RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT- 3	Sheet No. 1/5

Branch	Electronics & Tele-communication	Semester	VI
Course Code		Course Name	Advance Communication

Course Outcome 1	Explain the fundamentals of Mobile communication System	Teach Hrs	Marks
Learning Outcome 1	Illustrate of EM wave propagation and losses	6	10
Contents	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.		
Method of Assessment	External End semester Exam		
Learning Outcome 2	Identify the components and their function in Cellular Mobile communication Network	12	10
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. ***Components and function of Cellular mobile network:*** 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 Register).		
Method of Assessment	External End semester Exam		
Learning Outcome 3	(**Psychomotor**) Demonstrate the fundamentals of cellular mobile system	6	10
Contents	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 Assessment	External practical exam, viva voce		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT- 3	Sheet No. 2/5

Branch	Electronics & Tele-communication	Semester	VI
Course Code		Course Name	Advance Communication

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

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT- 3	Sheet No. 3/5

Branch	Electronics & Tele-communication	Semester	VI
Course Code		Course Name	Advance Communication

Course Outcome 3	Identify 4G and beyond mobile communication generations.	Teach Hrs	Marks
Learning Outcome 7	Discuss different components of 4G-LTE Technology	6	10
Contents	**(Theory)** Services offered in LTE 4G Technology, Frequency Bands allotted in LTE 4G, LTE System specification. Components and function of LTE 4G mobile network: UE(User Equipment), SIM(Subscriber Identification Module), E-UTRAN(Evolved-UMTS Terrestrial Radio Access Network), MME(Mobility Management Equipment), S-GW(Signaling Gateway), P-GW(PDN Gateway), HSS(Home Subscriber Server), PDN(Packet Data Network).		
Method of Assessment	External End semester Exam		
Learning Outcome 8	Outline 5G mobile technology	6	10
Contents	Introduction to 5G Technology- Basic concept of New Radio(NR), Beam forming, MIMO, Millimeter wave, small cell and Spatial multiplexing) Definition of- eMBB (Enhanced mobile broadband), URLL(ultra-reliable low latency communications), mMTC (Massive Machine-Type Communications).		
Method of Assessment	Internal Assessment/ Progressive test		
Learning Outcome 9	Demonstrate the working principle of LTE 4G mobile communication.	6	10
Contents	(**Psychomotor**) Working principle of 4G VoLTE Smart Phone and signals on trainer kit /or simulation software/video. Identify different parts and components of 4G Smart Phone and troubleshooting.		
Method of Assessment	Internal practical exam, viva voce		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT- 3	Sheet No. 4/5

Branch	Electronics & Tele-communication	Semester	VI

Course Code		Course Name	Advance Communication

Course Outcome 4	Elaborate Fundamentals of Optical Fiber Communication	Teach Hrs	Marks
Learning Outcome 10	Describe principle of light propagation through Optical Fiber	12	10
Contents	**(Theory)** 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 (**only definition**), Effect of Dispersion on Data rate, BDP (Bandwidth distance product) and its simple numerical.		
Method of Assessment	External End semester Exam		
Learning Outcome 11	Identify Components of Optical Fiber Communication Link	12	10
Contents	**(Theory)** Requirements from Source of Light, Comparison of LED and LASER, Intensity modulation in transmitter, wavelength division multiplexing. Photo-receiver: Photodiode, PIN photodiode. Splicing Block diagram of Optical Fiber Communication Link: Modulator, Optical Fiber medium, Demodulator, Repeater, optical amplifier. Calculation of power loss in OF link (simple numerical). Working principle and application of Optical Power meter, OTDR (optical time domain reflectometer). **Principle and Block Diagram:** FTTH (Fiber To The Home) technology.		
Method of Assessment	External End semester Exam		
Learning Outcome 12	Measure different parameter related to Optical fiber.	6	10
Contents	(**Psychomotor**) 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

RGPV (DIPLOMA WING) BHOPAL	**OBE CURRICULUM FOR THE COURSE**	**FORMAT-3**	**Sheet No.** 5/5

Branch	**Electronics & Tele-communication**	**Semester**	**VI**
Course Code		**Course Name**	**Advance Communication**

Course Outcome 5	Explain the fundamentals of satellite communication System	Teach Hrs.	Teach Hrs.
Learning Outcome 13	Explain the working Principle of satellite.	**10**	10
Contents	**(Theory)** Working Principle/fundamental of satellite, Services offered by satellite, Types of Orbit, Polar satellite, Geo-stationary Satellite, LEO, MEO. Frequency bands used in satellite communication (uplink and downlink), Functional block diagram of satellite communication system. Footprint of satellite, Effective Received Power, Functional Block diagram of transponder.		
Method of Assessment	External End semester Exam		

Course Outcome 5	Explain the fundamentals of satellite communication System	Teach Hrs.	Teach Hrs.
Learning Outcome 14	Compare applications of satellite.	8	10
Contents	**(Theory)** Functional Block diagram of: DBS, DTH Satellite receiver, Navigational Satellite system: 3- satellite GPS (Global Positioning System), Introduction of Satellite phone.		
Method of Assessment	Internal		
Learning Outcome 15	Demonstrate Satellite Communication Systems	6	10
Contents	(**Psychomotor**) 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	External practical exam, viva voce		

