RGI WI	PV (D NG)	IPLOM BHOPA	A	OBE CURI THE	RICULUM FOR COURSE	FORMA	AT- s	Sheet No. 1/5					
Branch		E	lectron	ics & Tele-commu	nication	Semester		VI					
Course	Code			Course Name	Advance Communica	ation	1						
Course	Outc	ome 1	Expla Syste	in the fundamen <sup>.</sup> m	tals of Mobile commu	unication	Teach Hrs	Marks					
Learnin	g Outo	come 1	Illustr	ate of EM wave	propagation and losse	es	6	10					
Co	ontent	S	Revie AWGN Loss, 1	ew the concept N (Additive White Fotal Path Loss, La	of Free-space EM wa Gaussian Noise), Grou rge –scale Fading, Small	ve propagat und Reflectio I-scale Fading	ion, Ch on Loss g, Doppl	annel noise: , Diffraction er shift.					
Method	of Asse	essment	Exterr	External End semester Exam									
Learnin	g Outo	come 2	Identi Cellul	Identify the components and their function in1210Cellular Mobile communication Network12									
Contents			(Theory) Principle of Frequency Reuse in cellular structure, Hexagonal cells, real cells, Frequency Reuse Factor k, Hand off, co-channel interference, adjacent channel interference, Cell splitting, Cell sectorization. <i>Components and function of Cellular mobile network:</i> MS(Mobile Set), SIM(Subscriber Identification Module), BTS (Base Trans receiver Station), BSC(Base Station Controller), MSC(Main Switching Center), O&M(Operation and Maintenance),HLR(Home Location Register), VLR(Visitor Location Register), AUC (Authentication Center), EIR( Equipment Identity Pagister)										
Method	of Asse	essment	Exterr	hal End semester E	xam								
Learnin	g Outo	come 3	( <b>Psycl</b> Demo	homotor) nstrate the fundar	nentals of cellular mob	ile system	6	10					
Co	ontent	S	Measure received power of mobile signal on your smart phone using Mobile apps. Study of different smart phones Electronics. Study of BTS. Demonstrate path loss prediction, hand off strategy using simulation/online resources										
Method	of Asse	essment			.,								

**RGPV (DIPLOMA** 

WING) BHOPAL

## **OBE CURRICULUM FOR**

THE COURSE

3

Sheet No. 2/5

Branch **Electronics & Tele-communication** Semester VI **Course Code Advance Communication** Course Name Teach Compare different Mobile Communication Technologies. Marks **Course Outcome 2** Hrs 12 10 Illustrate principle of GSM-2G Technology Learning Outcome 4 (Theory) Services offered in GSM 2G Technology, Frequency Bands allotted in GSM, Channel assignment in GSM-900 MHz band: Forward channels, Reverse channels. Contents Use of TDMA and FDMA in GSM. GSM multi frame structure, GSM-900 System specifications. Call Handling in GSM: Mobile originated call, Mobile terminated call. Concept of Traffic Channels, Control Channels External End semester Exam **Method of Assessment** 6 Define principle of WCDMA-3G Technology **Learning Outcome 5** (Theory) Services offered in WCDMA 3G Technology, Frequency Bands allotted in WCDMA. WCDMA System specifications. Use of CDMA in the Contents technology. Internal assignment, test, quiz **Method of Assessment** 6 10 Demonstrate the working of 2G/3G network. Learning Outcome 6 (Psychomotor) Demonstrate the working of 2G/3G network using 2G/3G mobile Contents communication Trainer kit/simulation software. Internal practical exam, viva voce **Method of Assessment** 

RGPV	(DIPL) BHC	OMA W OPAL	/ING)	OBE CURF THE	FORM/	<b>\T-</b>	Sheet No. 3/5						
Branch		I	Electron	ics & Tele-commun	nication	Semester		VI					
Course	Code			Course Name	Advance	Communica	tion						
Course	e Outc	ome 3	Identif	fy 4G and beyond m	nobile communication g	enerations.	Teach Hrs	Narks					
Learnir	ng Outo	come 7	Discuss different components of 4G-LTE Technology 6 10										
c	ontent	Services offered in LTE 4G Technology, Frequency Bands allotted 4G, LTE System specification. Components and function of LTE 4G mobile network: UE(User Equipm SIM(Subscriber Identification Module), E-UTRAN(Evolved-UMTS Terre Radio Access Network), MME( Mobility Management Equipment), S- GW(Signaling Gateway), P-GW(PDN Gateway), HSS(Home Subscriber S PDN(Packet Data Network).											
Method	of Asse	essment	Extern	al End semester Exa	am								
Learnir	ng Outo	come 8	Outlin	e 5G mobile techno	logy		6	10					
С	ontent	S	Introd formir Definit latenc	uction to 5G Tech ng, MIMO, Millimete tion of- eMBB (Enh y communications),	hnology- Basic concep er wave, small cell and s anced mobile broadbar , mMTC (Massive Mach	t of New F Spatial multip nd), URLL(ult ine-Type Cor	Radio(N plexing) tra-relia nmunic	IR), Beam ) able low cations).					
Method	of Asse	essment	Intern	al Assessment/ P	rogressive test								
Learnir	ng Outo	come 9	Demo comm	nstrate the working unication.	principle of LTE 4G mo	bile	6	10					
C	ontent	S	( <b>Psych</b> Workin simula Identif trouble Intern	omotor) ng principle of 4G V ition software/video fy different parts an eshooting. nal practical exam, v	oLTE Smart Phone and o. Id components of 4G Sr viva voce	signals on tra nart Phone a	ainer ki nd	t /or					
wethod	of Asse	essment		. ,									

