Supporting Documents

1.1.3 & 1.2.1

Electronics & Communication Engineering

S. No.	Documents attached
1	Mapping of Courses to Employability/
	Skill Development



Master of Technology ECE (Wireless Communication)

Department of E Ref. No. 132 | Date : 09/09/202) MTWC-101-18- Wireless Communication Sent to: Focus on Assessment Tools to Skill PO 1 PO 2 PO 3 PO 4 PO 5 PO 6 PO 7 PO 8 PO 9 PO 10 Employability / Course Outcome Measure Attainment of CO1: Implement physical Entrepreneurship CO models of wireless Implementation channels ٧ V V V MSTs, Class Tests, Quizes, V V ٧ yes ESF CO 2: Gain knowledge of key concepts of wireless Understanding communication ٧ V V V MSTs, Class Tests, Quizes, V CO 3:Measure capacity of no ESE AWGN channel, LTI Gaussian channels and ujral Punjab Technical University Campus Karurthala (Puniab) 144603 Analysis various fading channels ٧ V V V V MSTs, Class Tests, Quizes, V V yes ESE CO4: Study uplink and downlink model of AWGN Understanding channel, fading channels and multiuser diversity MSTs, Class Tests, Quizes, V Yes **ESE** MTWC-102-18- Information Theory & Coding Focus on Assessment Tools to Skill PO 1 PO 2 PO 3 PO 4 PO 5 PO 6 PO 7 PO 8 PO 9 PO 10 Employability / Course Outcome Measure Attainment of CO1: Understand the Entrepreneurship CO fundamentals of Understanding information theory. V ٧ ٧ V MSTs, Class Tests, Quizes, V ٧ V Yes ESE CO 2: Encode text, audio, speech, image and video signals through various Implementation coding and compression techniques. V MSTs, Class Tests, Quizes, ESK Gujral Punjab Technical University

detecting and correcting codes	V	٧	٧	٧	٧	V	Analysis ✓	No	MSTs, Class Tests, Quizes,
errors in the received signals through error							Analysis		
CO 3: Detect and correct									

MTWC-PE1-18- Wireless Sensor Networks

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Gain insights of Wireless Sensor Network(WSN) background, its challenges, constraints along with its advantages and applications.		V	٧	V	V	V	v	V	٧	٧	Understanding	no	MSTs, Class Tests, Quizes, ESE
architecture of WSN and ts sub-systems.	٧	٧	٧	V	v					٧	Understanding	No	MSTs, Class Tests, Quizes,
CO 3: Explain node structure along with the echnologies used in WSN.	٧	٧	٧	,	,		v	v .	v	v	Learning	No	MSTs, Class Tests, Quizes,
CO 4: Study various Wireless Propagation Models and discuss the arious MAC protocols, ommunication protocols nd routing protocols	V	,	,	,							Discussing		MSTs, Class Tests, Quizes,

MTWC-PE1B-18- RF MEMS FOR WIRELESS COMMUNICATION SYSTEM

			Foorgan	
Course Outcome	PO 1 PO 2 PO 3 PO 4 PO 5 PO 6 PO 7 PO	Skill Skill		Assessment Tools to Measure Attainment of

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CO: 1. Understand the key concepts in RF based MEMS wireless communication system.	V	V					V	V	V	V	Understanding		MSTs, Class Tests, Quizes
CO 2: Design RF based				-								no	ESE
circuits through modelling.	٧	٧	٧	V	٧	v				V	Implementation		MSTs, Class Tests, Quizes,
CO 3: Understand the usage of RF based circuit elements to reconfigure he circuit design.	٧	٧	V		V				,		Understanding	yes	MSTs, Class Tests, Quizes,
O 4: Study various									٧	V		No	ESE
scillators and filters.	٧	٧	٧	V	٧					٧	Understanding	no	MSTs, Class Tests, Quizes, ESE

MTWC-PE1C-18- ADVANCED DIGITAL SIGNAL PROCESSING

Course Outcome CO1: Apply digital	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability /	Assessment Tools to Measure Attainment of
ransform techniques on												Entrepreneurship	CO
signals.	٧		٧		V	v	V	V	.,		Implementation		MSTs, Class Tests, Quizes,
CO 2: Design digital FIR						•	V	V	٧	V		no	ESE
and IIR filters.	٧		٧	٧	٧	٧	٧			٧	Implementation	yes	MSTs, Class Tests, Quizes,
CO 3: Predict and estimate errors in digital signal erocessing systems.	,										Analysis		MSTs Class Tools On the
O 4: Handle multirate								V	V	٧		yes	MSTs, Class Tests, Quizes, ESE
SP and use adaptive Iters.	,	,	,	,	,	,				,	Understanding		MSTs, Class Tests, Quizes,

	MTWC-PE1D-18- AUDIO	AND	VIDEO	SIGNAL	PROCESSING
ı					1 110 CESSIIAG

Focus on	and
	Assessment Tools to
Course Outcome PO 1 PO 2 PO 3 PO 4 PO 5 PO 6 PO 7 PO 8 PO 9 PO 10 Skill Employability /	Measure Attainment -
Entrepreneursh	Can CO.

video signal processing ystems.	V				V	V	V			Understanding		MSTs Class T
CO 2: Code and decode						+	1	1	V		no	MSTs, Class Tests, Quizes, ESE
he image, audio and vide	0											102
ignals.	٧				٧	V			V	Implement		MSTs, Class Tests, Quizes,
20.2 M. J. J											yes	ESE
O 3: Modulate and												
lemodulate digital signal										Learning		
rocessing systems.	V	√	V	٧					V			MSTs, Class Tests, Quizes,

MTWC-PE2A-18-ADVANCED COMMUNICATION SYSTEM

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of
CO1: Differentiate between analog and digital communication systems.	٧				٧	v		V	V	V	Understanding		MSTs, Class Tests, Quizes,
CO 2: Transmit data												no	ESE ESE
through various digital modulation techniques	٧				v	v				٧	Understanding		MSTs, Class Tests, Quizes,
CO 3: Understand optical and satellite communication systems.	٧			,	v			,	v .	V	Understanding	no	MSTs, Class Tests, Quizes,
CO 4: Recognize mobile communication systems, access techniques and											Analysis	,10	ESE
ransmission protocols.	v	V	/ \	/ V	' v				V			no	MSTs, Class Tests, Quizes, ESE

MTWC-PE2B-18-DETECTION ANI	ESTIMATION THEORY

Focus on Head Assessment Tools to Skill Employability / Entrepreneurship PO 1 PO 2 PO 3 PO 4 PO 5 PO 6 PO 7 PO 8 PO 9 PO 10 Course Outcome Measure Attainment of comjab Technical University

CO1: Know the background of the signals, variables and processes.	٧						V			V	V	Understanding		MSTs, Class Tests, Quizes,
CO 2: Test the data													no	ESE
through statistical tools.	٧	_	٧		٧		٧			V	V	Analysis		MSTs, Class Tests, Quizes,
CO 3: Learn the ways to											1		no	ESE ESE
detect non-parametric, random and deterministic signals.	V											Understanding		Mor
CO 4: Familiarize with the			+	1				V	V	٧	٧		no	MSTs, Class Tests, Quizes, ESE
estimation of signal parameters	٧	٧	V	V	,	V	V				,	Understanding		MSTs, Class Tests, Quizes,
MTWC-PE2C-18- MOBILE A											V		yes	ESE

MTWC-PE2C-18- MOBILE ADHOC NETWORKS

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of
CO1: Know the features, applications, models and characteristics of adhoc networks.	v	٧	٧	v					٧	v	Understanding	No	MSTs, Class Tests, Quizes,
CO 2:Learn the protocols followed in MAC layer, Network layer, Transport layer, Security layer and Cross layer design.	٧				/		,	v	,		Understanding	NO	MSTs, Class Tests, Quizes,
CO 3: Learn how to ntegrate adhoc networks with mobile-IP networks.	٧	٧ ,	V	,							Understanding	yes	ESE MSTs, Class Tests, Quizes, ESE

MTWC-PE2D-18- OPTICAL NETWORK AND PHOTONIC SWITCHING



Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Know the optical transmission and reception	٧	٧	٧	٧					٧	v	Understanding	No	MSTs, Class Tests, Quizes,
CO 2: Apply the compensation techniques to the lost data/signals.	V	٧	٧	٧	V	٧	٧	٧	٧	٧	Implementation	yes	MSTs, Class Tests, Quizes,
architecture and protocols of passive optical networks.	٧	٧	٧	٧				٧	٧	٧	Learning	No	MSTs, Class Tests, Quizes,
		٧		٧				٧	٧	٧	Understanding	No	MSTs, Class Tests, Quizes,
VITRM-101-18 RESEARCH M		•		•				V	٧	٧	- Table 1	No	
Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: 1. Understand													
research, research process, define and redefine research problem through literature survey.	v	v	v	V	v	1	.,				Understanding		
					V	V	V	٧	٧	٧		Yes	MSTs, Quizes, ESE
CO 2: Know the primary and secondary sources of lata collection and select ample size based on the equirement.											Implementation		
O 3: Utilize the resources	V .	V .	٧ ,	V .	V .	٧	٧ ,	v ,	/	٧		yes	MSTs, Quizes, ESE
fficiently.	V	,	v ,	/	,	V	V	/	,	V	Implementation		MSTs, Quizes, ESE

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CO 4: Critically analyse the data through various statistical measures, perform experiment,										Implementation		
gather data and reach to a conclusion based on some hypothesis.	٧	V	V	V	٧	V	V	V	v		Yes	MSTs, Quizes, ESE
CO5:5. Know the ntellectual property rights								V	٧	Understanding	Yes	
CO6:6. Write up the report nd research article.		٧	٧	V	V		V	V	V	Implementation	Yes	MSTs, Quizes, ESE MSTs, Quizes, ESE

