SCHEME FOR LEARNING OUTCOME

_	LO Code	CO Code	de	urse Co	Co	le	ranch Cod	В
Format No. 4	1	1	3	0	4	1	0	0

COURSE NAME	Digital Communication						
CO Description	Identify different digital sign	nals and their parameters					
LO Description	Classify different digital sign	nals					

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-01	Analog vs Digital Signal, Types of Digital signal: Binary, Tertiary, Octal, Hexadecimal, Advantages of Digital Communication, Baseband Transmission vs Broadband Transmission	Interactive classroom lecture, PPT, demonstration, quiz, assignments	Teacher will explain the contents and provide handouts to students. Teacher will conduct quiz/ assignments/ tutorial.	6	0	Text Books, PPT, Handouts, chalk board, charts.Videos lectures- NPTEL& others	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-01	End Semester Theory Exam	 Student will be asked to(and/or): Define Binary, Tertiary, Octal, Hexadecimal signals Differentiate Baseband and Broadband signals Describe advantages of Digital Communication 	10	Question paper, Rating scale	External

SCHEME FOR LEARNING OUTCOME

	LO Code	CO Code	de	urse Co	Co	le	ranch Cod	В
Format No. 4	2	1	3	0	4	1	0	0

COURSE NAME	Digital Communication					
CO Description	Identify different digital signals and their parameters					
LO Description	Define different parameters related to digital signals					

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-02	Bitrate, Bandwidth, Baudrate, Transmission impairment: Attenuation, Distortion, Noise, BER, Jitter, Nyquist rate for noiseless channel, Shannon capacityfor noisy channel, Frequency and Time-Domain representation of periodic and non-periodic Digital Signal, frequency, bandwidth	Interactive classroom lecture, PPT, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct quiz/assignments/ tutorial to make students practice their knowledge.	8	0	Text Books, PPT, Handouts, chalk board, charts, Numerical Problems Workbook	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-02	End Semester Theory Exam	 Student will be asked to(and/or): Define Bitrate, Baudrate, Attenuation, Distortion, Jitter State Nyquist theorem for noiseless channel State Shannon's theorem for noisy channel Calculate bitrate for given channel. 	10	Question paper, Rating scale	External

	ma Wing \ Dhanal	SCHEME FOR LEARNING	E	Branch Co	de	Co	ourse Co	de	CO Code	LO Code	_
RGPV (Diploma Wing) Bhopal		OUTCOME	0	0	1	4	0	3	1	3	Format No. 4
COURSE NAME Digital Communication											
CO Description	Identify different digital sign	entify different digital signals and their parameters									
LO Description	Analyze variousdigital signal	nalyze variousdigital signal									

со

LO

SCHEME OF STUDY

S. No.	Learning Content	Teaching —Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-03	Time-Domain representation of given periodic and non-periodic digital signal, calculation of frequency, bandwidth and other parameters.	Lab demonstration, hands on practice, lab assignments, V-Lab.	 Teacher will explain the content in class/lab. Teacher with support from lab staff will demonstrate the procedure of lab experiments. Student will conduct lab assignment based on these experiments. 	0	6	Lab manual, charts, experimental trainer instruments/kit with measuring instruments, computer with relevant simulation software and high speed internet.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-03	Practical test in laboratory	Student will be asked to 1. Evaluate parameters of given waveform using CRO/DSO	10	Rubrics/Rating scale	Internal

RGPV (Diploma	Wing)	Bhopal
----------------------	--------	--------

SCHEME FOR LEARNING OUTCOME

	LO Code	CO Code	de	urse Co	Co	le	ranch Cod	В
Format No	4	2	3	0	4	1	0	0

COURSE NAME	Digital Communication
CO Description	Explain different steps of signal processing in PCM and digital line codes.
LO Description	Describe various signal processing methods in pulse code modulation.