RGPV (DIPLOMA

WING) BHOPAL

# OBE CURRICULUM FOR THE COURSE

3

Sheet No. 4/5

Branch		E	lectron	ics & Tele-commur	Semester	Semester VI						
Course	Code			Course Name	Advance	e Communica	tion					
Course	Outco	ome 4	Elabor	ate Fundamentals	of Optical Fiber Comr	nunication	Teach Hrs	Marks				
Learniı	ng Out 10	come	Descri Fiber	be principle of ligh	t propagation through	Optical	12	10				
			(Theo	ory)			1					
Cc	ontent	S	Advantages of Optical Fiber Communication, Optical fiber structure: core, cladding, Plastic cover. Comparison of step-index and graded index fiber. Principle of Light propagation through fiber, Total Internal Reflection, Numerical Aperture, Definition, derivation and its simple numericals. Propagation modes in fiber, Comparison of Single mode fiber and Multimode fiber, mode stripping, Propagation Loss in fiber: Scattering loss, infrared absorption loss, UV absorption loss, OH ion absorption loss, Total loss curve, Minimum loss windows. Dispersion and its type ( <b>only definition</b> ), Effect of Dispersion on Data rate,									
Method	d of Assessment External End semester Exam											
Learniı	Ing OutcomeIdentify Components of Optical Fiber Communication Link1210											
			(Theory)									
			Requirements from Source of Light, Comparison of LED and LASER, Intensity									
			modulation in transmitter, wavelength division multiplexing.									
			Photo	-receiver. Photodic	Silver Communication			ical				
Co	ontent	S	Block diagram of Optical Fiber Communication Link: Modulator, Optical									
			Colcul	neurum, Demodula	in OE link (simple nur	ampimer.						
			Worki	ng principle and an	nication of Ontical Po	wer meter (		ntical				
			time d	lomain reflectomet		wer meter, c		Jucar				
			Princi	ole and Block Diag	r <b>am:</b> FTTH (Fiber To T	he Home) tec	hnology					
Method	of Asse	ssment	Extern	al End semester Ex	am							
Learni	ng Quit	come					6	10				
Leanni	12	come	Measu	ure different param	eter related to Optica	al fiber.	0	10				
Co	ontent	S	( <b>Psychomotor</b> ) Perform Optical fiber communication related experiments on Optical fiber trainer kit. Calculate NA, dispersion, Power loss on simulation software. Demonstration of optical fiber Splicing Machine Demonstration of different types of Connector-SC,FC,ST,SMA.									

Method of Assessment External practical exam, viva voce													
RGF WII	PV (D NG) I	IPLOM/ BHOPA	۹ L	OBE CURR THE	RICULUM FOR	FORMA	NT- S	Sheet No. 5/5					
Branch		E	lectron	ics & Tele-commur	nication	Semester		VI					
Course (	Code			Course Name Advance Communication									
Course	e Outc	ome 5	Explain the fundamentals of satellite communicationTeachSystemHrs.										
Learning	g Outc	ome 13	Expla	Explain the working Principle of satellite. 10 10									
Co	ontent	S	<b>(The</b> Work Orbit, Frequ Funct Effect	ory) ing Principle/funda , Polar satellite, Ge iency bands used ir ional block diagrar tive Received Powe	imental of satellite, S o-stationary Satellite, I n satellite communicat n of satellite commun er, Functional Block dia	ervices offer LEO, MEO. tion (uplink an ication syste ngram of tran	ed by sa nd down m. Foot sponder	atellite, Ty Ilink), print of sa	pes of Itellite,				
Method	of Asse	essment	Exter	nal End semester E	xam								
Course	Outco	ome 5	Explai Systei	in the fundament m	als of satellite comm	nunication	Teach Hrs.	Tea Hrs	ch s.				
Learnir	ng Out 14	come	Compa	are applications of	8	10							
Co	ontent	s	(Theory) Functional Block diagram of: DBS, DTH Satellite receiver, Navigational Satellite system: 3- satellite GPS (Global Positioning System), Introduction of Satellite phone.										
Method o	of Asse	essment	Intern	al									
Learnir	ng Out 15	come	Demo	nstrate Satellite Co	mmunication Systems	i	6	10					
Contents			( <b>Psychomotor</b> ) Demonstrate Satellite Communication Systems on trainer kit and/or simulation software Study of name and location different Indian and others Satellites. Study of IRNSS.										
Method of Assessment			Extern	iai practical exam, v									

#### Suggested List of Experiments\*:

S.N.	Experiment
1	Study of Optical fiber Trainer Kit
2	Perform audio communication on Optical fiber Trainer Kit
3	Perform data communication on Optical fiber Trainer Kit
4	Calculate NA of Fiber on Optical fiber Trainer Kit
5	Demonstrate splicing of optical fibers.
6	Study of components of Smart Phone
7	Study of satellite phone on simulation software
8	Study of Aircraft Landing on simulation software
9	Observe and compare Mobile signal power at different location, different TSP, using Mobile App
10	Study of mobile call connection on simulation software
11	2G/3G call connection, SMS, internet connection on Trainer kit.
12	Study of 4G mobile phone.
13	Troubleshoot problem in Smart phone.
14	Prediction of pathloss using simulation software
15	Study of hand off strategy on simulation software

Ten experiments in a semester as per the discretion of the subject teacher.