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	DO 0	BO 6	PO 10		Focus on Employability /	Assessment Tools to Measure Attainment of
CO1: Understand that how							107	FUO	PU 9	PO 10	Skill	Entrepreneurship	co
to improve your writing													
skills and level of													
readability	٧	٧	V	V									MSTs, Class Tests, Quizes,
CO 2: Learn about what to				V					٧	٧	Understanding	No	ESE
write in each section	٧	٧	V	V	V	1	.,						MSTs, Class Tests, Quizes,
CO 3:Understand the skills				•	V	V	V	٧	٧	٧	Understanding	No	ESE
needed when writing a													LJL
Title	V	v	v	V									MSTs Class Tosts O :
CO 4: Ensure the good			•	·				V	V	٧	Understanding	No	MSTs, Class Tests, Quizes, ESE
quality of paper at very													LUL
first times sub	V	v	V	v	,	,							MSTs, Class Tests, Quizes,
				1	V	V	V	V .	V	V	Implementation		ESE

Course Outcome	PO 1 PO 2 PO 3 PO 4 PO 5 PO 6 PO 7 PO 8 PO 9 PO 10 Skill	The state of the s	Assessment Tools to Measure Attainment of
	Skill PO 7 PO 8 PO 9 PO 10 Skill	Entrepreneurship	CO

demonstrate a critical understanding of key concepts in disaster risk reduction and																
humanitarian response.	٧	٧	V	V	+				-	V		٧	Understanding	S No		MSTs, Class Tests, Quizes, ESE
CO 2: Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.	V	v	V	V	V	V		v	\ \ V	\ \ V		,	Angluit			MSTs, Class Tests, Quizes,
CO 3:Develop an										Ť	1	,	Analysis	No		ESE
understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.	٧	V	V	V					√	V	V		Implementation	yes		MSTs, Class Tests, Quizes, ESE
CO 4: Critically understand the strengths and weaknesses of disaster management approaches, planning and programming and different countries, particularly their home																LOL
	٧	٧	٧	٧	٧	V	v	V		/	٧		Understanding	No	N ES	ISTs, Class Tests, Quizes, SE
MTWC-103-18 Advanced W	/ireles	s Com	munic	ation											*	Head
ourse Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO	5 PO	7 0		0.0	DO			Focus on Employability /	A: M	easure Attainment of University (Augustian Property of Page 1988)

CO1: Review the fundamentals of wireless													
communication	V	V	V	V	V								MSTs, Class Tests, Quizes,
CO 2: Compare the					1			-	+	V	Understanding	No	ESE
performance of different													
digital modulation													
techniques over wireless													
channels.	٧	٧	٧	V	V	V		٧			Understanding	No	MSTs, Class Tests, Quizes,
CO 3: Design OFDM												INO	ESE
system and data													
ransmission through			Herm								Maria Salanta		
multicarrier modulation.	V	V	V	V	V	1							MSTs Class T
CO 4: Describe OFDMA			1	+	-	V	٧	٧	V	٧	Implementation	yes	MSTs, Class Tests, Quizes, ESE
ystem, its operation and											of lander the second		LSE
pplications.	V	V	V	V	V								MSTs, Class Tests, Quizes,
					1.					V	Understanding	No	ESE
VITWC-104-18- Soft Comp	uting T	echnic	aues										

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Study basic concept of soft computing and differentiate between supervised, unsupervised and reinforced learning													
methods.	٧	٧	v	٧	V					٧	Understanding	No	MSTs, Class Tests, Quizes,
ertificial neural network echniques, fuzzy sets, uzzification and	٧	, ,	,	٧	,		<i>y</i>				Understanding		MSTs, Class Tests, Quizes,
O 3: Optimize solutions sing Genetic Algorithm	٧	, ,	, ,	/ v	, v	, _V	/ v	,	v		mpementation		MSTs, Class Tests, Quizes,

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CO 4: Use hybrid soft						TT		1			
computing techniques.	V	V	V	V	٧	V	V	٧	Impementation	Yes	MSTs, Class Tests, Quizes, ESE

MTWC-105-18- SIMULATION OF WIRELESS COMM. SYSTEMS

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	CLIU	Focus on Employability /	Assessment Tools to Measure Attainment of
CO1: Study the role of									. 0 3	FO 10	SKIII	Entrepreneurship	co
simulation in	77.75												
communication system													
and random processes CO 2: Review stochastic	V	٧	٧	٧	٧					V	Understanding		Practical File, Internal Viva
processes and parameter											- Totalianing	No	Semester End External Viva
estimation	V	V	V	V	v	,							
CO 3:Model wireless			•	•	V	V	٧	٧	٧	٧	Understanding	yes	Practical File, Internal Viva,
communication systems												yes	Semester End External Viva
through numerical													
methods.	٧	V	V	V	V	/	/ /	,	,	,			Practical File Internation
										V	Impementation	yes	Practical File, Internal Viva, Semester End External Viva
CO 4: Study													The External Viva
communication channel													
models and perform													
Monte Carlo Simulation.	٧	/ \	/	/\	1		V	V	1		In do		Practical File, Internal Viva,
VITWC-PE3A-18- Smart Ant	ennas								v		Inderstanding	Yes	Semester End External Viva

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand the												•	
significance of smart													
antennas and its historical													
development.	٧	٧											MSTs, Class Tests, Quizes,
CO 2: Know the											Understanding	No	ESE
architecture of Smart													
antennas, types,													
applications	V	٧	V	v I	V	,			.				MSTs, Class Tests, Quizes,

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O3: Learn antenna array undamentals criteria and eam forming basics		٧				٧		V	Understanding		MSTs, Class Tests, Quizes,
O 4: Explain the Spatial									Onderstanding	no	ESE
rocessing techniques for											
DMA Smart Antennas	٧	٧	٧	٧	٧		V	V	Understanding		MSTs, Class Tests, Quizes,

MTWC-PE3B-18 Wireless Network Planning, Optimization and Management

	PO 1	PO 2	PO 3	PO 4	PO 5 PO	6 PO 7 PC	0 8 PO	9 PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO 1: Understand the											
Radio Network planning											
and optimization	٧	٧									MSTs, Class Tests, Quizes,
CO 2: Know the								CHANGE OF THE PARTY OF THE PART	Understanding	No	ESE
technologies of WCDMA											
and GSM	٧	٧	٧	٧	v		1	1			MSTs, Class Tests, Quizes,
CO 3: . Learn the					o - Contract	The same	V	- V	Understanding	Yes	ESE
undamentals of Radio	2/3/5										
Resource Management		٧									MSTs, Class Tests, Quizes,
			P-1110	THE PROPERTY			V	V	Understanding	No	ESE

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7 PO	O 8 PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of
CO1: Understand the											•	
significance of Microwave												
and RF designs	٧	٧	٧						.,			MSTs, Class Tests, Quizes,
CO 2: Know the									V	Understanding	No	ESE
fundamentals behind												-52
Microwave												
Amplifiers/Oscillators											F 11	
designs.	٧			,	1		1	EVER SERVICE		Understanding	Head	MSTs, Class Tests, Quizes, In Lectronics & Communication Engineering Technical University

CO 3: Technical know-how of Microwave and RF					Control of the Contro
antennas concepts.	VV	V V			MSTs, Class Tests, Quizes,
		10 10 10	√ Understanding	yes	ESE Costs, Quizes,

MTWC-PE3D-18- Multimedia Comunication and Technologies

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Learn multimedia													
	٧	٧	٧	V	V	V	V						MSTs, Class Tests, Quizes,
CO 2: Implement	17.42					-	V			V	Understanding	No	ESE
compression and													
decompression techniques													
on data.	٧	٧	٧	٧	٧	٧	٧	٧	V	v	Implementation		MSTs, Class Tests, Quizes,
CO 3: Understand the											mplementation	yes	ESE
concepts of storage and													
	v	,	,	,									NACT CI -
O 4: Learn multimedia			•	V	V				٧	٧	Understanding	No	MSTs, Class Tests, Quizes, ESE
lesign application.	v	v	v	v	V			,					MSTs, Class Tests, Quizes,
								V	V .	V	Understanding	No	ESE

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Shill	Focus on Employability /	Assessment Tools to Measure Attainment o
CO1: Understand the significance of										1010	SKIII	Entrepreneurship	СО
Cryptography.	٧	٧	٧	٧	٧	٧	٧			V	Understanding		MSTs, Class Tests, Quizes,
CO 2: Know its Integrity,											oriderstanding	No	ESE
Authentication and													
/lanagement.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Understanding	No	MSTs, Class Tests, Quizes, ESE
O 3: Learn the concepts f Security and threats to													LJL
rireless systems.	٧	٧	٧	٧ .	V				v	v	Understanding	yes	MSTs, Class Tests, Quizes, ESE

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO	8 PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand the													
fundamental concepts of						- 129							
software defined radio and													
	٧	٧		٧						V	II.		MSTs, Class Tests, Quizes,
CO 2: Develop the									-	V	Understanding	No	ESE
cognitive radio, as well as								11-4					
techniques for spectrum													
holes detection that													
cognitive radio takes													
advantages in order to exploit it.													
												America de Companyo	
	V	'	/	V		/	V .	٧	٧	٧	Implementation		MSTs, Class Tests, Quizes,
											promontation	yes	ESE
O 3: Understand			-										
undamental issues													
egarding dynamic													
pectrum access, the radio-	100												
esource	The												
nanagement and trading,													
s well as a number of													
ptimisation techniques													
or better spectrum													
xploitation.	V		V										MSTs, Class Tests, Quizes,
							٧	V	'	- 1	Inderstanding	No	ESE
O 4: Apply SDR principles													
smart antennas. √	V	٧	V	V	V	V	V		V			The search of th	MSTs, Class Tests, Quizes,
TWC-PE4C-18- Wireless and							v	IV	V	P	pplication	Yes	ESE

Focus on **Assessment Tools to** PO 1 PO 2 PO 3 PO 4 PO 5 PO 6 PO 7 PO 8 PO 9 PO 10 Skill **Course Outcome** Employability / Measure Attainment of Entrepreneurship CO Department of Electronics & Communication IK Gujral Punjab Technical University



CO1: Learn Wireless Communication Network									
layers/technology.	V	V	V	,	1.				MSTs Class Tests C
CO 2: Understand basic	Market Trans			- V	V	V	Understanding	No	MSTs, Class Tests, Quizes, ESE
network components of									
Nireless and Optical									
Networks.	V	I	V						MSTs, Class Tests, Quizes,
CO 3: Explain their			1			V	Understanding	No	ESE (Quizes,
pplications	V	l v	V						MSTs, Class Tests, Quizes,
					V	V	Understanding	No	ESE ESES, QUIZES,

