparison with other network.		
Contemporary Issues related to Topic		

Unit:3	Medium Access Control Protocols	7 Hours
Fundamentals of MAC protocols - Low duty cycle protocols and wakeup concepts - Contention- based protocols - Schedule-based protocols - SMAC - BMAC - Traffic-adaptive medium access protocol (TRAMA) .		
Contemporary Issues related to Topic		

Unit:4	Wireless channel and communication fundamental	6 Hours
Wireless channel and communication fundamental, physical layer and transceiver design consideration in WSN.		
Contemporary Issues related to Topic		

Unit:5	Naming and addressing	6 Hours
Naming and addressing, Time synchronization, Properties of Localization and positioning procedures, single hop localization, positioning in multihop environments, and impact of anchor placement.		
Contemporary Issues related to Topic		

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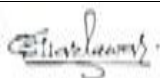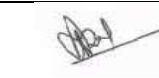(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

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Electronics and Telecommunication Engineering

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Unit :6	Data centric routing	7 Hours

Data centric routing, Data aggregation, Data centric storage, Topology control-controlling topology in a flat network, Hirarical network by dominating set, Hierarchical network by clustering, combining Hierarchical topologies and power control– Case Study: IEEE 802.15.4 LR-WPANs Standard - Target detection and tracking .

Contemporary Issues related to Topic

Total Lecture Hours	39 Hours

Textbooks	
1	Wireless Sensor Networks Technology, Protocols, and Applications" , Kazem Sohraby, Daniel Minoli and Taieb Znati,, John Wiley & Sons,, 2010.
2	Protocols and architecture for Wireless sensor Networks, Holger Karl, Andreas Willig, Wiley Publications, 2011.
3	Wireless Sensor Network Designs, Anna Hac , Wiley Publications,2003.
Reference Books	
1	Wireless Sensor Networks : A systems perspective, Nirupama Bulusu and Sanjay Jha, Artech House Publications, August 2005.
2	Wireless Sensor Networks : Architecture and Protocols , Jr., Edgar H. Callaway, Auerbach Publications, 2003..
3	Wireless Sensor Networks , Raghavendra, Krishna M. Sivalingam and TaiebZnati, Springer Publications, 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://nptel.ac.in/courses/106105160
2	https://archive.nptel.ac.in/courses/106/105/106105160/

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SoE No.
22ET-101

VII Semester

22ET732 –PE V: Augmented Reality & Virtual Reality

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Describe how VR systems work and list the applications of VR.
2. Analyze the hardware requirement of VR/AR systems
3. Explain the system of human vision and its implication on perception and rendering.
4. Describe how AR systems work and list the applications of AR

Unit:1	Introduction to Augmented Reality (A.R)	7 Hours

What Is Augmented Reality - Defining augmented reality, history of augmented reality, The Relationship Between Augmented Reality and Other Technologies-Media, Technologies, Other Ideas Related to the Spectrum Between Real and Virtual Worlds, applications of augmented reality Augmented Reality Concepts- How Does Augmented Reality Work? Concepts Related to Augmented Reality, Ingredients of an Augmented Reality Experience.

Contemporary Issues related to Topic

Unit:2	Augmented Reality Hardware	6 Hours

Augmented Reality Hardware – Displays – Audio Displays, Haptic Displays, Visual Displays, Other sensory displays, Visual Perception, Requirements and Characteristics, Spatial Display Model. Processors – Role of Processors, Processor System Architecture, Processor Specifications. Tracking & Sensors - Tracking, Calibration, and Registration, Characteristics of Tracking Technology, Stationary Tracking Systems, Mobile Sensors, Optical Tracking, Sensor Fusion

Contemporary Issues related to Topic

Unit:3	Computer Vision for Augmented Reality & A.R. Software	7 Hours

Computer Vision for Augmented Reality - Marker Tracking, Multiple-Camera Infrared Tracking, Natural Feature Tracking by Detection, Simultaneous Localization and Mapping, Outdoor Tracking Augmented Reality Software - Introduction, Major Software Components for Augmented Reality Systems, Software used to Create Content for the Augmented Reality Application.

Contemporary Issues related to Topic

Unit:4	Introduction to Virtual Reality	6 Hours

Defining Virtual Reality, History of VR, Human Physiology and Perception, Key Elements of Virtual Reality Experience, Virtual Reality System, Interface to the Virtual World-Input & output- Visual, Aural & Haptic Displays, Applications of Virtual Reality. Case Study: use of Virtual Reality at NASA

Contemporary Issues related to Topic

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Unit:5	Representing the Virtual World	7 Hours

Representation of the Virtual World, Visual Representation in VR, Aural Representation in VR and Haptic Representation in VR

Contemporary Issues related to Topic

Unit :6	The Geometry of Virtual Worlds &The Physiology of Human Vision	6 Hours

Geometric Models, Changing Position and Orientation, Axis-Angle Representations of Rotation, Viewing Transformations, Chaining the Transformations, Human Eye, eye movements & implications for VR.