#### Major Equipment/Materials:

1.	Cathode Ray Oscilloscope(CRO)
2.	Digital Storage Oscilloscope(DSO)
3.	Function generator
4.	Spectrum analyser
5.	Simulation Software
6.	Computer
7.	GSM Trainer kits
8.	Optical fiber Trainer kit
9.	Smart phone trainer kit

#### **Suggestions for Practicals:**

Experiments are expected to be performed

- 1. Using Trainer kits.
- 2. On simulation software Digital Communication System Simulation Software etc.
- 3. On virtual lab platforms available online .
- 4. Demonstration on videos.

### **Reference Books/Web Portals:**

S.N.	Title	Author
1	Electronic Communication Systems	Roody and Coollen
2	Data communication and networking	A. Behrouz Forozan
3	Wireless and mobile Communication	Upena Dalal
4	Optical Fiber Communication	John Senior
5	Fundamentals of 5G mobile networks	Jonathan Rodriguez
6	www.Nptel.ac.in	
7	www. Swayam.gov.in	
8	www.vlab.co.in	

R	RGPV (Diploma Wing )		SCHEN				ode	С	Course Code			LO Code	_			
		Bhopal	07		OUTCOME	E	0	3				1	1	Format No. <b>4</b>		
COURS	E NAME	Advance Comm	nunicatio	n												
CO Des	cription	Explain the fund	damental	ls of Mobile comr	nunication System											
LO Deso	cription	Illustrate of EM	wave pro	opagation and los	sses											
					SCHEME OF STUDY											
S. Learning Content No.				Teaching - Learning Method	Description of T-L Process	Te F	each Hrs.	ch Pract. 5. /Tut Hrs.			LRs R	equire	Remarks			
LO-01	LO-01 Review the concept of Free- space EM wave propagation, Channel noise: AWGN (Additive White Gaussian Noise), Ground Reflection Loss, Diffraction Loss, Total Path Loss, Large –scale Fading, Small-scale Fading, Doppler shift			Interactive classroom lecture, PPT, demonstration, quiz, assignments	Teacher will explain the contents and provide handouts to students. Teacher will conduct quiz/ assignments/ tutorial/video		6	-			Text Books, PPT, Handouts, chalk board, charts.Videos lectures- NPTEL& others					
	1		I		SCHEME OF ASSESSMENT			-		I			· · · ·			
S. No.	M As:	ethod of sessment		Descrip	tion of Assessment		Μ	aximı Mark	um s	Resc	ources	s Requ	iired	External / Internal		
LO-01End Semester Theory ExamStudent will be asked to(and/or):1. Define AWGN.2. Differentiate ground reflection loss, diffraction loss 3. Calculate Total path loss for given parameters.4. Distinguish between large and small scale fading.						oss,		10		Quest	tion pa sc	aper, F ale	Rating	External		
	ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)															

R	GPV (D	) () () () () () () () () () () () () ()	SCHEME FOR LEARNING			Branch Code			Code	CO LO Code Code		
		Bhopal	OUTCOME			0	3			1	2	Format No. <b>4</b>
COURS	E NAME	Advance Communicatio	n									
CO Des	cription	Explain the fundamenta	ls of Mobile communi	cation System								
LO Dese	cription	Identify the components	s and their function ir	n Cellular Mobile communi	cation	Netwo	ork					
		1		SCHEME OF STUDY								
S. No.	L	earning Content	Teaching – Learning Method	Description of T-L Pro	cess	Te H	ach Irs.	Pract. /Tut Hrs.		LRs Re	quire	d Remarks
LO-02	-02 <b>(Theory)</b> Principle of Frequency Reuse in cellular structure, Hexagonal cells, real cells, Frequency Reuse Factor k, Hand off, co-channel interference, adjacent channel interference, Cell splitting, Cell sectorization. Components and function of Cellular mobile network: MS(Mobile Set), SIM(Subscriber Identification Module), BTS (Base Transreceiver Station), BSC(Base Station Controller), MSC(Main		Interactive classroom lecture, PPT, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct quiz/assignments/ tutorial/video to make students practice their knowledge.			12	-		Text Bo PPT, Ha chalk bo charts, Numeric Problem Workbo	oks, andouts oard, cal ns ok	5,

	Switching Center), O&M(Op	peration					
	and Maintenance),HLR(Hon	ne					
	Location Register), VLR(Visi	tor					
	Location Register), AUC						
	(Authentication Center), EIF	8(					
	Equipment Identity Register	).					
		SCHEME OF ASSESSMEN	Т			1	
S.	Method of		May	ximum			External /
No.	Assessment	Description of Assessment	N	larks	Resourc	es Required	Internal
LO-02	Io.       Assessment       Description of Assessment         Io.       Assessment       Student will be asked to(and/or):         1.       Explain importance of frequency reuse in cellular mobile communication.         2.       Define SIM, BTS, BSC, MSC, HLR, VLR, AUC, EIR and their functions.         3.       Differentiate between Cell splitting and Cell sectorization.         4.       Define hand off.         5.       Differentiate co-channel and adjacent channel interference.         6.       Define Frequency reuse factor k.         7.       Draw cellular structure with Frequency reuse factor for given k (3.4.8.7)				Question pa	per, Rating scale	External
		ADDITIONAL INSTRUCTIONS FOR THE HOD	FACUL	.TY (IF AI	NY)		