MTWC-PE4D-18- MIMO Systems

Course Outcome CO1: Understand Basic	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability /	Assessment Tools to Measure Attainment of
MIMO communication												Entrepreneurship	CO
systems.	٧			٧	٧		٧		V	V	Understanding		MSTs, Class Tests, Quizes,
CO 2: Explore Space-time											Joseph	No	ESE
block codes & Space-time													
trellis codes.	٧	v	V	v	v								MSTs Class Tooks O
CO 3: MIMO systems for					•					V	Understanding	yes	MSTs, Class Tests, Quizes, ESE
requency-selective (FS)													
ading channels.	٧	٧			-	V	,	,	,	.,			MSTs, Class Tests, Quizes,
			-					_	V	V	Understanding	No	ESE

MTWC-PE5A-18- Millimeter Wave Communication Technology

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill		Assessment Tools to Measure Attainment of
CO1: Familiarization with the concept of Millimeter												- Preneursinp	СО
wave communication.	٧	٧	٧	٧	٧				٧	V	Understanding	No	MSTs, Class Tests, Quizes, ESE

CO 2: Calculate the performance parameters in millimeter wave											
antennas.	V	V	1	1	V						MSTa Class T
CO 3: Model the			-	V	V	V	V	V	Analysis	yes	MSTs, Class Tests, Quizes, ESE
millimeter wave link										700	LSE
budget.	V	V									MSTs Class Tark S
CO 4: Analyze the				_			V	٧	Implementation	No	MSTs, Class Tests, Quizes, ESE
millimeter wave with											LSL
multiple antennas.	V	V	1								MSTs Class Tool 9
							٧	٧	Implementation	No	MSTs, Class Tests, Quizes, ESE

MTWC-PE5B-18- Space Time Wireless Communication

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	000	1000	PO 10		Focus on Employability /	Assessment Tools to Measure Attainment of
CO1:Understand Space							107	FU	PU 9	PO 10	Skill	Entrepreneurship	co
Time Channel													
Characterization.	V	٧	V	V									MSTs Class To 1
CO 2: Explain Capacity of									٧	٧	Understanding	No	MSTs, Class Tests, Quizes, ESE
Multiple Antenna			Name of										LJE
Channels.	V	V	V	V		.,	.,						MCTo Class To a
CO 3: Learn ST OFDM,				•		V	V	٧	٧	٧	Understanding	yes	MSTs, Class Tests, Quizes, ESE
Spread Spectrum.	V			1									
				<u> </u>				V	٧	٧	Learning	No	MSTs, Class Tests, Quizes, ESE

MTWC-PE5C-18- Advanced Techniques for Wireless Reception

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of
CO1: Understand Wireless													
Signaling Environment.	٧		٧	V	V								MSTs Class Task 0
CO 2: Explain the usage of					•				٧	٧	Understanding	No	MSTs, Class Tests, Quizes, ESE
Multiuser detection.	٧		٧	٧	V			.,					MSTs, Class Tests, Quizes,
CO 3: Learn CDMA, OFDM,								V	٧	٧	Explain	No	ESE Tests, Quizes,
MIMO systems	٧	V	V			v	,,						
						•	<u> </u>	V	V	٧	Learning	No	MSTs, Class Tests, Quizes, ESE Head

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MTWC-PE5D-18- Emer	ging Tech	nologie	s of Wi	reless	Comm	unicatio

Course Outcome CO1: Understand the	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability /	Assessment Tools to Measure Attainment of
concept of												Entrepreneurship	CO
cellular/wireless													
communication	V	٧	٧	٧	٧				v	V	Understanding		MSTs, Class Tests, Quizes,
CO 2: Explain the Mobile											- Stotunding	No	ESE
Radio Propagation and													
Multiuser systems.	٧	٧		v .	V	٧			٧	v	Explain		MSTs, Class Tests, Quizes,
CO 3: Learn technologies								YM			LAPIGIII	No	ESE
of GPRS, UMTS, WiFi,													
WiMAX, Ultra Wideband										14.79			
communications, 4G and													
eyond 4G.	V	V					,						MCT- CI -
							V	'	/ 1	/	Learning	Ni	MSTs, Class Tests, Quizes, ESE

MTWC-PE5E-18- Microstrip Antennas

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	CLIN	Focus on Employability /	Assessment Tools to Measure Attainment of
									.03	10 10	SKIII	Entrepreneurship	СО
pasic concept of micro-													
strip antennas, methods of													
analysis and													
	٧	٧	٧	٧	٧				V	./			MSTs, Class Tests, Quizes,
CO 2: Explain micro-strip									V	V	Understanding	No	ESE
antennas arrays.	٧				V	V	V	V	v	.,			MSTs, Class Tests, Quizes,
CO 3: Understand the								V	V	V	Explain	No	ESE
hysical significance of													
liscontinuities	٧			,	v	,			,				MSTs Class Tests O
							-		V	V	Understanding	no	MSTs, Class Tests, Quizes, ESE
O 4: Learn coupled micro-													LUL
trip line with multiband		-								part -			
nd broadband behavior	v			l _v	, ,	, ,	,						MCTa Class T
					1						Learning	yes	MSTs, Class Tests, Quizes, ESE Head

MTOE-301A-18- Cost	Management of Engineering	Projects
		,] 0

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO S	PO o	PO 10	CLI	Focus on Employability /	Assessment Tools to Measure Attainment of
oo z. onderstand the cost								1.00	F 0 9	PO 10	Skill	Entrepreneurship	co
calculation for decision-													
making about an													
engineering research					179								
project	٧	٧	٧	٧	٧				J	_,			MSTs, Class Tests, Quizes,
CO 2: Able to define Role									V	٧	Understanding	No	ESE
of each member in the													
project team	V					V	V	v I	v				MSTs, Class Tests, Quizes,
								•	V	V	Describe	No	ESE
CO 3:Manage the project													
by applying Quantitative		100											
echniques for cost													
management	V		1	/	/				,				MSTs, Class Tests, Quizes,
									' '		Management	Yes	ESE

Course Outcome CO1:To design Path-	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability /	Assessment Tools to Measure Attainment of
Loss models	,,	.,	.,	,								Entrepreneurship	CO
CO2:To investigate	V	V	V	V	٧	٧			٧	٧	Implementation	Yes	Practical File, Internal Viva Semester End External Viva
Fading environments in													- Sterilar VIV
vireless channels	٧	٧		٧	٧	٧	v	V	v/	-,			Practical File, Internal Viva
CO3:To develop	18-71-1						-	V	V	V	Understand	No	Semester End External Viva
MATLAB codes for													Lind External VIV
Block codes, Cyclic													
odes and Convolutional													
odes.	٧	٧	,	V ,	v .	/			v	v	Coding	V	Practical File, Internal Viva,
												Yes	Semester End External Viva

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Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	POS	PO a	PO 10	el.:u	Focus on Employability /	Assessment Tools to Measure Attainment of
CO1:To understand the									103	10 10	SKIII	Entrepreneurship	CO
programming of													
Entropies and Mutual													
nformation	٧	٧	٧	٧	٧	٧				V	Understand		Practical File, Internal Viva
CO2:To learn and	F-118									•	Onderstand	No	Semester End External Viv
practice programming													
or generation and													
evaluation of various													
codes	٧	٧		V	V	V	v	v		N/	Imamia		Practical File, Internal Viva,
CO3:To develop			472 157							V	Implementation	Yes	Semester End External Viva
MATLAB codes for													
Block codes, Cyclic													
odes and Convolutional													
odes	٧	v	V	,	v	,		,	, .	,	C !!		Practical File, Internal Viva,
								-	V	v	Coding	Yes	Semester End External Viva

MTWC-105-18- SIMULATION OF WIRELESS COMM. SYSTEMS Laboratory

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
To understand the programming of OFDM based Transmitter & Receiver.	V	v	v	V	v								Practical File, Internal Viva,
Γo learn and practice				•	•					٧	Understanding	No	Semester End External Viva
MATLAB programming for mplementing Digital modulation techniques. To find the vacant	٧	٧	٧	٧	۷ ,	V	٧	٧	V	v	Implementation	yes	Practical File, Internal Viva, Semester End External Viva
paces for secondary sers in Cognitive Radio													Jernester End External Viva
letworks	v	v	,	,	/ \	,	,	v	v	V	mpementation	yes	Practical File, Internal Viva, Semester End External Viva



MTW	/C-MP	1-18-Min	i Project

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of
coi: Acquire practical knowledge of the chosen field.		V	v	v	v	v	V		V	N	Acquire		Report,Internal viva-voce
co2 Identify, analyze,									•	V	Acquire	No	and external viva-voce.
formulate & handle programming projects with systematic approach.	v	V	٧	٧	V	٧	٧	٧	٧	٧	Analysis	yes	Report, Internal viva-voce
cos: Contribute as a team eader in the levelopment of echnical projects.	, ,	,	۷	v ,	/		,	V		V	Implementation	yes	Report,Internal viva-voce
O4: Develop ommunication skills for ne presentation of roject related activities.											,		and external viva-voce.
e oject related activities.	1	/ \	/ v	/ \			1		,	,	mplementation	yes	Report,Internal viva-voce and external viva-voce.

MTWC-DS1-18 DISSERTATION PHASE I

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill		Assessment Tools to Measure Attainment of CO
CO1: Critically analyse and evaluate existing knowledge about the													
chosen problem	٧	٧	٧	٧	٧	٧	٧		٧	٧	Understanding	No	Report,Internal viva-voce and external viva-voce.

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CO 2: Find the gaps and motivation through													
iterature survey.	٧	٧	V	٧	V	٧	V	V	V	V	Analysis	yes	Report,Internal viva-voce and external viva-voce.
CO 3:Design the ramework to optimize the olution for the problem	٧	V	V	V	v			V		V	Implementation	yes	Report,Internal viva-voce
O 4: Construct the esearch proposal.	٧	٧	٧	V	V			V		V	Implementation	yes	Report, Internal viva-voce and external viva-voce.