Contemporary Issues related to Topic

Total Lecture Hours	39 Hours

Textbooks	
1	Augmented Reality: Principles & Practice by Schmalstieg / Hollerer, Pearson Education India; First edition (12 October 2016),ISBN-10: 9332578494
2	Understanding Virtual Reality: Interface, Application and Design, William R Sherman and Alan B Craig, (The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002
3	Virtual Reality, Steven M. LaValle, Cambridge University Press, 2016
Reference Books	
1	Developing Virtual Reality Applications: Foundations of Effective Design, Alan B Craig, William R Sherman and Jeffrey D Will, Morgan Kaufmann, 2009
2	Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach", 2005
3	Doug A Bowman, Ernest Kuijff, Joseph J LaViola, Jr and Ivan Poupyrev, "3D User Interfaces, Theory and Practice", Addison Wesley, USA, 2005.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://lavalle.pl/vr/book.html
	https://docs.microsoft.com/en-us/windows/mixed-reality/
MOOCs Links and additional reading, learning, video material	
1.	https://nptel.ac.in/courses/106/106/106106138/
2.	https://www.coursera.org/learn/introduction-virtual-reality
3.	https://www.coursera.org/learn/ar
4.	https://www.udemy.com/course/master-computer-vision-with-opencv-in-python/?gclid=EAIaIQobChMIotP6u7K36gIV8wl9Ch0naQ32EAAYASAAEgKvC_D_BwE&matchtype=b&utm_campaign=LongTail_CA&utm_content=deal4584&utm_medium=udemyads&utm_source=adwords&utm_term=_._ag_68541802798_._ad_340740475847_._kw_%2Bopencv+%2Bcourse_._de_c_._dm__._pl__._ti_kwd-649410253615_._li_9001160_._pd__._

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SoE No.
22ET-101

VII Semester

22ET733 –PE V: Low Power VLSI

Course Outcomes:
Upon successful completion of the course the students will be able to   1. Identify clearly the sources of power consumption in a given VLSI Circuit.   2. Design low power arithmetic circuits and systems.   3. Choose the types of SRAMs/ DRAMs for the given Low power applications.   4. Decide at which level of abstraction is advantageous to implement low power techniques in a VLSI system design.

Unit:1	**POWER DISSIPATION IN**	**7 Hours**
Hierarchy of limits of power – Sources of power consumption – Physics of power dissipation in CMOS FET devices – Basic principle of low power design **Contemporary Issues related to Topic**		

Unit:2	**POWER OPTIMIZATION**	**6 Hours**
Logic level power optimization – Circuit level low power design – circuit techniques for reducing power consumption in adders and multipliers. **Contemporary Issues related to Topic**		

Unit:3	**DESIGN OF LOW POWER CIRCUITS**	**7 Hours**
Computer arithmetic techniques for low power system – reducing power consumption in memories – low power clock, Inter connect and layout design – Advanced techniques – Special techniques. **Contemporary Issues related to Topic**		

Unit:4	**POWER ESTIMATION**	**6 Hours**
Power Estimation technique – logic power estimation – Simulation power analysis – Probabilistic power analysis. **Contemporary Issues related to Topic**		

UNIT:5	**MEMORIES**	**7Hours**
Sources of power dissipation in SRAMs, Low power SRAM circuit techniques, Sources of power dissipation in DRAMs, Low power DRAM circuit techniques, Low Power Techniques for SRAM,SRAM Cell , Memory Bank Partitioning , Pulsed Wordline and Reduced BitIine Swing **Contemporary Issues related to Topic**		

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Electronics and Telecommunication Engineering

Unit :6	ADVANCED TECHNIQUES	6 Hours
Complementary Adiabatic Logic , Power Efficiency of Adiabatic Logic, pass Transistor Logic Synthesis, Basics of Pass Transistor Logic, Boolean Decision Diagram and Pass Transistor Logic ,Pass Transistor Logic Synthesis System **Contemporary Issues related to Topic**		
Total Lecture Hours		**39 Hours**

Textbooks	
1	Kaushik Roy and S.C.Prasad, "Low power CMOS VLSI circuit design", Wiley, 2000.
2	Dimitrios Soudris, Christians Pignet, Costas Goutis, "Designing CMOS Circuits for Low Power", Kluwer, 2002.
Reference Books	
1	J.B.Kulo and J.H Lou, "Low voltage CMOS VLSI Circuits", Wiley 1999.
2	A.P.Chandrasekaran and R.W.Broadersen, "Low power digital CMOS design", Kluwer,1995
3	Abdelatif Belaouar, Mohamed.I.Elmasry, "Low power digital VLSI design", Kluwer, 1995.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	https://drive.google.com/file/d/0BzoKWH8M1BoTOTl5ZEZtdXhMSW8/view?usp=sharing&resourcekey=0-EtE6UuviRslRmJVX7DVFLQ
2	https://drive.google.com/file/d/0BzoKWH8M1BoTQl9CUUpOYlpuYjQ/view?usp=sharing&resourcekey=0-FD5XWGmOlwV9q8xi7uetjw
3	https://drive.google.com/file/d/0BzoKWH8M1BoTZi11R3QzWldxWVk/view?usp=sharing&resourcekey=0-pDg2As058cMcq1gxRhVKVw
MOOCs Links and additional reading, learning, video material	
1	https://archive.nptel.ac.in/courses/106/105/106105034/