SCHEME OF STUDY

S. No.	Learning Content	Teaching — Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-04	Nyquist Sampling Theorem, Impulse sampling, Natural sampling- sample and hold operation –Quantization, Quantization levels, Quantization noise, PCM Encoding, Companding, Scrambling. Interleaving. Functional Block Diagram of PCM	Interactive classroom lecture, PPT, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.		0	Text Books, PPT, Handouts, chalk board, charts, Video lecture- NPTEL and others.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-04	End Semester Theory Exam	 Student will be asked to(and/or): Define Nyquist Sampling Theorem. Describe Quantization, Quantization levels, Quantization noise, companding. Calculate bitrate of given PCM signal. Explain operation of PCM encoder 	10	Question paper, Rating scale	External

RGPV (Diploma Wing) Bhop	al
---------------------------	----

SCHEME FOR LEARNING OUTCOME

	LO Code	CO Code	de	ourse Co	Co	le	ranch Cod	В
Format No. 4	5	2	3	0	4	1	0	0

COURSE NAME	Digital Communication
CO Description	Explain different steps of signal processing in PCM and digital line codes.
IO Description	Compare various digital line codes

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-05	Digital Line Codes: non return-to-zero(NRZ), return- to-zero (RZ), Manchester code	Interactive classroom lecture, PPT, Video, demonstration, quiz, assignments.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	5	0	Text Books, PPT, Handouts, chalk board, charts, Video lecture- NPTEL and others.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximu m Marks	Resources Required	External / Internal
LO-05	End Semester Theory Exam	Student will be asked to(and/or): 1.Describe (NRZ), return-to-zero (RZ), Manchester code 2. Calculate bitrate and bandwidth of given Line code	10	Question paper + Rating scale.	External

	//Diele	Mina	· \ Dhanal	SCHEME FOR LEARNING	Bra	nch Code	Course Code	CO Code	Code Code	1			
KGPV	/ (Dibio	ıma vving	g) Bhopal	OUTCOME	0	0 1	4 0 3	2	6	Format No. 4			
COURS	SE NAME	Digital Comm	nunication										
CO Des	cription	Explain diffe	rent steps of sig	nal processing in PCM and digital line cod	des.								
LO Des	cription												
				SCHEME OF STUDY	1								
S. No.	Learnir	ng Content	Teaching Learning Method		Teach Hrs.	/Tut IRs Red				Remarks			
LO-06	6 PerformPCM modulation /demodulation considering various signal processing steps Viz., Different type of Sampling, Quantization, Quantization levels, Quantization noise, Encoding. (On Trainer Kits/ Simulation Software)		PerformPCM modulation /demodulation considering various signal processing steps Viz., Different type of Sampling, Quantization, Quantization levels, Quantization noise, Encoding. (On Trainer Kits/		demonstration PPT , hands of practice, lab		0	6	Handouts, of trainer inst measuring computer visimulation	Lab manual, charts, Handouts, experimental trainer instruments/kit with measuring instruments, computer with relevant simulation software and high speed internet.			
				SCHEME OF ASSESSM	ENT								
S. No.	S. No. Method of Assessment			Description of Assessment	Maximu	ım Marks	arks Resources Required			External / Internal			

LO-06		Exam			m PCM modulation ner kit/ simulation	-	1	U	K	LUDI ICS	s, Kal	ing sca	116	External
				ADDIT	IONAL INSTRUCTION	ONS FOR THE HOD	/ FACUL	TY (IF AN	Y)					
				_	SCHEME FOR	LEARNING	Bran	ch Code	Co	urse Cod	e	CO Code	LO Code	
RGPV (Diploma Wing) Bhopal				pal	OUTCOME O 0 1 4 0 3						3	3	7	Format No. 4
COURSE NAME Digital Communication				1					'					
CO Des	cription	Identify	different digit	al modula	ntion, demodulation	techniques and thei	r applicat	tion.						
LO Des	cription	Illustrate	e different dig	ital modu	lation and demodula	tion techniques								
					SCH	HEME OF STUDY								
S. No.		Learning Content			Learning Content Learning '		Teach Hrs.	/	Pract. /Tut LRs Required Hrs.		uired	Remarks		
LO-07 Digital modulation techniques with block diagram, ASK, FSK BPSK, GMSK. Digital Demodulation techniques with block diagram, ASK, FSK, BPSK, GMSK.				/ISK. ies with	Interactive classroom lecture, PPT, Video, demonstration, quiz, assignments.	Teacher will explain contents and provide handouts to student Teacher will conduct assignments/ quiz/t to make students put their knowledge.	de ts. ect autorial	8		0	PP7 cha cha lect	t Bool Γ, Han lk boa rts, Vic cure- N I other	douts, rd, deo PTEL	
					SCHEN	IE OF ASSESSMEN	Т							
		od of	T. Control of the Con					1	imun			sourc		External /