MTWC-DS2-18- DISSERTATION PHASE II

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of
CO1: Implement the proposed framework practically or through simulation	v	V	V	V	v	٧	V		7	1			Report,Internal viva-voce
CO 2: Gather the results and publish in the research									V	V	Implementation	yes	and external viva-voce.
orticles. O 3: Write-up the	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Implementation	yes	Report,Internal viva-voce and external viva-voce.
oroposed work, results with conclusion and future work in the form of thesis	V	٧	V	v ,	v			v		V	Implementation	yes	Report,Internal viva-voce and external viva-voce.



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() () () () () () () () () ()		-	-	10					
CO4. B									
CO4: Present the research work before a committee.	٧	V	V	V		,,	D		Report,Internal viva-voce
					V	v	Presentation	yes	and external viva-voce.

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Signature of Head of Department

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		Nan	ne of	f the	Dep	artn	nem:	B.7	Tech.	Ele	ctro	nice	and	Commen		Engineering	Tit
		Subj	ect: N	Vlapr	ping o	f Cou	irse C	Outco	mes	with	Drog	ram	Oute	omes of E	inication I	Ingineering	Pepartment of EC
	Ref No									1	TIUS	Taili	Oute	omes of E	31	Date:	Ref. No. 1322 Date : 09/
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning				Sent to :
	(BTEC-301-18: Electronic Devices)	PO 1	PO 2	PO 3	B PO 4						PO 10			2 Skill	Focus on Employability / Entrepreneurs hip	Assessment Tools to Measure Attainment of	
CO1	Understand physics of semiconductors and behavior of charge carriers within semiconductors	V	V			V								Analyze	No	MSTs, ESE, Class/Quiz Tests	
CO2 0	Understand the working of semiconductor diodes supported with mathematical explanation.	٧	٧		٧	V								Apply	No	MSTs, ESE, Class/Quiz Tests	
CO3	Understand the working of BJT and MOSFET with their equivalent small signal models.	٧	٧		V	V							V	Analyze	No (MSTs, ESE, Class/Quiz Fests	

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CO4	Understand the chemical processes used in fabrication of integrated circuits.	٧	V		٧	V							V	Apply	No	MSTs, ESE, Class/Quiz Tests	
CO No.	(BTEC-302-18: Digital System Design)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	2 Skill	Focus on Employability Entrepreneurs	Assessment Tools to Measure Attainment of	
CO1	Have a thorough understanding of the fundamental concepts and techniques used in digital electronics.	v	V			٧								Understand	hip No	MSTs, ESE, Class/Quiz Tests	
CO2	To understand and examine the structure of various number systems and its application in digital design.													Understand	No	MSTs, ESE, Class/Quiz Tests	
CO3	The ability to understand, analyze and design various combinational and sequential circuits.	V	V V			V							A	Analyze	No	MSTs, ESE, Class/Quiz ests	
CO4	Ability to identify basic requirements for a design application and propose a cost effective solution.	V	V										U	nderstand	No C	ISTs, ESE, lass/Quiz ests	

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CO5	The ability to identify and prevent various hazards and timing problems in a digital design.		V			V								Understand	No	MSTs, ESE, Class/Quiz Tests	
CO No.	(BTEC-303-18: Electromagneti c Waves)	PO 1	PO 2	PO	3 PO 4	PO 5	PO 6	PO	7 PO 8	PO 9	PO 10	PO 1	1 PO 1	12 Skill	Focus on Employability Entrepreneurs	Measure	
CO1	characteristics & wave propagation through transmission lines		V											Analyze	No	MSTs, ESE, Class/Quiz Tests	
CO2	understand Maxwell's equations for electromagnetic waves	٧	V		V	V							V	Apply	No	MSTs, ESE, Class/Quiz	
CO3	Characterize uniform plane wave	٧	٧		V	v							V	Analyze	No	Tests MSTs, ESE, Class/Quiz	
CO4	Calculate reflection and transmission of waves at media interface	V	٧		٧	V										MSTs, ESE, Class/Quiz Tests MSTs, ESE, Class/Quiz Tests	
CO No.	(UC-BTAM-303- 18: Engineering Mathematics- III)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10 F	PO 11	V PO 12	Skill	Employability / Entrepreneurs	Assessment Tools to Measure Attainment of	
CO1	The mathematical tools needed in evaluating multiple integrals and their usage	V	1		1								,	Apply	lo (MSTs, ESE, Class/Quiz Tests	

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CO2	The effective mathematical tools for the solutions of differential equations that model physical processes.	٨	1		1									Apply	No	MSTs, ESE, Class/Quiz Tests	
CO3	The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems		٧		1									Apply	No	MSTs, ESE, Class/Quiz Tests	
CO4	To introduce the solution methodologies for second order Partial Differential Equations with applications in engineering	1	1		1									Understandii	n No	MSTs, ESE, Class/Quiz Tests	
CO5	To provide an overview of probability and statistics to engineers	V	1		٧									Understandin	No		
CO No.	(BTEC-304-18: Network Theory)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurs	Assessment Tools to Measure Attainment of	
CO1	Analyze linear networks using network theorems	٧	٧		,										INO	MSTs, ESE, Class/Quiz	
CO2	Use Laplace transform to analyze transient & steady state response of linear networks	V	V		٧	٧							٧	Apply	No	Tests	

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CO3	analyze two po	V		v		v									Analyze	No	MSTs, ESE, Class/Quiz
CO4	Realize one pol networks using Foster's and Cauer's methods.	rt v	,			v	,								Apply	No	MSTs, ESE, Class/Quiz Tests
CO No.	(BTEC-311-18: Electronic Devices Laboratory)	PO 1	I PO	2 PC) 3 PO	4 PO	5 PC) 6 PC	7 PC	0 8 P	O 9 F	PO 10	PO 11	PO 1	2 Skill	Focus on Employabili Entreprene	Measure Attainment of
CO1	Realization using resistors and diodes in circuits with proper understanding to their working	V															CO
CO2	Understand characteristics & working of transistor in different configurations.	٧	V		V	V									Implementat	ii Yes	Practical notebooks,internal viva,End sem external v
	Understand characteristics & working of MOSFET in circuits		\ \ \ \ \			V								٧	Understanding	no	Practical notebooks, Internal viva, End sem external vi
	Think and design working circuits based		•			V							+	٧	Understanding	no	Practical notebooks,Internal viva,End sem external viv
	on resistors,diodes, transistors and MOSFETs	٧	٧		V	٧								v li	malone		
	(BTEC-312-18:													V	mplementatio '	res	Practical notebooks,Internal viva,End sem external viva
O No.	Digital System	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO ·	10 PO	11 PO	12 S	kill E	Focus on Employability / Entrepreneurs ip	Assessment Tools to Measure Attainment of

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logic gates	V	V		\ v	1,											
Realize sequential circuits using logic gates	V											V	Implementat	tio no	Practical notebo	oks,internal viva,End sem external vi
VHDL programs for combinational & sequential circuits.	V												Implementat	io no	Practical noteboo	oks,Internal viva,End sem external viv
design working projects using	٧	٧	v	V								V			Practical noteboo	ks,Internal viva,End sem external viva
													Implementation	Yes	Practical notebool	ks,Internal viva,End sem external viva
(HSMC101-18: Devlopment of Societies)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11			Focus on Employability / Entrepreneurs hip	Assessment Tools to Measure Attainment of	, seem execution viva
Origin of Family, Clan and Society. Understand the								1				1	Understand	No	MSTs, ESE, Class/Quiz Tests	
Forms of Government, like Democracy, Monocracy, Dictatorship and others								V				V	Understand	No	MSTs, ESE,	
Inderstand the asic concepts of conomic, Barter ystem and aljmani system: ocialism, apitalism, and larxism.								V				√ A	nalyze N	10	Class/Quiz	
now about the evelopment cocess before, uring and after itish Rule in dia.								1				√ U	nderstand		Class/Quiz	
	logic gates Write & simulate VHDL programs for combinational & sequential circuits. Think and design working projects using digital 74XX Ics (HSMC101-18: Devlopment of Societies) Understand the Origin of Family, Clan and Society. Understand the Forms of Government, like Democracy, Monocracy, Dictatorship and others Inderstand the asic concepts of conomic, Barter ystem and animani system: Dicialism, Apitalism, and larxism Thow about the evelopment cocess before, uring and after itish Rule in	logic gates Write & simulate VHDL programs for combinational & sequential circuits. Think and design working projects using digital 74XX Ics (HSMC101-18: Devlopment of Societies) Understand the Origin of Family, Clan and Society. Understand the Forms of Government, like Democracy, Monocracy, Dictatorship and others Inderstand the asic concepts of conomic, Barter ystem and ujmani system: Decialism, apitalism, and larxism Dow about the evelopment ocess before, uring and after itish Rule in	logic gates Write & simulate VHDL programs for combinational & sequential circuits. Think and design working projects using digital 74XX Ics W (HSMC101-18: Devlopment of Societies) Understand the Origin of Family, Clan and Society. Understand the Forms of Government, like Democracy, Monocracy, Dictatorship and others Inderstand the asic concepts of conomic, Barter ystem and aijmani system: Decialism, apitalism, and larxism Thow about the evelopment cocess before, uring and after itish Rule in	logic gates Write & simulate VHDL programs for combinational & sequential circuits. Think and design working projects using digital 74XX Ics W (HSMC101-18: Devlopment of Societies) Understand the Origin of Family, Clan and Society. Understand the Forms of Government, like Democracy, Monocracy, Dictatorship and others Inderstand the asic concepts of conomic, Barter ystem and ujmani system: Decialism, apitalism, and larxism Dow about the evelopment cocess before, uring and after itish Rule in	logic gates Write & simulate VHDL programs for combinational & sequential circuits. Think and design working projects using digital 74XX Ics W (HSMC101-18: Devlopment of Societies) PO 1 PO 2 PO 3 PO 4 PO 4 PO 3 PO 4 PO 4 PO 3 PO 4 PO 4 PO 3 PO 4 PO 4 PO 3 PO 4 PO 3 PO 4 PO 4 PO 5 PO 5 PO 5 PO 6 PO 6 PO 6 PO 6 PO 7 PO 6 PO 7 PO 7 PO 7 PO 8 PO 8 PO 9	logic gates Write & simulate VHDL programs for combinational & sequential circuits. Think and design working projects using digital 74XX lcs V V V (HSMC101-18: Devlopment of Societies) Understand the Origin of Family, Clan and Society. Understand the forms of Government, like Democracy, Monocracy, Dictatorship and others Inderstand the asic concepts of conomic, Barter ystem and alignani system: cicalism, apitalism, and larxism how about the evelopment ocess before, uring and after itish Rule in	logic gates Write & simulate VHDL programs for combinational & sequential circuits. Think and design working projects using digital 74XX lcs V V (HSMC101-18: Devlopment of Societies) PO 1 PO 2 PO 3 PO 4 PO 5 PO 6 Understand the Origin of Family, Clan and Society. Understand the Forms of Sovernment, like Democracy, Wonocracy, Oictatorship and others Inderstand the asic concepts of conomic, Barter system and oijmani system: ocialism, apitalism, and larxism. Inow about the evelopment occess before, uring and after itish Rule in	logic gates Write & simulate VHDL programs for combinational & sequential circuits. Think and design working projects using digital 74XX los V V V (HSMC101-18: Devlopment of Societies) PO 1 PO 2 PO 3 PO 4 PO 5 PO 6 PO 7 Understand the Origin of Family, Clan and Society. Understand the Forms of Government, like Democracy, Monocracy, Dictatorship and others Inderstand the asic concepts of conomic, Barter ystem and aimani system: cocialism, apitalism, and larxism now about the evelopment cocess before, uring and after itish Rule in	logic gates Write & simulate VHDL programs for combinational & sequential circuits. Think and design working projects using digital 74XX lcs PO 1 PO 2 PO 3 PO 4 PO 5 PO 6 PO 7 PO 8 Understand the Origin of Family, Clan and Society. Understand the Forms of Government, like Democracy, Wonocracy, Dictatorship and others Inderstand the asic concepts of conomic, Barter ystem and digmani system: cicalism, apitalism, and darxism Tow about the evelopment ocess before, uring and after itish Rule in	logic gates Write & simulate VIDL programs for combinational & sequential circuits. Think and design working projects using digital 74XX Ics PO 1 PO 2 PO 3 PO 4 PO 5 PO 6 PO 7 PO 8 PO 9 Understand the Origin of Family, Clan and Society. Juderstand the Forms of Sovernment, like Forms of Covernment,	logic gates	logic gates	logic gates V V V V V V V V V V V V V V V V V V V	logic gates	logic gates	Circuits using logic gates v v v v v v v v v v v v v v v v v v v