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Electronics and Telecommunication Engineering

SoE No.
22ET-101

VII Semester

22ET734–PE V: Biomedical Engineering

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Elaborate Fundamentals of Biomedical Instrumentation and its Electrodes
2. Explain the measuring and recording instruments
3. Describe the functioning of imaging systems.
4. Describe the functioning of therapeutic equipment's

Unit :1	Fundamentals of Biomedical Instrumentation and its Electrodes.	7 Hours

Introduction to Physiological System of Human Body, Sources of Biomedical Signals, Man instrument system, Basic Medical Instrumentation System, Origin of Bioelectric Signals, Recording Electrodes, Electrodes for ECG. Electrodes for EEG, Electrodes for EMG.

Contemporary Issues related to Topic

Unit:2	Biomedical recorders and its Systems.	6 Hours

Basic Recording System, Biomedical Signal Analysis Techniques, Electrocardiograph Phonocardiograph (PCG), Electroencephalo-graph (EEG), Electromyograph (EMG) , Other Biomedical Recorders.

Contemporary Issues related to Topic

Unit:3	Measuring Instrumentation	6 Hours

Blood pressure measurement, Heart sound measurement oximetry, Pulse Oximeter, Electromagnetic Blood Flowmeter, Ultrasonic Blood Flow meters,
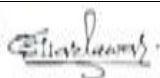
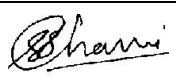**Contemporary Issues related to Topic**

Unit:4	Analysers	7 Hours

Pulmonary Function Measurements, Spirometry, Pneumo-tachometers, Measurement of Volume Respiratory Gas Analyzers, Acid-base Balance, Blood pH Measurement, Blood pO2 Measurement.

Contemporary Issues related to Topic

Unit:5	Imaging Systems	6 Hours

Basis of Diagnostic Radiology, Nature and Production of X-rays, Visualization of X-rays Physical Parameters for X-ray Detectors, Ultrasonic Imaging Systems Medical Ultrasound, Basic Pulse-echo Apparatus, A-Scan , Echocardiograph (M-mode), B-Scanner, Real-time Ultrasonic Imaging Systems, MRI
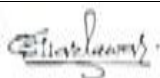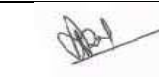
Contemporary Issues related to Topic

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Unit:6	Therapeutic Equipment	7 Hours
Cardiac Pacemakers: Need for Cardiac Pacemaker, External Pacemakers Implantable Pacemakers. Cardiac Defibrillators: Need for a Defibrillator, DC Defibrillator, and Implantable Defibrillators Ventilators: Its types and characteristics. **Contemporary Issues related to Topic**		
Total Lecture Hours		39 Hours

Textbooks	
1	Joseph Carr, Brown, Introduction to Biomedical Equipment, Pearson, 2014
2.	Khandpur R.S, Hand Book of Biomedical Instrumentation – Tata McGraw Hill publication , New Delhi, 2014.
Reference Books	
1	Leslie Cromwell, "Biomedical Instrumentation and measurement", PHI, New Delhi, 2015
2	John G. Webster, "Medical Instrumentation Application and Design", John Wiley and sons, New York, 2015.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://link.springer.com/openurl?genre=book&isbn=978-1-4471-4474-8
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/108105101

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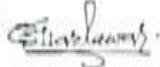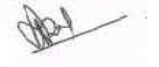## Electronics and Telecommunication Engineering

SoE No.
22ET-101

VII Semester

22ET735 –PE V: Data Compression and Encryption

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Elaborate text, audio, image and video compression techniques.
2. Elaborate data and network security issues.
3. Implement text compression Techniques.
4. Implement Symmetric and Asymmetric Key Cryptography schemes.

Unit:1	Introduction to Data Compression	7 Hours

Data Compression: Modelling and Coding, Statistical Modelling, Dictionary Schemes, LZ, Lossy Compression, Shannon – Fano Algorithm, Huffman Algorithm, Adaptive Huffman Coding, Difficulties in Huffman Coding, Arithmetic Coding – Decoding, Dictionary Based Compression, Sliding Window Compression: LZ-77, LZ-78, and LZW.

Contemporary Issues related to Topic

Unit:2	Image Compression	6 Hours

DCT, JPEG, JPEG – LS, Differential Lossless Compression, DPCM, JPEG – 2000 Standards

Contemporary Issues related to Topic

Unit:3	Video and Audio Compression	7 Hours

Digital Video, MPEG – 2, H – 261 Encoder and Decoder Sound, Digital Audio, µ-Law and A-Law Companding, MPEG – 1 Audio Layer (MP3 Audio Format).