Lo-07	End Se Theory		 Descri Explain 	be ASK, F n ASK, FS	sked to(and/o SK BPSK,GMSk K BPSK,GMSK o etween ASK, F	modulation.			10		Question paper , Rating scale			External
				AD	DITIONAL INS	TRUCTIONS FOR THE HOD	/ FACUL	ΓΥ (IF A	ANY)					
DCD\	//Diplo	ma M	ling \ Rh	onal	SCHEM	E FOR LEARNING	Branc	h Code	С	ourse Co	ode	CO Code	LO Code	<i>1</i>
RGPV (Diploma Wing) Bhopa			юраі	(OUTCOME	0	0 1	4	0	3	3	8	Format No. 4	
COURSE NAME Digital Communication														
CO Des	cription	Identify	/ different di	gital mod	dulation, demo	dulation techniques and their	r applicat	ion.						
LO Des	cription	Outline	various app	lications	of digital modu	ulation and demodulation tec	hniques.							
						SCHEME OF STUDY								
S. No.	Lea	rning Co	ontent		aching – ing Method	Description of T-L Process	Teach Hrs.		Pract. ut Hrs.		LRs Required			Remarks
Applications of digital modulation techniques in Mobile communication, Wi-Fi, Bluetooth, DTH, DSL Technologies, FTTH		Applications of digital classroom lecture, modulation techniques in Mobile communication, Wi-Fi, Bluetooth, DTH, DSL Interactive classroom lecture, contents and provide handouts to students. Teacher will explain the contents and provide handouts to students. Teacher will explain the contents and provide handouts to students. Teacher will explain the contents and provide handouts to students. Teacher will explain the contents and provide handouts to students. Teacher will explain the contents and provide handouts to students.		6		0	Ha bo Vio	Text Books, PPT, Handouts, chalk board, charts, Video lecture- NPTEL and others.		k				
	1					SCHEME OF ASSESSMEN	T	<u> </u>		-				
S. No.	Metho			of Assessment			mum irks	Res	ource	es Req	uired	External / Internal		

LO-08	Mid semester Exam Assignment, Quiz	 Student will be asked to (and/or): CompareASK, FSK BPSK,GMSK. Explore Modulation,demodulation techniques usedinWi-Fi, Bluetooth, DTH, DSL Technologies, FTTH 	10	Question paper, Rating scale	Internal	
-------	---	--	----	---------------------------------	----------	--

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING	E	Branch Code			Course Code		CO Code	LO Code	4
KGPV (Dipio	ma wing) Bhopai	OUTCOME		0	1	4	0	3	3	9	Format No. 4
COURSE NAME	RSE NAME Digital Communication										
CO Description	Identify different digital mod	dulation, demodulation techniques and their	appli	cation							
LO Description Verify digital modulation and demodulation.											

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-09	Perform digital modulation – ASK, FSK, BPSK & GMSK and observe output waveform and verify it. Perform digital demodulation – ASK, FSK, BPSK & GMSK and observe output waveform and verify it. (On Trainer Kits/ Simulation Software)	Lab demonstration, PPT , hands on practice, lab assignments.	 Teacher with support from lab staff will demonstrate the procedure of lab experiments. Student will conduct lab assignment based on these experiments. 	0	8	Lab manual, charts, Handouts, experimental trainer instruments /kit with measuring instruments, computer with relevant simulation software and high speed internet.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-09	End Semester practical Exam	 Student will be asked to Perform ASK, FSK BPSK,GMSK Digital Modulation on trainer kit/ simulation software Perform ASK, FSK BPSK,GMSK Digital Demodulation on trainer kit/ simulation software 	10	Rubrics, Rating scale	External

RGPV (Diploma	Wing	Bhopal
---------------	------	---------------

SCHEME FOR LEARNING OUTCOME

4	LO Code	CO Code	de	ourse Co	Co	le	ranch Coc	В	
Format No. 4	10	4	3	0	4	1	0	0	

COURSE NAME	Digital Communication
CO Description	Analyze different Multiplexing and Multiple Access methods and their applications.
LO Description	Compare different Multiplexing and Multiple Access techniques.