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CON	Training)	P	01	PO:	PO	3 PC)4 P	05	PO 6	PO 7	PO 8	PO	9 PO	10 PO	11 P	0 12	Skill	Focus on Employabil Entreprene	Measure	
CO1	Exposure to Practical Aspects of the Discipline		,	V													Analyze	hip	Attainment of CO	
CO2	Realization of common and simple circuits with proper understanding to their working			V				V				V				V	Apply	Yes	Practical notebooks, Interna	al viva,End sem external viva
CO3	Think and design working circuits based on common Electronic components	V		V		,		v				٧				V	Analyze	Yes	Practical notebooks, Interna	viva,End sem external viva
						V	· ·		+			٧				V		Yes	Practical notebooks,Internal	viva,End sem external viva
CO No.	(BTEC-331-18; Mentoring and Professional Development)	PO	1 F	0 2	PO 3	PO 4	РО	5 PO	6 P	07 F	8 09	PO 9	PO 10	PO 11	PO	12 SI	kill	Focus on Employability Entrepreneurs	Assessment Tools to Measure Attainment of	
CO1	Development of Overall Personality and Aptitutde															An	alyze	hip	Aptiitude Skills Tests, Viva	
CO2	General Awareness both Current affairs & GK							\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		V	V	٧	٧		V	Exa	amine	Yes	Aptitude Skills Tests, Viva	
	Development of Communication Skills										V	٧	٧		٧	Ana	alyze	Yes	Aptitude Skills Tests, Viva	
CO4	Development of Presentation Skills							V	1		v	V	v v		v v	Арр	oly	Yes	Aptitude Skills Tests, Viva	
	(BTEC-401-18: Analog Circuits)	PO 1	PO	2 P	O3 F	PO 4	PO 5	PO 6	PO	7 PO	8 PC) 9 P(O 10 P	O 11 F	PO 12	Skill		Employability /	Assessment of Head	

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CO1	Understand the biasing of transistors and analyze BJT/FET amplifiers	٧	V		V	٧								Analyze	No	MSTs, ESE, Class/Quiz Tests	1100
CO2	Analyze various rectifier and amplifier circuits				V	V								Apply	No	MSTs, ESE, Class/Quiz Tests	
СОЗ	Analyze sinusoidal and non-sinusoidal oscillators	٧	٧		V	V							V	Analyze	No	MSTs, ESE, Class/Quiz	
CO4	Understand various types of Power Amplifiers	٧	V			V							v v	Apply	No	MSTs, ESE, Class/Quiz Tests	
CO No.	(BTEC-402-18: Microprocesso rs and Microcontroller s)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	? Skill	Focus on Employability / Entrepreneurs hip	Assessment Tools to Measure Attainment of	
CO1	Understand architecture &functionalities of different building block of 8085 microprocessor.	٧	J											Analyze	No	MSTs, ESE, Class/Quiz Tests	
CO2	Understand working of different building blocks of 8051 microcontroller.	V	V		V	٧								Apply	No	MSTs, ESE, Class/Quiz Fests	
соз	Comprehend and apply programming aspects of 8051 microcontroller.	V	٧		V								V	Analyze	No	//STs, ESE, Class/Quiz cests	

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CO4	Interface & interact with different peripherals an devices.		,	٧		V		ľ							Apply	No	MSTs, ESE, Class/Quiz Tests	
CO No	Systems)	PC)1	PO 2	PO 3	P0 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	P0 1	1 PO	12 Skill	Focus on Employabilit Entrepreneu	Assessment Tools to	
CO1	Mathematically characterize different types of signals and systems.			٧		v									Understan	hip d No	MSTs, ESE, Class/Quiz	
CO2	Analyze the behavior of linear-shift invariant systems.	V		٧		v									Analyze	No	MSTs, ESE, Class/Quiz	
CO3	Apply concepts of Fourier and Laplace Transforms to analyze continuous-time signals and systems.														Apply	No	MSTs, ESE, Class/Quiz Tests	Mint
CO4	Investigate discrete-time signals and systems using Discrete-Time Fourier and Z-Transforms and simple Probability concepts.	٧		1		٧									Analyze	No	MSTs, ESE, Class/Quiz Tests	
	(HSMC-122-18: Universal Human Values- 2)	PO 1	РО	2 P	O 3 P	04 P	O 5 P(O 6 P	07 P	O8 P	0 9 Pc	O 10 PC) 11 P	0 12		hin	Assessment Tools to Measure Attainment of	
COI	Understand the core of Universal Human Values.									v				1	Jnderstand	No	MSTs, ESE, Class/Quiz Tests	

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CO2	Understand the Harmony and Self Exploration. Understand the								1				1	Understand	No	MSTs, ESE, Class/Quiz Tests	
CO3	Basic Human Aspiration.								1				1	Analyze	No	MSTs, ESE, Class/Quiz Tests	
CO4	Know about the Professional Ethics.								1				1	Understand		Class/Quiz Tests	
CO No.	(EVS-101- 18:Environmen tal Sciences)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	CONTRACTOR OF THE PARTY	Focus on Employability / Entrepreneurs hip	Assessment Tools to Measure Attainment of CO	
	Students will enable to understand environmental problems at local and national level through literature and general awareness							4					1		No	MSTs, ESE, Class/Quiz Tests	
CO2	The students will gain practical knowledge by visiting wildlife areas, environmental institutes and various personalities who have done practical work on various environmental lssues							1					V	Undertsand	No (MSTs, ESE, Class/Quiz Tests	

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CO3	The students will apply interdisciplinary approach to understand key environmental issues and critically analyze them to explore the possibilities to mitigate these							١					1		No	MSTs, ESE, Class/Quiz Tests	
	Reflect critically about their roles and identities as													Apply			
CO4	citizens, consumers and environmental actors in a complex, interconnected world		X					1					1			MSTs, ESE, Class/Quiz Tests	
													-	Analyse	No		
CO No.	(BTEC-411-18: Analog Circuits Lab)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurs hip	Assessment Tools to Measure Attainment of	
C01	Study and verify the characteristics of BJTs in circuits with proper understanding to their working.	v	v		v	V									in p	СО	
C02	Understand frequency response & working of various types of Oscillators	٧											V	Jnderstanding	no	Practical notebooks,	nternal viva,End sem external viva
CO3	Understand characteristics & working of different types of Power amplifiers				٧	٧							L	Inderstanding	no F	Practical notebooks,li	nternal viva,End sem external viva



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CO4	Design working circuits of oscillators,emitter follower circuit and power amplifier	1	V		V	v								√ III	mplementati	n Yes			
CO No.	(BTEC-412-18: Microprocesso rs and Microcontroller s Lab)	PO 1	PO 2	PO 3	PO 4	PO 5	РО	6 PO	7 PO	8 PO!	PO 1	0 PO			skill	Focus on Employabilit Entrepreneu	Assessment Tools to		ks,Internal viva,End sem external vi
CO1	Understanding the architecture &functionalities of different building blocks of 8085 microprocessor.		V																
CO2	Programming for controlling stepper and DC motors using 8085 Microprocessor(s).	٧	V		٧	V								Un	derstanding	yes	Practical notebo	ooks,In	iternal viva,End sem external viva
CO3	Programs to generate waveforms and interface ADC and DAC using 8051 Microcontroller.	٧	٧		٧	V							V		olementatio y				ernal viva,End sem external viva
O No.	(UC-BTEC-501- 18: Analog and Digital Communicatio n)	PO 1	P0 2 F	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10 F	PO 11	PO 12	Skill	En	on abiging 012	Assessment Tools to Measure Attainment of		ernal viva,criu sem external viva