RGPV (Diploma Wing		ing)	SCH	EME FOR LEARN	ING	Branch Code			Course Code		CO Code	LO Code		
	È	Bhopal	0,		OUTCOME		E (	) 3	8			1	3	Format No. 4
COURS	E NAME	Advance Com	munication											
CO Des	cription	Explain the fur	ndamentals of	f Mobile c	ommunication System									
LO Desc	cription	r mobile system												
	SCHEME OF STUDY													
S. Learning Content No.			Teaching -L Meth	.earning od	Description of T-L F	Process	Teac h Hrs.	Pı /Tu	act. t Hrs.		LRs R	equir	Remarks	
LO-03	-03 Measure received power of mobile signal on your smart phone using Mobile apps. Study of different smart phones Electronics. Study of BTS.		Lab demons PPT , hands practice, lab assignments	stration, s on s.	<ul> <li>Teacher will explain the content in class/lab.</li> <li>Teacher with support from lab staff will demonstrate the procedure of lab experiments.</li> <li>Student will conduct lab assignment based on these experiments.</li> </ul>			6		Lab Han train with inst with soft	Lab manual, charts, Handouts, experiment trainer instruments/kit with measuring instruments, computer with relevant simulatic software and high speed internet.		rts, imenta nts/kit nputer nulation	l n
	1		1		SCHEME OF ASS	ESSMENT	1							
S. No.	Me Ass	Method of Assessment Description of Assessment					ו		Resou	rces R	equir	ed		External / Internal
LO-03	LO-03 Practical External Exam 2. Write BTS sta			l be asked erve pow g mobile a e BTS stati	d to er of mobile signal app. on specifications	10	Rubrics/Rating scale			le		External		

			ADDITIONAL INS	TRUCTIONS FOR THE HOD/ I	FAC	CULTY	(IF A	NY)					
R	E FOR LEARNING	I	Branch Co	de	C	Course	Code	CO Code	LO Code				
	, I	Bhopal	(	OUTCOME			3				2	4	Format No. 4
COURSE NAME Advance Communication													
<b>CO Description</b> Compare different Mobile Communication Technologies.													
LO Description Illustrate principle of GSM-2G Technology													
		1		SCHEME OF STUDY									
S. No.	Le	arning Content	Teaching - Learning Method	Description of T-L Process		Teach Hrs.		Prac Tut H	t. Irs.	LR	s Requ	iired	Remarks
LO-04	LO-04 <b>(Theory)</b> Services offered in GSM 2G Technology, Frequency Bands allotted in GSM, Channel assignment in GSM-900 MHz band: Forward channels, Reverse channels. Use of TDMA and FDMA in GSM.		Interactive classroom lecture, PPT, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial/video to make students practice their knowledge.		12		-		Text Books, PPT, Handouts, chalk board, charts, Video lecture- NPTEL and others.			

	GSM multi frame structu	ıre,							
	GSM-900 System								
	specifications.								
	Call Handling in GSM: N	lobile							
	originated call, Mobile								
	terminated call.								
	Traffic Channels, Contro Channels	l							
			11	SCHEME OF ASS	ESSMENT	1			
S. No.	Method of Assessment		Description of Asse	essment	Maximum	Marks	Resourc	es Required	External / Internal
		Stude	nt will be asked to(a	ind/or):					
	1.		ecribe GSM 2G tech	nology services					
		1. De	ferentiate between for						
		z. Di	verse channel.	ward and					
		3. Ex	plain specifications of	GSM-900.					
LO-04	End Semester Theory Exam	4. De	escribe mobile originate	ed call in GSM.	10		Question pa	per, Rating scale	External
		5. De	escribe mobile terminat	ted call in GSM.					
		6. Di	fferentiate between	Traffic Channels,					
		Co	ntrol Channels						
		7. Dr	aw Frequency spectr	rum of forward					
		ch	annels in GSM-800.						
			ADDITIONAL INST	RUCTIONS FOR T	HE HOD/ F	ACULTY (	(IF ANY)		

R	GPV (D	iploma Wi	ing)	SCHEM	E FOR LEARNING	Br	anch Co	de	Со	urse Code	CO Code	LO Code	
	Ě	Bhopal	07	(	DUTCOME	Ε	0	3			2	5	Format No. <b>4</b>
COURS	E NAME	Advance Comr	nunicati	on									
CO Des	cription	Compare differe	ent Mobil	e Communication Tecl	nnologies								
LO Des	LO Description Define principle of WCDM			MA-3G Technology									
SCHEME OF STUDY													
S. No.	Lea	arning Content	t	Teaching - Learning Method	Description of T-L Process	Te H	ach rs.	Pra /Tut	ct. Hrs.	LR	s Require	ed	Remarks
LO-05	LO-05 <b>(Theory)</b> Services offered in WCDMA 3G Technology, Frequency Bands allotted in WCDMA. WCDMA System specifications. Use of CDMA in the technology.		MA 3G ands DMA se of	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.		6	-		Text Hand board Video NPTE	Books, PF outs, chall I, charts, o lecture- EL and oth	ΥΤ, k ners.	
	·				SCHEME OF ASSESSMENT							i	
S.Method of AssessmentDescription				Description of	f Assessment n	/axi 1 Ma	mu arks		Reso	urces F	Required		External / Internal