SCHEME OF STUDY

S. No.	Learning Content	Teaching — Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-10	Difference between Multiplexing and Multiple Access. Need of multiplexing, Comparison of Time division multiplexing (TDM), Frequency division multiplexing (FDM), Orthogonal Frequency	Interactive classroom lecture, PPT, Video, demonstration, quiz, assignments.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	8	0	Text Books, PPT, Handouts, chalk board, charts, Video lecture- NPTEL and others.	

PCD\	/ (Diploma Wing) Bl	honal	SCHEM	E FOR LEARNING	Branch Co	ode	Cour	se Code	CO Code	LO Code	Format No. 4
		AD	DITIONAL INS	TRUCTIONS FOR THE HOD) FACULTY	(IF ANY	()				
LO-10	End Semester Theory Exam	 Explain Desc Diffe Explain Desc Diffe 	 Student will be asked to (and/or): Explain need of multiplexing. Describe TDM, FDM, OFDM. Differentiate between TDM, FDM, OFDM. Explain need of multiple access. Describe& Compare TDMA, FDMA, OFDMA. Differentiate between Multiplexing and Multiple Access 			10		Question paper, Rating scale.			External
S. No.	Method of Assessment		Description	n of Assessment	Maximu	ım Mar	ks F	Resource	s Requ	ired	External / Internal
	Division Multiplexing (OFDM). Need of multiple Access, Comparison of Time Division Multiple access(TDMS), Frequency Division Multiple access(FDMA), Code Division Multiple access(CDMA)			SCHEME OF ASSESSMEN	IT.						

-	OUTCOME 0 0 1 4 0 3 4 11								
COURSE NAME	COURSE NAME Digital Communication								
CO Description	O Description Analyze different Multiplexing and Multiple Access methods and their applications.								
LO Description	O Description List out various applications of Multiplexing and Multiple Access techniques.								
SCHEME OF STUDY									

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-11	Application of FDM, TDM, OFDM in PSTN, Mobile communication, Wi-Fi, Bluetooth, DTH, DSL Technologies, FTTH Application of FDMA, CDMA, OFDMA in Mobile communication, Wi-Fi, Bluetooth, DTH, DSL Technologies, FTTH.	Interactive classroom lecture, PPT, Video, demonstration, quiz, assignments.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	6	0	Text Books, PPT, Handouts, chalk board, charts, Video lecture- NPTEL and others.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-11	Mid semester Exam,Assignment, Quiz	 Student will be asked to(and/or): Write carrier frequencies and channel bandwidth of Wi-Fi, DTH,DSL,FTTH,PSTN, mobile comm. Differentiate FDM, TDM, OFDM. 	10	Question paper, Rating scale.	Internal

SCHEME FOR LEARNING OUTCOME

4	LO Code	CO Code	de	ourse Co	Co	le	ranch Cod	В
Format No. 4	12	4	3	0	4	1	0	0

COURSE NAME	Digital Communication
CO Description	Analyze different Multiplexing and Multiple Access methods and their applications.
LO Description	Verify different Multiplexing and Multiple Access techniques.

SCHEME OF STUDY

S. No.	Learning Content	Teaching — Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-12	Perform and verify different Multiplexing and Multiple Access techniques-FDM, TDM, OFDM, FDMA, TDMA, CDMA, OFDMA. (On Trainer Kits/ Simulation Software)	Lab demonstration, PPT, hands on practice, lab assignments.	 Teacher with support from lab staff will demonstrate the procedure of lab experiments. Student will conduct lab assignment based on these experiments. 	0	8	Lab manual, charts, Handouts, experimental trainer instruments/kit with measuring instruments, computer with relevant simulation software and high speed internet.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-12	Practical test in laboratory	 Student will be asked to Perform TDM,FDM,OFDM on trainer kits/Simulation software. Perform TDMA,FDMA,OFDMA on trainer kits/Simulation software. 	10	Rubrics, Rating scale	Internal