	Analyze and			T	T	T	7	T	-	_	-		-		7		
CO1	compare different analog modulation schemes for their efficiency and bandwidth													Understan	d No	MSTs, ESE, Class/Quiz Tests	
CO2	Analyze the behavior of a communication system in presence of noise.	V	V			V								Understand	I No	MSTs, ESE, Class/Quiz Tests	
CO3	Investigate pulsed modulation system and analyze their system performance.	٧	V			V								Analyze	No	MSTs, ESE, Class/Quiz Tests	
CO4	Analyze different digital modulation schemes and can compute the bit error performance.	٧	٧			v							V	Understand	No	MSTs, ESE, Class/Quiz Tests	
CO NO.	(UC-BTEC-502- 18: Digital Signal Processing)	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurs	Assessment Tools to Measure	
C01	Represent signals mathematically in continuous and discrete time and frequency domain	٧	٧			٧								Understand	hip	Attainment of CO MSTs, ESE, Class/Quiz Tests	
C02	Get the response of an LSI system to different signals	٧	٧										١	Jnderstand	No	MSTs, ESE, Class/Quiz Tests	
C03	Design of different types of digital filters for various applications	v											V	nalyze	No	MSTs, ESE, Class/Quiz	

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CO No	Circuits)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	POS	PO	10 PO 1	11 PO	12 Skill	Focus on Employability Entrepreneur	Assessment Tools to Measure	
CO1	Represent signals mathematically in continuous and discrete time and frequency domain	٧	٧			v								Understand	hip No	Attainment of CO MSTs, ESE, Class/Quiz Tests	
CO2	Get the response of an LSI system to different signals	٧	V										V	Understand	No	MSTs, ESE, Class/Quiz	
CO3	Design of different types of digital filters for various applications	٧	٧			V							V V	Analyze	No	MSTs, ESE, Class/Quiz Tests	
CO No.	(UC-BTEC-504- 18: Control Systems)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	907	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurs hip	Assessment Tools to Measure Attainment of	
CO1	Characterize a system and find its steady state behaviour	v	v	V	٧									Understand	No	MSTs, ESE, Class/Quiz	
CO2	Investigate stability of a system using different tests	٧	٧	٧	V									Analyze	No	Tests MSTs, ESE, Class/Quiz Fests	
	Design various controllers Solve linear,	٧	٧	V	V								V	Analyze	No (MSTs, ESE, Class/Quiz Tests	
004	non-linear and optimal control oroblems	v	٧	V	V								V	apply I	No C	ASTs, ESE, class/Quiz ests	

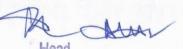
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CO No	DC Motors)		PO	2 PO	3 PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 1	0 PO 1	11 PO 1	2 Skill	Focus on Employability Entrepreneurs	Assessment Tools to Measure Attainment of	
CO1	Understand the principle of energy conversion	V				V								Analyze	hip No	MSTs, ESE, Class/Quiz	
CO2	Explain the working principle, construction and applications of DC motors		٧			v								Apply	No	MSTs, ESE, Class/Quiz Tests	
CO3	Explain the working principle, construction and applications of AC motors				V									Analyze	No	MSTs, ESE, Class/Quiz Tests	
CO4	Gain knowledge about the fundamentals of Special motors	٧	٧		v	٧								Apply	No	MSTs, ESE, Class/Quiz Fests	
CO No.	(UC-BTEC- 901C-18: Satellite Communicatio n)	PO 1	PO 2	PO 3	PO 4	PO 5 F	PO 6	PO 7 F	PO 8 F	PO 9 P	O 10 P	°O 11	PO 12 8	Skill	Employability / Entrepreneurs	assessment ools to leasure ttainment of	
CO1	Interpret & define basics of Satellite communication, understand the complete link design along with and the nterference effects on it		v										U	nderstand	No C	STs, ESE, ass/Quiz ests	

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C O2	Understand various fixed and demand assignment multiple access techniques	V	V											Analyze	No	MSTs, ESE, Class/Quiz Tests	
CO3	Understand the special purpose communication satellites.	V	V											Analyze	No	MSTs, ESE, Class/Quiz	
CO4	Have knowledge of laser satellite communication and CATV system.	٧				V								Apply	No	MSTs, ESE, Class/Quiz Tests	
CO No.	(UC-BTEC- 901F-18: JAVA Programming)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	2 Skill	Focus on Employability / Entrepreneurs hip	Assessment Tools to Measure Attainment of	
CO1	Apply the concepts and basics of JAVA	v	v											Analyze	No	MSTs, ESE, Class/Quiz	
CO2	Demonstrate the knowledge of operators and control statements					٧								Apply	No	MSTs, ESE, Class/Quiz Tests	
соз	Ability to learn about Inheritance, Interface, Applets		٧			٧								Analyze	No	MSTs, ESE, Class/Quiz	
CO4	Learn about JAVA database connectivity	v												Apply		//STs, ESE, Class/Quiz	



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CO No.	(UC-BTEC-511 18: Analog and Digital Communicatio n Laboratory)	PO 1	PO	2 PO	3 PO	4 PO	5 PO	6 PO	7 PO	8 PO	9 PC	10	PO 11	PO 12	2 Skill	Focus on Employability Entrepreneurs hip	Assessment Tools to Measure Attainment of	
CO1	Study the characteristics and output waveforms of AM, FM, PCM	v	v		V	V											CO	
CO2	Study and compare noise in AM and FM systems	٧	٧		V	V									Understanding			ks,Internal viva,End sem external viv
CO3	Investigate the output responses of PAM, PCM, PSK, FSK, MSK and QAM.	٧	V												Understanding		Practical notebook	cs,Internal viva,End sem external viva
004	Digital link simulation & error estimation in a digital link using MATLAB (SIMULINK)/ communication simulation packages.	V			V	v									mplementatio			s,Internal viva,End sem external viva
CO No.	(UC-BTEC-512- 18: Digital Signal Processing Laboratory)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	P0 7	PO 8	PO 9	PO 10	PO	11 PC	12 8	kill E	ocus on imployability / intrepreneurs	Assessment Fools to Measure	Internal viva,End sem external viva
CO1	Develop a MATLAB program to generate standard sequences and various signals	٧	٧		٧	٧											Attainment of CO	
002	Configuring Audio Codec of C6xxx Boards	V	٧		V	V								V im	plementatio no	Pr	ractical notebooks,Ir	nternal viva,End sem external viva

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CO3	Develop programs to verify convolution and design FIR & IIR filters.	V	V																
CO4	Implementation of Audio Delay Line, Echo and Audio Reverberation	V	V				V				v					mentati			ooks,Internal viva,End sem external vi
															V Implen	nentatio	Yes	Practical noteboo	oks,Internal viva,End sem external viv
CO No.	Circuits Laboratory)	PO 1	PO 2	PO 3	PO 4	РО	5 PO	6 PO	7 PO	8 PC) 9 PC) 10 F	PO 11	PO	12 Skill		Focus on Employability Entrepreneurs	Assessment Tools to Measure	
CO1	Study the configurations of Differential amplifiers	٧	V		V	V											hip	Attainment of CO	
CO2	Determine the performance parameters of an OP-Amp	٧	٧							1	/			٧	Underst	anding r	no	Practical notebook	s,Internal viva,End sem external viva
CO3	Design various applications using Op-Amps				٧	v				V					Understa			Practical notebooks	,Internal viva,End sem external viva
CO4	Examine the									V		+	+	٧	Implemen	ntatio ye	es	Practical notebooks,	Internal viva,End sem external viva
	operation of a Phase lock loop			٧	٧	٧								٧	Understan	ding no			nternal viva,End sem external viva
CO No.	(UC-BTEC-601- 18: Wireless Communicatio n)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 1	PO	11 P(0 12	Skill	En	cus on	Assessment Tools to Measure Attainment of	
CO1	Understand the basic elements of Cellular Radio Systems and its design	٧	٧		v	V								A	Analyze	No	N. C.	ISTs, ESE,	



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CO2	the concepts Digital communication through fading multipath channels	٧	V		V	V									Apply	No	MSTs, ESE, Class/Quiz Tests	
CO3	Understand various Multiple Access techniques for Wireless communication	٧	V		V	V								A	nalyze	No	MSTs, ESE, Class/Quiz Tests	
CO4	Know about the Wireless standards and systems	٧	٧		V	V							V	Ар	pply	No	MSTs, ESE, Class/Quiz Tests	
CO No.	(BTCS-504-18: Computer Networks)	PO 1	PO 2	PO 3	PO 4	PO 5	P0 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	2 Skil	II.	Focus on Employability / Entrepreneurs hip	Assessment Tools to Measure Attainment of	
CO1	Explain the functions of the different layer of the OSI Protoco																MSTs, ESE, Class/Quiz Tests	
CO2	Describe the function of each block of widearea networks (WANs), local area networks (LANs) and Wireless LANs (WLANs)															No I	MSTs, ESE, Class/Quiz Fests	
C03	Develop the network programming for a given problem related TCP/IP protocol												A	Analyze	e N	M	STs, ESE, ass/Quiz ests	

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CO4	Learn about DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.													Understand	No	MSTs, ESE, Class/Quiz Tests	
CO No.	(UC-BTEC-602- 18: OpticsI Fibres and Communicatio n)	P01	PO 2	PO 3	PO 4	PO 5	PO 6	P0 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability Entrepreneurs	Assessment Tools to Measure Attainment of	
CO1	Recognize and classify the structures of Optical fiber and types.	٧	V			v								Understand	hip No	MSTs, ESE, Class/Quiz	
	Discuss the channel impairments like losses and dispersion and analyze various coupling losses.	V	٧										٧	Understand	No	MSTs, ESE, Class/Quiz Tests	
CO3	Classify the Optical sources and detectors and to discuss their principle.	V											V	nalyze	NO	MSTs, ESE, Class/Quiz	
CO4	Familiar with Design considerations of fiber optic systems and sources and detectors	v	V	V	V	٧							V UI	nderstand N	lo (MSTs, ESE, Blass/Quiz ests	
								-	-		_		٧				