Contemporary Issues related to Topic

Unit:4	Data Security	6 Hours

Security Goals, Cryptographic Attacks, Techniques Symmetric Key: Substitution Cipher, Transposition Cipher, Stream and Block Cipher DES, AES.

Contemporary Issues related to Topic

Unit:5	Number Theory and Asymmetric Key Cryptography	7 Hours

Euler's theorems, Chinese remainder theorem, Principles of public key cryptography, RSA algorithm, Diffie-Hellman Key Exchange. Elliptic curve cryptology, message authentification and Hash functions, Hash and Mac algorithms, Digital signatures.

Contemporary Issues related to Topic

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Unit :6	**Network Security**	**6 Hours**
	Email, PGP, S/MIME, Intrusion Detection System Web Security Considerations, SSL Architecture, SSL Message Formats, TLS, Secure Electronic Transactions Kerberos, X.509 Authentication Service, Public Key Infrastructure. **Contemporary Issues related to Topic**	
Total Lecture Hours		**39 Hours**

Textbooks	
1	Mark Nelson, Jean-Loup Gailly,The Data Compression Book‖, 2nd edition, BPB Publications
2	Khalid Sayood, ‖Introduction to Data Compression‖, 2nd Edition Morgan Kaufmann
3	William Stallings, ―Cryptography and Network Security Principles and Practices 5th Edition‖, Pearson Education
4	Behrouz A. Forouzan, ―Cryptography and Network Security‖, Tata McGraw-Hill
Reference Books	
1	David Salomon, ―Data Compression: The Complete Reference‖, Springer.
2	Matt Bishop, ―Computer Security Art and Science‖, Addison-Wesley.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	https://www.mbit.edu.in/wp-content/uploads/2020/05/data_compression.pdf
2	http://www.cs.vsb.cz/ochodkova/courses/kpb/cryptography-and-network-security_-principles-and-practice-7th-global-edition.pdf
3	https://doc.lagout.org/Others/Information%20Theory/Compression/Data%20Compression%20The%20Complete%20Reference%203rd%20Ed%20-%20David%20Salomon.pdf
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/106/105/106105031/

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SoE No.
22ET-101

VII Semester

22ET736 –PE V: RADAR Engineering

Course Outcomes:	
Upon successful completion of the course the students will be able to	
1. Elaborate the Fundamentals of Radar System.	
2. Analyse Different types of Radar and their working.	
3. Elaborate Different Transmitters and Antennas and duplexers	
4. Analyse the types of radar Clutters	
Unit:1 Basics of RADAR	7 Hours
Basics of Radar: Introduction to Radar, Principle of RADAR, Radar Block Diagram and Operation, Radar Range Equation, Illustrative Problems Radar Frequencies and Applications of Radar, Continuous Wave(CW)Radar and Continuous Wave(CW)Radar with IF Amplification, Frequency Modulated (FM)Radar – Block Diagram **Contemporary Issues related to Topic**	
Unit:2 RADAR Types	6 Hours
Doppler Effect, MTI and Pulse Doppler Radar: Introduction, Principle, Moving Target Indicator(MTI) -Coherent MIT Radar and non coherent MTI radar, Delay Line Cancellers, Blind Speeds, Traking Radar: Tracking with Radar, Sequential Lobing , Conical Scan, Monopulse Tracking Radar. **Contemporary Issues related to Topic**	
Unit:3 Transmitters	6 Hours
Radar transmitters, Magnetron, Travelling wave tube, Klystron Amplifiers, Modulators . **Contemporary Issues related to Topic**	
Unit:4 RADAR Antennas	7 Hours
Radar antennas , paraboloid reflectors, offset parabolic reflector, types of feeds, Cassegrain Feed, scanning field reflectors, lens antennas . **Contemporary Issues related to Topic**	
Unit:5 Duplexers and Displays	6Hours
Radar Receivers, Duplexer: Branch type duplexer and Balanced Duplexer, Phase Array ,Types of Displays detection of radar signals in noise signals. **Contemporary Issues related to Topic**	

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Unit :6	RADAR Clutters	7 Hours

Radar Clutters, surface clutter radar equation, Angles used in describing geometry of the radar, Sea Clutter and Land clutter effect of weather on Radar, detection of targets in precipitation, synthetic aperture radar, HF over horizon Radar.