SCHEME FOR LEARNING OUTCOME

	LO Code	CO Code	de	urse Co	Co	le	ranch Cod	В
Format No. 4	13	5	3	0	4	1	0	0

COURSE NAME	Digital Communication						
CO Description	Explain different Spread Spectrum methods and their applications.						
LO Description	Compare different Spread Spectrum methods						

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
O-13	Advantages of spread spectrum systems – Pseudo noise sequence- Functional block diagram and operation of Direct sequence spread spectrum systems(DSSS), Functional block diagram and operation of Frequency hoppingspread spectrum system (FHSS)	Interactive classroom lecture, PPT, Video, demonstration, quiz, assignments.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	8	0	Text Books, PPT, Handouts, chalk board, charts, Video lecture- NPTEL and others.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-13	End Semester Theory Exam	 Student will be asked to(and/or): Explain pseudo noise sequence. Explain functional block diagram and operation of Direct sequence spread spectrum systems(DSSS) Explain functional block diagram and operation of Frequency hoppingspread spectrum system (FHSS) 	10	Question paper, Rating scale.	External

DCD/	/ /Diplo	ma Wing \ Dh	onal	SCHEM	E FOR LEARNING	В	ranch C	ode	(Course Co	ode	CO Code	LO Code	
KGP	/ (Dipic	oma Wing) Bh	юраі	(OUTCOME	0	0	1	4	0	0 3 5 14		Format No. 4	
COURS	SE NAME	Digital Communicati	ion											
CO Des	CO Description Explaindifferent S			ctrum method	s and their applications.									
LO Des	cription	Outline different ap	pplication	s of DSSS and	FHSS.									
					SCHEME OF STUDY									
S. No.	Lea	rning Content		eaching – ing Method	Description of T-L Process	Tea Hr	_		ract. It Hrs	•	LRs R	equire	ed	Remarks
LO-14	LO-14 Application of DSSS, FHSS in Mobile comm., Wi-Fi, Bluetooth, DTH, DSL Technologies, FTTH.		classroom lecture, contents and provide handouts to students.		6		0		Text Books, PPT, Handouts, chalk board, charts, Video lecture- NPTEL and others.					
					SCHEME OF ASSESSMEN	Γ								
S. No.	Metho	d of Assessment		Descriptio	on of Assessment	Ma	aximı	um M	arks	Re	sourc	es Red	quired	External / Internal
Mid semester Exam, Assignment, Quiz		, , , , , , , , , , , , , , , , , , , ,					10		Que		paper, scale.	Rating	Internal	

DCD\	/ /Diplo	ma Wing \ Ph	onal	SCHEM	E FOR LEAI	RNING	Branch C	ode	Co	urse Cod	le (CO Code	LO Code	_
KGPV	(Dipio	oma Wing) Bh	ораі		OUTCOME		0 0	1	4	0	3	5	<i>15</i>	Format No.
COURS	E NAME	Digital Communication	on											
CO Des	cription	Explain different Sp	read Spe	ctrum method	s and their appli	cations.								
LO Des	cription	Simulate and verify	FHSS and	DSSS.										
					SCHEME (OF STUDY								
S. No.	Lea	rning Content		aching – ing Method	Description Proce		Teach Hrs.	Pra /Tut		L	Rs Red	quire	d	Remarks
LO-15	sequence systems(hoppings system (F	and PerformDirect e spread spectrum DSSS), Frequency spread spectrum FHSS) and verify it. ner Kits/ Simulation		•	Teacher with from lab staf demonstrate procedure of experiments Student will assignment these experiments	f will the lab conduct lab pased on ments.		3	3	Han expo train inst with inst com rele soft	Lab manual, charts, Handouts, experimental trainer instruments/kit with measuring instruments, computer with relevant simulation software and high speed internet.		tion igh	
					SCHEME OF A	ASSESSMENT	-							
S. No.	Metho	od of Assessment	De	scription of A	ssessment	Maximur	n Marks		Reso	urces	Requ	ired		External Internal

LO-15	Practical test in laboratory	 Student will be asked to Perform DSSS on trainer kits/Simulation software. Perform FSSS on trainer kits/Simulation software. 	10	Rubrics, Rating scale	Internal
		ADDITIONAL INSTRUCTIONS FOR	THE HOD/ FACULTY	(IF ANY)	