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CO No.	Engineering)	PO 1	РО	2 PC	03 P	04 1	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 1	2 Skill	Focus on Employab Entrepren	ility /	Assessment Tools to Measure	
CO1	Understand the working and operation of various Microwave Tubes and Microwave Solid-state devices.	V	V				v								Analyze	hip No		Attainment of CO MSTs, ESE, Class/Quiz Fests	
CO2	Learn about various important Microwave Components and the Microwave measurements that can be carried out	٧	٧		V									٧	Apply	No	C	STs, ESE, ass/Quiz ests	
CO3	Explain the basic concepts and types of Antennas and its regions.	٧			V									A	nalyze	No	MS Cla Tes	Ts, ESE, ss/Quiz	
CO4	Describe the important concepts of Antenna Arrays and Antenna Aperture	٧	٧	٧	٧	V									oply	No	MST Clas Test	rs, ESE, s/Quiz s	
CU NO.	(UC-BTEC- 902B-18: Power Electronics)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO	9 PO	10 PO 1	1 PO 1	2 Ski	u	Focus on Employability / Entrepreneurs hip	Tools Meas	ssment is to ure	

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C01	Understand the principles of mobile ad hoc networks, and their models.	V	v		v	v								Analyze	No	MSTs, ESE,		
CO NO.	(UC-BTEC- 902C-18; Mobile ADHOC nETWORKS)	PO 1	PO 2	PO 3	PO 4	PO 5	P06	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurs hip	Measure Attainment of		
CO4	Simulate power electronic converters and their control scheme.	٧	V		٧								V	Apply	No	MSTs, ESE, Class/Quiz Tests		
CO3	Illustrate the operating principle and construct a various types of DC-DC converters	٧	V			V								Analyze	No	MSTs, ESE, Class/Quiz Tests		
CO2	Demonstrate and build a various single phase AC-DC power converter circuits and understand their applications				\ \ \ \ \	V								Apply	No	MSTs, ESE, Class/Quiz Tests		
C01	Attain the ability and to handle the concept of construction and characteristics of Power semiconductor devices and fundamental of thyristors and family	d	V		V	٧								Analyze	No	MSTs, ESE, Class/Quiz Tests		

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CO No.	(UC-BTEC-611- 18: Optical Fibres and Communicatio n Laboratory)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	POS	9 PO	10 PO	11 PC	12 8	kill	Em	ployability / trepreneurs			
C04											+									
	Have a broad knowledge in Fuzzy logic principles and will be able to determine different methods of Defuzzification	٧	٧	V	٧	V									Analyz	e N	o'o	MSTs, ESE, Class/Quiz Tests		
CO2	understand the mathematical foundations of neural network models		V	V	V	V									Apply		No	MSTs, ESE, Class/Quiz		
CO1	Understand generic machine learning terminology	٧	٧	٧	V	V									Analy	/ze	No	MSTs, ESE, Class/Quiz		
CO No.	(UC-BTEC- 902E-18: Artificial Neural Networks)	PO 1	PO:	2 PO	3 PO 4	POS	5 PC) 6 PC	07 P	08	PO 9	PO 10	PO 11	PO	12 Skill		Focus on Employability Entrepreneur	Attainment of		
CO3	routing and security in mobile adhornetworks.	1	V			v									v An	alyze	No	MSTs, ESE, Class/Quiz Tests		
	mobile adhoc networks Analyze the challenges is designing,		,	,		, ,	V								A	oply	No	Class/Quiz Tests		
CO2	and develop information dissemination protocols for														A	anh		MSTs, ESE,	,	

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CO1	Simulation of an optical communication system & calculation of its BER and Q factor using simulator.		\ \ \ \		V											
CO2	Study various types of optical sources and light detectors	V	V										1	/ Implementa	atio no	Practical notebooks,Internal viva,End sem external viva
СОЗ	Familiarization with the methods of slicing and connecting techniques of optical fibres	V	V		V	V							V	Understand	ing no	Practical notebooks,Internal viva,End sem external viva
CO4	Study different types of losses in optical fibres.	٧	٧										V	Implementat	io yes	Practical notebooks,Internal viva,End sem external viva
	Design various applications of optical fiber communication sysytem		V		V	V							V	Understandin		Practical notebooks,Internal viva,End sem external viva
CO No.	(UC-BTEC-612- 18: Microwave and Antenna Engineering Laboratory)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	P0 7	PO 8	PO 9	PO 10	PO 11	PO 12	Implementation Skill	Focus on Employability / Entrepreneurs	Practical notebooks,Internal viva,End sem external viva Assessment Tools to Measure Attainment of
CO1	Learn about general Microwave components and Microwave bench	V	V		V											СО
CO2	Measure common parameters related to Microwave Oscillator(s).		٧		V	٧							Į	Understanding	no	Practical notebooks,Internal viva,End sem external viva

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CO3	Determine frequency and wavelength of waveguides. Measure and	٧			V	٧							V	Implementati			
CO4	plot radiation patterns of various types of Antennas		V		v								V	Implementation			ernal viva,End sem external viv
															7-0		rnal viva,End sem external viva
CO No.	(UC-BTEC-631- 18: Project-I)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurs	Assessment Tools to Measure Attainment of	
CO1	Understand the Survey and study of published literature on the assigned topic	٧	٧		V	٧									hìp	co	
CO2	Working out a preliminary Approach to the Problem relating to the assigned topic	٧	٧		٧	V				V				Understanding		Practical notebooks,Interr	nal viva,End sem external viva
CO3	preliminary Analysis/Model ling/Simulation/ Experiment/De sign/Feasibility	v	V		٧	٧				V				Understanding Y		Practical notebooks,Intern	al viva,End sem external viva
CO4	Preparing a Written Report on the Study conducted for presentation to the Department	v	٧										V	mplementatio Ye	es p	ractical notebooks,Interna	ll viva,End sem external viva
			-	-	٧	٧		_		٧			V In	nplementatio ye			viva,End sem external viva

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CO No.	18: Internet of Things (IOT) & Cloud Computing)		1 PO) 2 P	03	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	10 P	0 11	PO 12	Skill	Focus on Employability Entrepreneur hip	Assessment Tools to Measure Attainment of	
CO1	Understanding concept o cloud computing and analyze tradeoff between deploying application on cloud and using local infrastructure	f				٧	٧									Understand		MSTs, ESE, Class/Quiz Tests	
CO2	Identify issues and design challenges in IoT applications.														٧	Understand	No	MSTs, ESE, Class/Quiz Tests	
	Select appropriate hardware and software components for IoT applications	V	V			v	V									nalyze	No	MSTs, ESE, Class/Quiz Tests	
CO4	Conceptual knowledge will help students to build IOT applications	٧	٧		v	,	V								V A	pply	yes	MSTs, ESE, Class/Quiz Tests	
CO No.	(BTEC-907C- 18: Robotics and Embedded systems)	PO 1	PO 2	PO:	3 PO	4 P(O 5 P	0 6 P	07 P	08 F	09 P	O 10	PO 11	1 PO	12 Sk	ill	Employability /	Assessment of State o	
C01	Ability to understand pasic concept of robotics.	٧	٧		V		v								Un		No C	ISTs, ESE, lass/Quiz ests	

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CO No.	(BTEC-909C- 18: Embedded Systems Design)	PO 1	PO 2	PC)3 P	04	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	0 PO 1	11 PO	2 51	cin E	mployability /	Assessment Fools to Measure Attainment of	
	techniques		V			٧	√									escribe	NO	Class/Quiz Tests	
CO4	Describe about CMOS Testing																		
CO3	VHDL Synthesis and the tools involved	٧	٧			v	٧								L	.earn	No	MSTs, ESE, Class/Quiz Tests	
	VLSI Circuit Design processes and Gate level design Learn about	٧	v			٧	٧								V	Understand	No	MSTs, ESE,	
CO1	concepts and various processes related to VLSI Understand the	\ \ \ \ \ \		,		٧	٧									Understand	No	MSTs, ESE, Class/Quiz Tests	
CO No.	(BTEC-908C- 18: VLSI Design)	PO	1 Po	02	PO 3	PO 4	PO	5 PO	6 PO	7 PO	8 PO	9 PC	O 10 P	O 11 F	O 12	Skill	Focus on Employability Entrepreneurs	Measure Attainment of	
CO4	To know abouthe dynamics and control in robotics industries			٧		٧	V								٧	Apply	Yes	MSTs, ESE, Class/Quiz Tests	
соз	about the differential motion, and statics robotics	ne Id in v		٧		v	,	,								Analyze	No	MSTs, ESE, Class/Quiz Tests	
CO2	Instrumentati n systems au their applications various To kno	nd to		٧				v								Analyze	No	MSTs, ESE, Class/Quiz Tests	

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	(BTMC-101-18: Indian Constitution)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		Focus on Employability / Entrepreneurs hip	Assessment Tools to Measure Attainment of CO		
	Understand Embedded Networking concepts based upon connected MCUs		V			V								Understand	No	MSTs, ESE, Class/Quiz Tests		
соз	Reviews and implement the protocols used by microcontroller to communicate with external sensors and actuators in real world	٧			V	V							V	Revieweing	No	MSTs, ESE, Class/Quiz Tests		
CO2	Understand hardware interfacing concepts to connect digita as well as analog sensors while ensuring low power considerations.													Understand	d No	MSTs, ESE, Class/Quiz Tests		
CO1	Learn about the basic architecture of 32-bit microcontrollers	c f	V		v									Learning	No	MSTs, ESE, Class/Quiz Tests		

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CO No.	CO Statements (BTMC-102-18: Essence of Indian Traditional Knowledge)	PO-a	РО-ь	РО-с	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-I	Learning Lev	Focus on Employability / Entrepreneurs hip	Assessment Tools to Measure Attainment of CO	
CO4	The Course will also helpful in prepration of Competitive exams National wide and state level, like IAS, IPS and others.								1				1	Understand		MST,s ESE, Class/Quiz Tests	
CO3	Examine the Forms of government, Parliamentary form of Govt. & Presidential Form of Govt, powers and position of President and Prime Minister .								1				1	Analyze	No	MSTs, ESE, Class/Quiz Tests	
CO2	Understand the Rights and Duties of Citizens, Fundmantal Rights and Human Rights.								V				,	√ Understan	d No	MSTs, ESE, Class/Quiz Tests	Ξ,
CO1	Understand the Philosophy of Indian constitution, like Sovereignty, Secular, Republic Socialist and Democracy.									V				√ Understa	nd No	MSTs, ESE Class/Quiz Tests	SE,