LO-05	Interna Prog	l Assignment/ ressive test	Student w 1. Expl 2. Des 3. Des 4. Des 5. Des Tecl	ill be asked to lain WCDMA 3G cribe WCDMA B cribe specification cribe services of cribe use of CDM hnology.	(and/or): Technology. and allocation. ons of WCDMA. f WCDMA. MA in WCDMA 3G	10	Ru	brics/l	Rating	scale.		Internal
			A	DDITIONAL INS	STRUCTIONS FOR THE HOD/	FACULT	Y (IF ANY)					
R	GPV (E	)iploma W	'ing )	SCHEM	IE FOR LEARNING	Branch	Code a	Course C	Code	CO Code 2	LO Code	Format No. <b>4</b>
		Bhopal			OUTCOIVIE		5			2	U	
COURS		Advance Com	munication									
CO Des	cription	Compare differ	rent Mobile Co	mmunication Tec	chnologies							
LO Dese	cription	Demonstrate t	he working of 2	2G/3G network.								
					SCHEME OF STUDY							
S. No.	Le	arning Conter	nt	Teaching - Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs	5.	LRs Ro	equire	d	Remarks

LO-06	(Psychomotor) Demonstrate the working of 2G/3G network using 2G/3G mobile communication Trainer kit simulation software.	Lab demonstration, PPT , hands on practice, lab assignments.	<ul> <li>Teacher will explain the content in class/lab.</li> <li>Teacher with support from lab staff will demonstrate the procedure of lab experiments.</li> <li>Student will conduct lab assignment based on these experiments.</li> </ul>	-	6	Text Bo Handou board, o Video le NPTEL	ooks, PF ts, chal harts, ecture- and oth	ΥΤ, k	
			SCHEME OF ASSESSMENT		1	· · · · · · · · · · · · · · · · · · ·		I	
S. No.	Method of Assessment	Descriptio	n of Assessment	Maximu	um Marks	Resour	ces Red	quired	Internal
LO-06	Practical Internal	<ol> <li>Introduction interfacing</li> <li>Call setup u and manual</li> <li>Retrieving c received an</li> </ol>	n of trainer and PC using serial port. sing GSM/CDMA software l commands call registers for missed, d dialed calls.		10	Rubrics	/Rating	scale.	Internal
		ADDITIONAL INS	TRUCTIONS FOR THE HOD/	FACULTY	(IF ANY)				
R	GPV (Diploma Wing )	SCHEM	E FOR LEARNING	Branch Co	ode	Course Code	CO Code	LO Code	
	Bhopal		OUTCOME	E 0	3		3	7	Format No. 4
COURS	E NAME Advance Communic	ation							

CO Des	cription	Identify 4G and	beyond mobile com	munication generations.				
LO Des	cription	Discuss differer	nt components of 4G	-LTE Technology				
				SCHEME OF STUDY				
S. No.	Learni	ing Content	Teaching - Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-07	(Theory) Services 4G Techr Frequence allotted i System s Compone function o mobile ne Equipmer SIM(Subs Identifica E-UTRAN Terrestria Network) Mobility I Equipmer GW(Signa P-GW(PD HSS(Hom Server), P Network)	offered in LTE hology, cy Bands in LTE 4G, LTE pecification. ents and of LTE 4G etwork: UE(User ht), criber tion Module), (Evolved-UMTS il Radio Access , MME( Management ht), S- aling Gateway), N Gateway), e Subscriber DN(Packet Data	Interactive classroom lecture, PPT, demonstration, quiz, assignments, tutorial/video	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	6		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	<b>Resources Required</b>	External / Internal						
LO-07	End Semester Theory Exam	<ol> <li>Student will be asked to         <ol> <li>Describe LTE 4G Technology.</li> <li>Draw LTE 4G Band allocation.</li> <li>Define E-UTRAN, UMTS, MME, S-GW, P-GW, HSS, PDN.</li> <li>Describe services of LTE 4G Technology.</li> <li>Describe specifications of LTE 4G Technology.</li> </ol> </li> </ol>	10	Question paper, Rating scale	External						
		ADDITIONAL INSTRUCTIONS FOR THE H	OD/ FACULTY (IF AN	Y)							

R	RGPV (Diploma Wing )	SCHEN	IE FOR LEARNING	Branch Code			Course Code		CO Code	LO Code	_	
	Bhopal			Ουτςομε	Ε	0	3			3	8	Format No. <b>4</b>
COURSE NAME Advance Communication			ion									
<b>CO Description</b> Identify 4G and beyond mobi			nobile communicatio	n generations.								
LO Des	cription	Outline 5G mobile techno	ology									
				SCHEME OF STUDY								
S. No.	Le	arning Content	Teaching - Learning Method	Description of T-L Process	Te H	each Irs.	Pra /Tut	ict. Hrs.	LRs F	Require	ed	Remarks