Contemporary Issues related to Topic

Total Lecture Hours	39 Hours

Textbooks	
1	Introduction to Radar Systems – Merrill I. Skolnik, Tata McGraw-Hill, 2nd Edition, 2007.
2	Radar Principals, Technology, Applications – Byron Edde, Pearson Education, 2007.
Reference Books	
1	Electronic Communication Systems by George Kennedy 3rd Edition McGRAW-Hill
2	Radar Systems Principle Harold R.Raeme
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	
MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.nptel.ac.in/noc22_ee114 Principles And Techniques of Modern Radar Systems - Course (nptel.ac.in)

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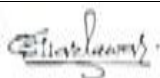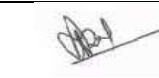(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)
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Electronics and Telecommunication Engineering

SoE No.
22ET-101

VII Semester

22ET751 –PE VI: 5G Communications

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Understand the 5G Technology advances and benefits.
2. Learn 5G Architecture and air interface.
3. Explore the Transmission Channel access techniques of 5G.
4. Insight about Device to Device Communication.
5. Explore the Channel Models, Interference and Mobility Management.

Unit:1	Introduction to 5G	6 Hours

Evolving 1G to 5G capability, An Overview of 5G requirements, 5G NR and 5G core network (5GCN) - 5G Standardization, Regulations for 5G,Spectrum Analysis and Sharing for 5G, Challenges and Applications.
Contemporary Issues related to Topic

Unit:2	5G Architecture	7 Hours

5G Architecture: Software Defined Networking, Network Function Virtualization, Basics about RAN Architecture, High-Level Requirements for 5G Architecture and 5G Flexibility, Functional Architecture, Physical Architecture and 5G Deployment of Millimeter Wave Communication, Channel Propagation, Hardware Technologies for mmW Systems, Deployment Scenarios, Architecture and Mobility, Beamforming, Physical layer Techniques.
Contemporary Issues related to Topic
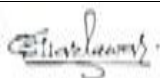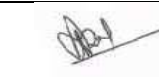
Unit:3	The 5G Radio Transmission Channel Access techniques	6 Hours

Basic requirements of transmission over 5G, Modulation Techniques – Orthogonal Frequency Division Multiplexing (OFDM), MIMO-OFDM, Generalized Frequency Division Multiplexing (GFDM), Multiple Accesses Techniques – Orthogonal Frequency Division Multiple Accesses (OFDMA), Comparison of multiple access methods.

Contemporary Issues related to Topic

Unit:4	Device - to Device (D2D) Communication	7 Hours

Device-to-Device (D2D) and Machine-to-Machine (M2M) type communications, Extension of 4G D2D, standardization to 5G, radio resource management for mobile broadband D2D, multi-hop and multi-operator D2D communications.
Contemporary Issues related to Topic

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Unit:5	**Channel Models for 5GNR**	**6 Hours**
Channel Hierarchy in 5G NR, Logical Channels and Transport Channels in 5G NR, Physical Layer Data Channels in 5G NR, Downlink Physical Channel and Uplink Physical Channels, Propagation Channel models for 5G.	
Unit :6	**Interference management, mobility management, and security for 5G**	**7 Hours**
Network deployment types, Ultra-dense network or densification, Moving networks, Heterogeneous networks, Interference management in 5G, Interference management in UDN, Interference management for moving relay nodes, Interference cancelation, mobility management in 5G, User equipment- controlled versus network-controlled handover, Mobility management in heterogeneous 5G networks. **Contemporary Issues related to Topic**	
Total Lecture Hours		**39 Hours**

	Textbooks
1	Asif Oseiran, Jose F.Monserrat and Patrick Marsch, "5G Mobile and Wireless Communications Technology", Cambridge University Press, Second Edition, 2016
2	Jonathan Rodriquez, "Fundamentals of 5G Mobile Networks", Wiley, 2015
3	Martin Sauter "From GSM From GSM to LTE–Advanced Pro and 5G: An Introduction to Mobile Networks and Mobile Broadband", Wiley-Blackwell
4	Erik Dahlman, Stefan Parkvall, Johan Skold, "5G NR: The Next Generation Wireless Access Technology", Elsevier, First Edition, 2016.
	Reference Books
1	Patrick Marsch, Omer Bulakci, Olav Queseth and Mauro Boldi, "5G SystemDesign – Architectural and Functional Considerations and Long Term Research",Wiley, 2018
2	Martin Sauter "From GSM From GSM to LTE–Advanced Pro and 5G: An Introduction to Mobile Networks and Mobile Broadband", Wiley-Blackwell.
3	Theodore S.Rappaport, Robert W.Heath, Robert C.Danials, James N.Murdock "Millimeter Wave Wireless Communications", Prentice Hall Communications.
4	Athanasios G.Kanatos, Konstantina S.Nikita, Panagiotis Mathiopoulos, "New Directions in Wireless Communication Systems from Mobile to 5G", CRC Press