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CO1	Understand the Philosophy of Indian Knowledge system and and its Basic Structure.								1				1	Understand	No	MSTs, ESE, Class/Quiz Tests	
CO2	Ancient India Culture, Society and Religion. Examine the								1				1	Understand	No	MSTs, ESE, Class/Quiz Tests	
CO3	areas of Indian Linguistic Tradition. Know the								1				1	Analyze	No	MSTs, ESE, Class/Quiz Tests	
CO4	contrubtion of scientists of different eras.								٧				1	Understand		MST,s ESE, Class/Quiz	
CO No.	(BTEC-909E- 18: Bio Medical Signal Processing)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		Focus on Employability / Entrepreneurs hip	Assessment Tools to Measure	
CO1	Understand the fundamentals of signal processing for various bio- signal analysis	٧	٧		٧	٧									No	MSTs, ESE, Class/Quiz Tests	
CO2	Learn the Infinite impulse response (IIR) filter and study its applications	٧			٧	٧							v	Learning	No	MSTs, ESE, Class/Quiz Tests	
CO3 li	Attain in-depth knowledge about the casic concepts of finite mpulse response (FIR) ilter and study ts applications	v			٧									Understand N	10	//STs, ESE, class/Quiz cests	
					V								٧		Depart Depart	ment of Electronics & Communication Engineering uiral Punjab Technicat University Campus, Kapurthala (Punjab)-144603	

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CO4	Apply different methods of signal processing techniques in analyzing the various biosignals such as Electro cardiogram (ECG), Electro myogram (EMG) and Phonocardiogram (PCG)				v								V	Apply	No	MSTs, ESE, Class/Quiz Tests	
CO No.	(BTEC-907B- 18: Antenna Radiating Systems)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurs hip	Assessment Tools to Measure Attainment of CO	
	To understand the basic concepts of radiation	٧	٧		٧	v								Understand	No	MSTs, ESE, Class/Quiz Tests	
CO2	To analyse the radiation pattern of antenna arrays.	٧	٧										٧	Analyze	No	MSTs, ESE, Class/Quiz Tests	
CO3	To understand the concept of various wave propagation techniques											8		Understand	No	MSTs, ESE, Class/Quiz Fests	
C04	To understand the concept of radiating systems on environment	v	٧		٧	٧							V	Inderstand	No (//STs, ESE, Class/Quiz rests	

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CO No.	n Networks)		PO 2	PO 3	PO 4	PO 5	PO 6	PO	PO 8	PO 9	PO 10	PO 11	1 PO 1:	2 Skill	Employability Entrepreneurs	Assessment Tools to Measure Attainment of	
CO1	Understand the working principles of the mobile communication													Understand	hip	MSTs, ESE, Class/Quiz Tests	
CO2	systems Understand the relation between the user features and underlying		▼		٧	٧								Understand	No	MSTs, ESE, Class/Quiz Tests	
CO3	technology Analyze mobile communication systems for improved performance	V √	√		v	V								Analyze	No	MSTs, ESE, Class/Quiz Tests	
							100										
	(BTEC-908A- 18: Artificial Intelligence)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Employability / Entrepreneurs	Assessment Tools to Measure Attainment of	
	Learn about the basic understanding of Artificial Intelligent system	v	V		v								L		No (MSTs, ESE, Class/Quiz Tests	
CO2	Explain about various types of Artificial Neural Networks & their models	v	V		V	V							E	explain	40	MSTs, ESE, Class/Quiz ests	
соз	pescribe Artificial Neural networks methods, operation and parameters	٧	v		v	V							D	escribe N	lo C	STs, ESE, lass/Quiz ests	

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CO4	Explore Neural Network MATLAB Toolbox	V	v		V	v								Explore	No	MSTs, ESE, Class/Quiz Tests	
CO No.	and Machine Learning) Understand the	PO 1	PO 2	PO 3	3 PO 4	PO 5	PO 6	PO 7	PO 8	POS	PO 1	PO 11	PO 12	2 Skill	Focus on Employability / Entrepreneurs hip	Assessment Tools to Measure Attainment of CO	
CO1	concept of information and entropy Understand	٧	٧		V	٧								Understand	No	MSTs, ESE, Class/Quiz Tests	
CO2	Shannon's theorem for coding				V	V								Understand	No	Class/Quiz	
	Calculation of channel capacity													Calculate	No	MSTs, ESE, Class/Quiz	
	Apply coding techniques	٧	٧			٧								Apply	No	MSTs, ESE, Class/Quiz Tests	
CO No.	(BTEC-909B- 18: Information Theory and Coding)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Employability / Entrepreneurs	Assessment Fools to Measure	
CO1	To learn the difference between optimal reasoning Vs human like reasoning	V	٧		٧	V							Į.		hip (Attainment of CO ASTs, ESE, Class/Quiz ests	

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C02	Develop Python programs with conditionals and loops.	٧	٧		v	_							V	Develop	No	MSTs, ESE, Class/Quiz Tests	
C01	Read and write simple Python programs.	٧	٧		٧	V									No	MSTs, ESE, Class/Quiz	
CO No.	(BTEC-907D- 18: Python Programmimg)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurs hip	Assessment Tools to Measure Attainment of	
CO4	To understand the applications of AI namely, Game Playing, Theorem Proving, Expert Systems, Machine Learning and Natural Language Processing		V		V	V							V	Understand	No	MSTs, ESE, Class/Quiz Tests	
CO3	To learn different knowledge representation		٧			V							,	Learning	No	MSTs, ESE, Class/Quiz	
CO2	heuristic search alon with the tim and space	g e												Understand	d No	MSTs, ESE, Class/Quiz Tests	

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CO3	functions and to use Python data structures—lists , tuples, dictionaries.	٧	V		v	V								Learning	No	MSTs, ESE, Class/Quiz Tests	
CO4	Perform input/output operations with files in Python.	٧	v		V								V	Perform	No	MSTs, ESE, Class/Quiz Tests	
CO5	Execute Searching, sorting and merging in Python.	v	·	٧	V	V V							V	Excecute	Yes	Tests MSTs, ESE, Class/Quiz Tests	
00 140.	(BTEC-907E- 18: Adaptive Signal Processing)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurs	Assessment Tools to Measure Attainment of	
CO1	Understand the non-linear control and the need and significance of changing the control parameters with respect to real-time situation	٧	V		V	V								Understand	hip No	MSTs, ESE, Class/Quiz Tests	
CO2	Mathematically represent the adaptability requirement'.	٧	V	٧	٧	v							V	Apply	No	MSTs, ESE, Class/Quiz Tests	
CO3 ti	he nathematical reatment for he modeling and design of he signal rocessing	v	V	V	v	V							ļ	Analyze	No	MSTs, ESE, Class/Quiz ests	
3									and the latest and th				٧			1111	L.

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CO No.	(BTEC-908D- 18: Soft Computing)	PO 1	PO 2	PO:	3 PO 4	POS	PO	9 PO 1	PO 8	POS	PO 1	0 PO 1	1 PO 1:	2 Skill	Focus on Employability Entrepreneurs hip	Attainment of	
CO1	Understand the concepts of Soft Computing and Algorithms involved therein		V			V								Understand		MSTs, ESE, Class/Quiz Tests	
	Understand Genetic Algorithms with its operators and applications Learn about		V			v							V	Understand	No	MSTs, ESE, Class/Quiz Tests	
CO3	the Neural Network models and its applications	٧	٧		٧	V							v	Applying	Yes	MSTs, ESE, Class/Quiz Tests	
CO4	Describe the Fuzzy systems and Swarm Intelligence	٧			٧									Describe	No	MSTs, ESE, Class/Quiz Tests	
CO No. 1	(BTEC-909A- 18: Big Data Fundamentals)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12 S		Employability / Entrepreneurs	Assessment Cools to Measure	
CO1	Understand the Evolution and pasics of Big														N.	attainment of CO	
CO2	Data. Understand the Architecture of Hadoop with its ile system and is Programming.	V	٧		V								٧	nderstand	No C	ests STs, ESE, lass/Quiz ests	
CO3 A	Explain the advanced nalytical neory and nethods.		٧		v	v v							V Ex	plain N	lo CI	STs, ESE, ass/Quiz sts	

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CO4	Describe the challenges in handling streaming data from the real world.	٧	٧			٧)						٧	Describe	No	MSTs, ESE, Class/Quiz Tests	
CO No.	(BTEC-908E- 18: Digital Image and Video Processing)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurs hip	Assessment Tools to Measure Attainment of CO	
CO1	Mathematically represent various types of images and analyze them.	٧	V		V	V							V	Analyze	No	MSTs, ESE, Class/Quiz Tests	
CO2	2. Process these images for the enhancement of certain properties or for optimized use of the resources.	V	٧		V	V							٧	Apply	Yes	MSTs, ESE, Class/Quiz Tests	
CO3	Develop algorithms for image compression and coding.		٧		٧	٧							٧	Design	Yes	MSTs, ESE, Class/Quiz Tests	
CO No.	(BTEC-731-18: Project-II)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurs hip	Assessment Tools to Measure Attainment of CO	
CO1	Review and finalization of the Approach to the Problem relating to the assigned topic		٧		٧	V							٧	Review	Yes	Report Submission, Internal Viva, Project Submission, Semester-End Viva	

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CO2	Detailed Analysis/Model ing/Simulation/ Design/Proble m Solving/Experi ment as needed	٧	٧		٧	٧				V	Apply	Yes	Report Submission, Internal Viva, Project Submission, Semester-End Viva	
CO3	Final development of product/proces s, testing, results, conclusions and future directions:	V	>	V	>	V				V	Design	Yes	Report Submission, Internal Viva, Project Submission, Semester-End Viva	
CO4	Prototyping or Product development/P atent and Video demonstration;	٧	V	V	٧	V				V	Design	Yes		
CO5	Preparing a paper for Conference presentation/P ublication in Journals;	٧	V		٧						Prepare	No	Report Submission, Internal Viva, Project Submission, Semester-End Viva	
CO6	Preparing a Dissertation in the standard format for being evaluated by the Department	V	V		V	V				V	Prepare	Yes	Report Submission, Internal Viva, Project Submission, Semester-End Viva Report Submission, Internal Viva, Project Submission, Semester-End Viva Report Submission, Internal Viva, Project Submission, Semester-End Viva Report Submission, Internal Viva, Project Submission, Internal Viva, Project Submission, Semester-End Viva	

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