LO-8	Introduction to 5G Techno Basic concept of New Radio Beam forming, MIMO, Millin wave, small cell and Sp multiplexing) Definition of- eMBB (Enha mobile broadband), URLL(u reliable low lat communications), m (Massive Machine- Communications).	Interactive c(NR), classroom lectur neter PPT, Video, demonstration, quiz, assignmen unced ultra- tency nMTC Type	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	6	-	Text Bo Handou board, c Video le NPTEL	oks, PI ts, chal harts, ecture- and oth	YT, k			
			SCHEME OF ASSESSMENT								
S. No.	Method of Assessment	Descrip	tion of Assessment	Maxim	um Marks	Resourc	es Req	uired	External / Internal		
LO-08	Internal Assessment/ Progressive test	d to(and/or): MO,SPM, Beam forming. Band allocation. Gervices of 5G. As on eMBB, URLLC and mMTC		10	Rubrics,	Rating	scale	Internal			
	I	ADDITIONAL	INSTRUCTIONS FOR THE HOD/	FACULTY	(IF ANY)				1		
R	GPV (Diploma Win	g) SCHE	EME FOR LEARNING	Branch C	ode	Course Code	Code	Code	Format No. 4		
Bhopal OUTCOME				E 0	3		3	09			
COURS	E NAME Advance Commu	inication									

CO Description       Identify 4G and beyond mobile communication generations.         IO Description       Demonstrate the working principle of LTE 4G mobile communication								
LO Dese	cription	Demonstrate the worki	ng principle of LTE 4G	mobile communication.				
		I		SCHEME OF STUDY				
S. No.	Le	arning Content	Teaching - Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-09	(Psychon Working VoLTE Si signals o simulatio Identify compon troubles	motor) principle of 4G mart Phone and on trainer kit /or on software. different parts and ents and hooting.	Lab demonstration, PPT , hands on practice, lab assignments.	<ul> <li>Teacher will explain the content in class/lab.</li> <li>Teacher with support from lab staff will demonstrate the procedure of lab experiments.</li> <li>Student will conduct lab assignment based on these experiments.</li> </ul>		6	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.	Metho	d of Assessment	Descriptio	on of Assessment	Maximu	um Marks	<b>Resources Required</b>	External / Internal
LO-09 Practical Internal		<ol> <li>Demonstrate the 4G working on trainer kit/ video/simulation software</li> <li>Measure voltages and observe waveforms on test points.</li> <li>Identify different parts and components.</li> <li>Troubleshoot the problem</li> </ol>						
	·	· · · · · · · · · · · · · · · · · · ·	ADDITIONAL IN:	STRUCTIONS FOR THE HOD/	ACULTY	(IF ANY)		·

R	GPV (D	) Diploma Wing )	SCHEME FOR	LEARNING	Bran	ch Coc	le	Co	urse Cod	e CC Coc	e	LO Code	-
	- (	Bhopal	OUTCO	OME E		0	3			4		10	Format No. <b>4</b>
COURS	E NAME	Advance Communication		· · · · · · · · · · · · · · · · · · ·			··			!			
CO Des	cription	Elaborate Fundamentals of Optica	al Fiber Communication	n									
LO Des	cription	Describe principle of light propaga	ation through Optical F	iber									
			SCI	HEME OF STUDY									
S. No.		Learning Content	Teaching - Learning Method	Description of T-L Process		Te	each Irs.	Pr / H	act. Tut Irs.	LRs R	equ	iired	Remarks
LO-10	(Theory) Advantag Communi core, clac step-inde Principle Total II Aperture, simple nu	es of Optical Fiber cation, Optical fiber structure: lding, Plastic cover. Comparison of x and graded index fiber. of Light propagation through fiber, nternal Reflection, Numerical Definition, derivation and its mericals.	Interactive classroom lecture, PPT, Video, demonstration, quiz, assignments.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tuto to make students praction their knowledge.	e rial ce		12		-	Text B PPT, H chalk b charts, lecture and oth	ooks oard Vide - Ni ners	s, louts, d, eo PTEL	

	Propagation modes Single mode fiber mode stripping, Pr Scattering loss, infr absorption loss, C Total loss curve, Mi Dispersion and its Effect of Dispersion (Bandwidth distance numerical.	in fiber, Comparison of and Multimode fiber, opagation Loss in fiber: ared absorption loss, UV OH ion absorption loss, nimum loss windows. type (only definition), on on Data rate, BDP e product) and its simple					
		1	SCHEN	ME OF ASSESSMENT		1	1
S. No.	Method of Assessment		Description of Ass	essment	Maximum Marks	Resources Required	External / Internal
Lo-10	End Semester Theory Exam	<ol> <li>Student will be asked</li> <li>List out advantage</li> <li>Explain structure</li> <li>Explain propagat</li> <li>Differentiate step</li> <li>Differentiate betw</li> <li>Explain propagation</li> <li>List out different ty</li> <li>Calculate BDP for D</li> <li>Calculate NA for µC</li> <li>Explain mode stripp</li> </ol>	d to(and/or): es of Optical fiber. of optical fiber. ion of light throug index and graded veen single-mode n loss in fiber. pe of dispersion in Dispersion of 1ns/km core=1.55, µcladding ing.	h Fiber. index. and multimode fiber. fiber. g=1.45	10	Question paper , Rating scale	External
		ADDIT		ONS FOR THE HOD/ FACULT	Y (IF ANY)		