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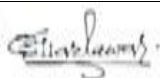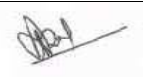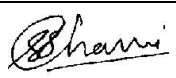|	YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/SERIES%20WISE%20BOOKS/ ELECTRONICS%20AND%20TELE/ELECTRONICS%20AND%20TELE.%20(ER%20Series).pdf
2	https://link.springer.com/book/10.1007/978-3-319-34208-5
3	https://link.springer.com/book/10.1007/978-3-030-51441-9
4	https://link.springer.com/book/10.1007/978-3-319-61869-2
	E Books:
1	https://www.nokia.com/networks/portfolio/radio-access-networks-ran/
2	https://www.huawei.com/minisite/hwmbbf16/insights/5G-Nework-Architecture-Whitepaper-en.pdfsson.com/en/ reports-and-papers/white-papers/5g-systems
	MOOCs Links and additional reading, learning, video material
1	NPTEL : https://nptel.ac.in/courses/108/105/108105134/
2	Udemy : https://www.udemy.com/course/5g-mobile-networks-modern-wireless-communication-technology/
3	Class Central : https://www.classcentral.com/course/swayam-evolution-of-air-interface-towards-5g-12957
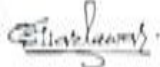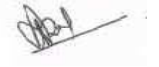
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SoE No.
22ET-101

VII Semester

22ET752 –PE VI: Speech Processing

Course Outcomes:
At the completion of this course, student will be able to

1. Elaborate digital models for speech production and solve numerical on model
2. Apply Time and frequency domain methods for speech signal analysis.
3. Compare and explain audio signals compression model.
4. Explain speaker recognition system and methods.

Unit:1	**Speech production model & Speech perception**	**7 Hours**

Introduction to Speech processing, Speech Production, human speech production mechanism, acoustic theory of speech production, Digital models for speech production. Speech perception human hearing, auditory psychophysics, Classes of speech sounds, Spectral characteristics of consonants and vowels, formants

Contemporary Issues related to Topic

Unit:2	**Speech analysis techniques**	**7 Hours**

JND, pitch perception, auditory masking, models for speech perception. Speech Analysis Time and frequency domain analysis of speech, speech parameter estimation, STFT, linear prediction.

Contemporary Issues related to Topic

Unit:3	**Speech Compression**	**6 Hours**

Quality measures, waveform coding, source coders, Speech compression standards for personal communication systems

Contemporary Issues related to Topic

Unit:4	**Audio processing & compression**	**7 Hours**

Audio processing characteristics of audio signals, sampling, Audio compression techniques, Standards for audio compression in multimedia applications, MP3 Audio encoding and decoding, audio databases and applications

Contemporary Issues related to Topic

Unit:5	**Speech synthesis**	**7 Hours**

Text to speech Synthesis, letter to sound rules, syntactic analysis, timing and pitch segmental analysis

Contemporary Issues related to Topic

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Electronics and Telecommunication Engineering

Unit:6	**Speech Recognition**	**6 Hours**

Segmental feature extraction, DTW, HMMs, approaches for speaker, speech and Language recognition and verification

Contemporary Issues related to Topic

Total Lecture Hours	**39Hours**

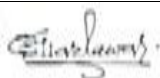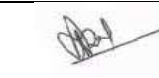| **Textbooks**	
1.	Douglas O'Shaugnessy, Speech Communication – Human and Machine, IEEE Press, 2000
2.	L R Rabiner, Digital Processing of Speech Signals, Pearson,1978
3.	T.F Quatieri, Discrete-time speech signal processing: Principles and Practise Pearson,2002
4.	Zi Nian Li, Fundamentals of Multimedia, Pearson Education, 2003
Reference Books	
1.	Lawrence Rabinerand Biing-Hwang Juang, "Fundamentals of Speech Recognition", Pearson Education, 2003.
2.	Daniel Jurafsky and James H Martin, "Speech and Language Processing – An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition", Pearson Education.
3.	Steven W. Smith, "The Scientist and Engineer's Guide to Digital Signal Processing", California Technical Publishing
4.	Claudio Becchetti and Lucio Prina Ricotti, "Speech Recognition", John Wiley and Sons, 1999.
5.	Ben gold and Nelson Morgan, "Speech and audio signal processing", processing and perception of speech and music, Wiley- India Edition, 2006 Edition.
6.	Frederick Jelinek, "Statistical Methods of Speech Recognition", MIT Press
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	
MOOCs Links and additional reading, learning, video material	
1	https://archive.nptel.ac.in/courses/117/105/117105145/
2	https://ocw.mit.edu/courses/6-345-automatic-speech-recognition-spring-2003/
3	https://www.classcentral.com/course/youtube-digital-speech-processing-47859

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Electronics and Telecommunication Engineering

SoE No.
22ET-101

VII Semester
22ET753 –PE VI: Deep Learning

Course Outcomes:
Upon successful completion of the course the students will be able to

1. Examine the concept of deep learning for visual computing
2. Analyse CNN and Deep CNN with computational complexity
3. Explain advanced CNN visual computing applications
4. Analyse transfer learning using encoders

Unit:1	**Visual Computing and Neural Networks**	**7 Hours**

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
Contemporary Issues related to Topic

Unit:2	**Encoders**	**6 Hours**

Stacked, Sparse, Denoising, Autoencoders and Ladder Training, Cost functions, Optimization Techniques and Learning Rules
Contemporary Issues related to Topic

Unit:3	**Convolutional Neural Network**	**7 Hours**

Convolutional Neural Network Building Blocks, Simple CNN Model: LeNet, Convolutional Autoencoder and Deep CNN, AlexNet, VGGNet, Computational Complexity
Contemporary Issues related to Topic

Unit:4	**Very Deep CNN**	**6 Hours**

Very Deep CNN for Classification (GoogLeNet, ResNet, DenseNet), Assessing the space and computational complexity of very deep CNNs, Transfer Learning
Contemporary Issues related to Topic

Unit:5	**Advanced CNN**	**6 Hours**

Object Localization (RCNN), Region Proposal Networks (rCNN and Faster rCNN) and Semantic Segmentation with CNN, UNet and SegNet for Semantic Segmentation
Contemporary Issues related to Topic

Unit :6	**Generative AI**	**7 Hours**

Autoencoders and Latent Spaces, Principle of Generative Modeling, Adversarial Autoencoders Recurrent Neural Networks and Long Short-Term Memory
Contemporary Issues related to Topic

Total Lecture Hours	**39 Hours**

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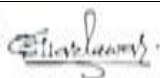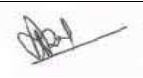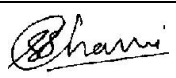
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SoE No.
22ET-101

Textbooks	
1	Goodfellow, Y, Bengio, A. Courville, "Deep Learning", MIT Press, 2016.
Reference Books	
1	S. Haykin, "Neural Networks and Learning Machines", 3e, Pearson, 2008.
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
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MOOCs Links and additional reading, learning, video material	
1	NPTEL Course on Deep Learning for Visual Computing by IIT Kharagpur, https://onlinecourses.nptel.ac.in/noc20_ee74/preview

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SoE No.
22ET-101

VII Semester

22ET754 –PE VI: Industrial Automation

Course Outcomes:

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

1. Analyse industrial need of automation and systems application.
2. Illustrate industrial automation components and hardware.
3. Impart the role of PLC in industry automation
4. Expose to various control techniques employed in process automation
5. Elaborate various applications of networking and communication systems.

Unit:1	Introduction to Industrial Automation	7 Hours

Automation overview, Requirement of automation systems, Architecture of Industrial Automation system, Introduction of PLC and Supervisory Control and Data Acquisition (SCADA).

Contemporary Issues related to Topic

Unit:2	Automation Components	6 Hours

Sensors for temperature, pressure, force, displacement, speed, flow, level, humidity and pH measurement. Actuators, process control valves. Introduction of DC and AC servo drives for motion control.

Contemporary Issues related to Topic

Unit:3	Automation in Process Industries	7 Hours

Introduction to computer based industrial automation. Programming languages of PLC, Basic instruction sets. PLC programming, Ladder diagram, Sequential flow chart, PLC selection, PLC Installation.

Contemporary Issues related to Topic

Unit:4	Distributed Control System	6 Hours

Overview of DCS, DCS software configuration, DCS communication, DCS Supervisory Computer Tasks, DCS integration with PLC and Computers, Features of DCS, Advantages of DCS.

Contemporary Issues related to Topic

Unit:5	SCADA/ HMI System Development	7 Hours

SCADA and HMI systems, Different Systems in SCADA like Field Instrumentation, RTUs, Industrial Data Communication, HMI Development, Data Processing, Network Communications, Communication with RTUs, PLC as RTU.

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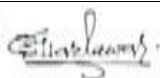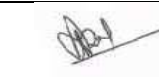(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

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Contemporary Issues related to Topic

Unit :6	Industrial Networking	6 Hours

SCADA and HMI systems, Different Systems in SCADA like Field Instrumentation, RTUs, Industrial Data Communication, HMI Development, Data Processing, Network Communications, Communication with RTUs, PLC as RTU.

Contemporary Issues related to Topic

Total Lecture Hours	39 Hours

Textbooks	
1	Industrial Instrumentation and Control By. S.K. Singh The McGraw Hill Companies
2	Programmable logic controller, Dunning, Delmar
Reference Books	
1	Process Control Instrumentation Technology By. C.D. Johnson, PHI
2	Digital Communication, 1st edition, Shanmugham, CBS Publisher
3	Modern Digital & Analog Communication Systems, 4th edition Date: 2009, B.P.Lathi, Oxford Univ Pr Publication
4	Principles of Communication Systems, 2nd edition Pub Date: SEP-07, Taub Schilling, Publisher: Prentice Hall
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
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MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/108105063

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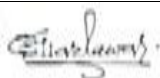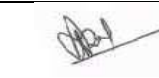**B. Tech SoE and Syllabus 2022**
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**SoE No.
22ET-101**

Electronics and Telecommunication Engineering

VII Semester

22ET755 –PE VI: Nano Electronics

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Explain various aspects of nano-technology and the processes involved in making nano components and material. 2. Elaborate advantages of the nano-materials and appropriate use in solving practical problems.