R	GPV (D	piploma Wing )	SCHEM	E FOR LEARNING	Bra	anch Co	de	Coι	ırse Co	de	CO Code	LO Code	_
		Bhopal	(	DUTCOME	E	0	3				4	11	Format No. <b>4</b>
COURS	E NAME	Advance Communicat	ion	/						· !			-
CO Des	cription	Elaborate Fundamentals	of Optical Fiber Comn	nunication									
LO Dese	cription	Identify Components of	Optical Fiber Communi	cation Link									
		·		SCHEME OF STUDY									
S. No.	Le	arning Content	Teaching - Learning Method	Description of T-L Process	Tea Hr	ach rs.	Pra /Tut	act. Hrs.	LRs Required				Remarks
LO-11	<ul> <li>No.</li> <li>(Theory) Requirements from Source of Light, Comparison of LED and LASER, Intensity modulation in transmitter, Wavelength division multiplexing .</li> <li>Photoreceiver: Photodiode, PIN photodiode.</li> <li>Splicing, Block diagram of Optical Fiber Communication Link: Modulator, Optical Fiber medium, Demodulator, Repeater, optical amplifier.</li> <li>Calculation of power loss in OF</li> </ul>		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.	1	.2		-	Te: Ha boa Vic NP	xt Bool ndouts ard, cha leo lect PTEL ar	ks, PP , chall arts, ture- nd oth	T,	

	Working principle of Optical Power r	and application neter. OTDR						
	(optical time dom	ain						
	reflectometer).							
	Principle and Block FTTH (Fiber To technology.	k Diagram: o The Home)						
				SCHEME OF ASSESSMENT				
S. No.	Method of Assessment       Description of Assessment         Student will be asked to (and/or):       1. List out the various requirement of light source for optical fiber.         2. Explain working principle of OTDR.       3. Compare LED and LASER.				Maximum Marks	<b>Resources Required</b>	External / Internal	
LO-11	End Semester Theory Exam	Student will k 1. List out 2. Explain 3. Compar 4. Compar 5. Calcular having dBm los power of 6. Draw ar 7. Describ 8. Different	be asked to (and/o the various required working principle of re LED and LASER. re photodiode and P te power of photo tr 2 splices with 5 dBm ss each and photo-re of 30 dBm. nd explain optical fik e FTTH with suitable	r): ment of light source for optical f OTDR. PIN photodiode. ransmitter for communication lin a loss each and 6 connectors with eceiver with minimum detectabl per communication link. e block diagram. eater and optical amplifier.	fiber. nk h 3 le	15	Question paper , Rating scale	External
			ADDITIONAL INS	TRUCTIONS FOR THE HOD/ F	FACULI	ΓΥ (IF ANY)		

R	GPV (D	) (iploma Wing )	SCHEN	/IE FOR LEARNIN	IG	Branch	Code		Co	urse Cod	le	CO Code	LO Code	
	, I	Bhopal		OUTCOME	E	0		3				4	12	Format No. <b>4</b>
COURS	E NAME	Advance Communicati	ion											
CO Des	cription	Elaborate Fundamentals	of Optical Fiber Con	nmunication										
LO Des	cription	Measure different param	neter related to Opti	cal fiber.										
				SCHEME OF STU	JDY									
S. No.	Le	arning Content	Teaching - Learning Method	Description of T-L P	Process	Teac Hrs	h	Pr: ר/ H	act. Tut rs.	LRs Required Lab manual, charts, Handouts, experimental trainer				Remarks
LO-12	( <b>Pshycon</b> Perform C communi- experime trainer kit Calculate loss on sir Demonstr Splicing N Optical fi function. Demonstr of Connec	notor) Optical fiber cation related nts on Optical fiber  NA, dispersion, Power mulation software. ration of optical fiber lachine ber cable structure and ration of different types ctor-SC,FC,ST,SMA.	Lab demonstration, PPT , hands on practice, lab assignments.	<ul> <li>Teacher will explain to content in class/lab.</li> <li>Teacher with support lab staff will demonst procedure of lab experiments.</li> <li>Student will conduct assignment based on experiments.</li> <li>Live or Video demonst of splicing the optical connectors and fiber</li> </ul>	the t from trate the lab these stration l fiber, cable.	-			6	Lab Han exp inst mea inst com rele soft spe	manu ndouts erime asurin rumer nputer evant s cware ed inte	ial, ch s, ntal tr nts/kit g nts, r with simula and h ernet.	arts, ainer with tion igh	
	·			SCHEME OF ASSESS	SMENT					· · · · · · · · · · · · · · · · · · ·				
S. No.	S. Method of Assessment No.		Description	of Assessment M	laximum N	/larks			Reso	urces	s Requ	uired		External / Internal

			Student will be as	ked to								
			communica	ation								
LO-12	End Sei	mester Practical Exam	2. Evaluate	2. Evaluate NA. Dispersion Rubrics, F					, Rating scale			External
			and Power	Loss.								
			3. Watch wo	orking of Optical								
			fiber Splicing	Machine								
			ADDITIONAL INS	TRUCTIONS FOR THE HOD/	FACULT	(IF AN	IY)					
											10	1
R	GPV (C	) () () () () () () () () () () () () ()	SCHEM	SCHEME FOR LEARNING		Branch Code			de	Code	Code	
		Bhopal	(	OUTCOME						5	13	Format No. 4
COURS	E NAME	Advance Communicat	ion			I	1				1	1
CO Des	cription	Explain the fundament	als of satellite comm	unication System								
LO Deso	cription	Explain the working Prine	ciple of satellite.									
		1		SCHEME OF STUDY								
S			Teaching -		Teach	Pra	act					
Ne	Le	arning Content	Learning	<b>Description of T-L Process</b>	Hrs	/=		L	.Rs Re	quire	ed	Remarks
INO.			Method		111.5.	/100	Hrs.					
LO-13	(Theory)	)	Interactive	Teacher will explain the	10		-	Tex	t Bool	ks, PP	PT,	
	Working	Principle/fundamental of	Classroom lecture,	contents and provide				boa	rd, cha	, chan arts,	ĸ	
	satellite,	Services offered by	demonstration,	Table to students.				Vid	eo lec	ture-		
	satellite,	Geo-stationary Satellite,	quiz,	auiz/assignments/ tutorial				NP	TEL a	nd oth	ners.	
	LEO, MEC	).	assignments,	to make students practice								
	Frequency bands used in satellite		tutorial	to make students practice								