Unit:1		7 Hours
Introduction to nanotechnology, meso structures, Basics of Quantum Mechanics: Schrodinger equation, Density of States. **Contemporary Issues related to Topic**		

Unit:2		6 Hours
Particle in a box Concepts, Degeneracy. Band Theory of Solids. KronigPenny Model. Brillouin Zones. **Contemporary Issues related to Topic**		

Unit:3		7 Hours
Shrink-down approaches: Introduction, CMOS Scaling, The nanoscale MOSFET, Finfets, Vertical MOSFETs, limits to scaling, system integration limits (interconnect issues etc.) **Contemporary Issues related to Topic**		

Unit:4		6 Hours
Resonant Tunneling Diode, Coulomb dots, Quantum blockade, Single electron transistors, Carbon nanotube electronics. **Contemporary Issues related to Topic**		

Unit:5		6 Hours
Bandstructure and transport, devices, applications, 2D semiconductors and electronic devices, Graphene, atomistic simulation **Contemporary Issues related to Topic**		

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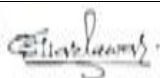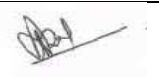## Electronics and Telecommunication Engineering

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22ET-101

Unit :6		7 Hours
Spintronics: Introduction, Overview, History & Background, Generation of Spin Polarization Theories of spin Injection, spin relaxation and spin dephasing, Spintronic devices and applications, spin filters, spin diodes, spin transistors		
Contemporary Issues related to Topic		
Total Lecture Hours		**39 Hours**

Textbooks	
1	G.W. Hanson, Fundamentals of Nanoelectronics, Pearson, 2009.
2	W. Ranier, Nanoelectronics and Information Technology (Advanced Electronic Materialand Novel Devices), Wiley-VCH, 2003.
3	Concepts in Spintronics – Sadamichi Maekawa Oxford University press
Reference Books	
1	C.P. Poole, F. J. Owens, Introduction to Nanotechnology, Wiley, 2003
2	Spin Electronics – David Awschalom
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MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/117108047

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Electronics and Telecommunication Engineering

SoE No.
22ET-101

VII Semester

22ET756 –PE VI: Adhoc Networks

Course Outcomes:
Upon successful completion of the course the students will be able to
1. compare the differences between cellular and ad hoc networks and the analyse the challenges at various layers and applications
2. summarize the protocols used at the MAC layer and scheduling mechanisms
3. compare and analyse types of routing protocols used for unicast and multicast routing
4. examine the network security solution and routing mechanism
5. evaluate the energy management schemes and Quality of service solution in ad hoc networks
6. Explain the concept of VANET

Unit:1		7 Hours

Cellular and ad hoc wireless networks, Applications of ad hoc wireless networks. Issues in ad hoc wireless networks-medium access scheme, routing, transport layer protocols, security and energy management. Adhoc wireless internet.

Contemporary Issues related to Topic

Unit:2		6 Hours

Design goals of a MAC protocol, Contention based protocols; Contention based protocols with reservation mechanisms and scheduling mechanisms, MAC protocols using directional antennas

Contemporary Issues related to Topic

Unit:3		7 Hours

Table driven routing protocols, On demand routing protocols, hybrid routing protocols, Hierarchical routing protocols, Power aware routing protocols, Tree based and mesh based multicast routing protocols
Contemporary Issues related to Topic

Unit:4		6 Hours

Network security requirements-Issues and challenges, network security attacks, key management, secure routing protocols
Contemporary Issues related to Topic

Unit:5		6 Hours

Energy management schemes-Battery management, transmission power management, system power management schemes. Quality of service solutions in ad hoc wireless networks

Contemporary Issues related to Topic

			July 2023	1.00	Applicable for
					AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

Nagar YuwakShikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

B. Tech SoE and Syllabus 2022
(Scheme of Examination w.e.f. 2022-23 onward)

Electronics and Telecommunication Engineering

SoE No.
22ET-101

Unit :6		7 Hours
Introduction: Challenges and Requirements, Layered architecture for VANETs, DSRC /WAVE standard (IEEE 802.11), IEEE 802.11 protocol Stack (PHY & MAC) **Contemporary Issues related to Topic**		
Total Lecture Hours		**39 Hours**

Textbooks	
1	C.Siva ram murthy,B.S. Manoj, "Ad hoc wireless networks-Architectures and protocols" Pearson Education, 2005
2	Stefano Basagni, Marco Conti, "Mobile ad hoc networking", Wielyinterscience 2004
3	Charles E.Perkins ,"Ad hoc networking", Addison Wesley,2001
Reference Books	
1	VANET Applications and Interworking Technologies Hannes Hartenstein, Kenneth Laberteaux Wiley Publications First edition 2010
2	George Aggelou,"Mobile ad hoc networks-From wireless LANs to 4G networks, McGraw Hill publishers, 2005
YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	
MOOCs Links and additional reading, learning, video material	
1	https://archive.nptel.ac.in/courses/106/105/106105160/#

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