	communication (uplink a downlink), Functional block diagram satellite communication syste Footprint of satellite, Effect Received Power, Functional Blo diagram of transponder.	nd of m. ve ock	their knowledge.									
			SCHEME OF ASSESSMENT									
S. No.	Method of Assessment	Descriptio	on of Assessment	Ma	ximuı	m Ma	arks	Resc	ource	s Requ	External / Internal	
LO-13	End Semester Theory Exam	<ol> <li>Student will be asked</li> <li>Describe work</li> <li>Define freque communication</li> <li>Explain with (any one)- Sattransponder</li> <li>Define Foot Control, TTC.</li> <li>Describe G</li> <li>Differentiation</li> <li>DEO, MEO sattransponder</li> </ol>	d to (and/or): orking principle of Satellite. uency band used in satellite tion. of functional block diagram atellite, Earth station, r and Satellite receiver. print, Attitude control, Orbit eostationary Satellite. te between Polar satellite, tellite		1	Question Paper, 10 Rating scale.			er,	External		
		ADDITIONAL INS	STRUCTIONS FOR THE HOD/	FACU	JLTY (	IF AN	IY)					
R	GPV (Diploma Wing	) SCHEM	SCHEME FOR LEARNING OUTCOME			Branch Code C			de	CO Code 5	LO Code 14	Format No. <b>4</b>

		Bhopal														
COURS	E NAME	Advance Commu	inicatio	on												
CO Des	cription	Explain the funda	amenta	als of satellite comn	nunication System											
LO Deso	ription	Compare application	ons of s	satellite.												
		•			SCHEME OF STUDY											
S. No.	Le	Learning Content		Teaching - Learning Method	Description of T-L Proces	S	Teacl Hrs.	h	Pract. /Tut Hrs.		LRs Required				Remark	5
LO-14	(Theory) Functiona DTH Navigatio satellite System), phone.	I Block diagram of: Satellite rece nal Satellite systen GPS (Global Positio Introduction of Sat	DBS, eiver, n: 3- oning cellite	Interactive classroom lecture, PPT, Video, demonstration, quiz, assignments.	Teacher will explain the contents and provide handour to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	ts S	8				Text Books, PPT, Handouts, chalk board, charts, Video lecture- NPTEL and others.					
					SCHEME OF ASSESSMENT											
S. No.	Method	l of Assessment		Descriptio	on of Assessment		Maximum Marks Resources Required					ed	External Internal	/ I		
LO-11	D-11 Internal, quiz/seminar Internal, quiz/seminar				<b>to</b> (and/or): em. e phone. te GPS system. Ilite receiver with functional blocl	(		10			Questi	on pape scale	ing	Internal		
			1	ADDITIONAL INS	STRUCTIONS FOR THE HOD/	FAC	CULTY	(IF A	NY)					I		
			•	SCHEM	E FOR LEARNING		Branch Co	ode		Course	Code	CO Code	LO Code			_
R	GPV (D	piploma Win	g )		OUTCOME		0	3				5	15	Fo	rmat No.	4

		Bhopal									
COURS	E NAME	Advance Communica	tion							-	
CO Des	cription	Explain the fundamer	itals of satellite com	nmunication System							
LO Dese	cription	Demonstrate Satellite C	Communication System	ms							
		1		SCHEME OF STUDY							
S. No.	Le	arning Content	Teaching - Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.		LRs Re	equired		Remarks
LO-15	<ul> <li>(Pshycomotor)</li> <li>Demonstrate Satellite</li> <li>Communication Systems on trainer kit and/or simulation</li> <li>software</li> <li>Study of name and location</li> <li>different Indian and others</li> <li>Satellites.</li> <li>Study of IRNSS.</li> </ul>		Lab demonstration, PPT, hands on practice, lab assignments.	<ul> <li>Teacher will explain the content in class/lab.</li> <li>Teacher with support from lab staff will demonstrate the procedure of lab experiments.</li> <li>Student will conduct lab assignment based on these experiments.</li> </ul>		Lab manual, charts, Handouts, experimental trainer instruments/kit with measuring instruments, computer with relevant simulation software and high speed internet.			ntal it er ion eed		
	1			SCHEME OF ASSESSMENT	•		1				<u> </u>
S. No.	Meth	od of Assessment	Descript	tion of Assessment	Maximum Marks Resources Require			quired	E) I	xternal / nternal	
LO-15	Pract	tical Exam External	<ul> <li>Student will be</li> <li>1. Study of s system.</li> <li>2. List name Foreign sa</li> <li>3. Describe I</li> <li>4. Set up a s link and s</li> </ul>	asked to atellite communication and location of Indian and atellites. IRNSS ant its services. satellite communication study the change in uplink	10	Rubrics, Rating scale			External		

	and downlink frequency 5. Establish audio-video satellite link between transmitter and receiver.								
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)									