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	

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		E	0	3				1	1	

COURSE NAME	**Advance Communication**
CO Description	Explain the fundamentals of Mobile communication System
LO Description	Illustrate of EM wave propagation and losses

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	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	

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): 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.	10	Question paper, Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		E	0	3				1	2	

COURSE NAME	**Advance Communication**
CO Description	Explain the fundamentals of Mobile communication System
LO Description	Identify the components and their function in Cellular Mobile communication Network

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	**(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. 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 Books, PPT, Handouts, chalk board, charts, Numerical Problems Workbook	

	Switching Center), O&M(Operation and Maintenance),HLR(Home Location Register), VLR(Visitor Location Register), AUC (Authentication Center), EIR(Equipment Identity Register).						

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): 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 &7).	10	Question paper, Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		E	0	3				1	3	

COURSE NAME	**Advance Communication**
CO Description	Explain the fundamentals of Mobile communication System
LO Description	(**Psychomotor**) Demonstrate the fundamentals of cellular mobile system

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	Measure received power of mobile signal on your smart phone using Mobile apps. Study of different smart phones Electronics. Study of BTS.	Lab demonstration, PPT , hands on practice, lab assignments.	• 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.		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.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-03	Practical External Exam	Student will be asked to 1. Observe power of mobile signal using mobile app. 2. Write BTS station specifications	10	Rubrics/Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		E	0	3				2	4	

COURSE NAME	**Advance Communication**
CO Description	Compare different Mobile Communication Technologies.
LO Description	Illustrate principle of GSM-2G Technology

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	**(Theory)** 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 structure, GSM-900 System specifications. Call Handling in GSM: Mobile originated call, Mobile terminated call. Traffic Channels, Control Channels						

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): 1. Describe GSM 2G technology services. 2. Differentiate between forward and reverse channel. 3. Explain specifications of GSM-900. 4. Describe mobile originated call in GSM. 5. Describe mobile terminated call in GSM. 6. Differentiate between Traffic Channels, Control Channels 7. Draw Frequency spectrum of forward channels in GSM-800.	10	Question paper, Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		E	*0*	*3*				*2*	*5*	

COURSE NAME	**Advance Communication**
CO Description	Compare different Mobile Communication Technologies
LO Description	Define principle of WCDMA-3G Technology

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	**(Theory)** Services offered in WCDMA 3G Technology, Frequency Bands allotted in WCDMA. WCDMA System specifications. Use of CDMA in the technology.	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 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-05	Internal Assignment/ Progressive test	**Student will be asked to**(and/or): 1. Explain WCDMA 3G Technology. 2. Describe WCDMA Band allocation. 3. Describe specifications of WCDMA. 4. Describe services of WCDMA. 5. Describe use of CDMA in WCDMA 3G Technology.	10	Rubrics/Rating scale**.**	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	**SCHEME FOR LEARNING OUTCOME**	**Branch Code**			**Course Code**			**CO Code**	**LO Code**	Format No. **4**
		E	***0***	***3***				***2***	***6***	

COURSE NAME	**Advance Communication**
CO Description	Compare different Mobile Communication Technologies
LO Description	Demonstrate the working of 2G/3G network.

SCHEME OF STUDY

S. No.	**Learning Content**	**Teaching – Learning Method**	**Description of T-L Process**	**Teach Hrs.**	**Pract. /Tut Hrs.**	**LRs Required**	**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.	• 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.	-	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	Resources Required	Internal
LO-06	Practical Internal	1. Introduction of trainer and PC interfacing using serial port. 2. Call setup using GSM/CDMA software and manual commands 3. Retrieving call registers for missed, received and dialed calls.	10	Rubrics/Rating scale**.**	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	**SCHEME FOR LEARNING OUTCOME**	**Branch Code**			**Course Code**			**CO Code**	**LO Code**	Format No. **4**
		E	***0***	***3***				***3***	***7***	
COURSE NAME	**Advance Communication**									

CO Description	Identify 4G and beyond mobile communication generations.						
LO Description	Discuss different components of 4G-LTE Technology						
SCHEME OF STUDY							
S. No.	**Learning Content**	**Teaching – Learning Method**	**Description of T-L Process**	**Teach Hrs.**	**Pract. /Tut Hrs.**	**LRs Required**	**Remarks**
LO-07	**(Theory)** Services offered in LTE 4G Technology, Frequency Bands allotted in LTE 4G, LTE System specification. Components and function of LTE 4G mobile network: UE(User Equipment), SIM(Subscriber Identification Module), E-UTRAN(Evolved-UMTS Terrestrial Radio Access Network), MME(Mobility Management Equipment), S-GW(Signaling Gateway), P-GW(PDN Gateway), HSS(Home Subscriber Server), PDN(Packet Data Network).	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**	**Resources Required**	**External / Internal**
LO-07	End Semester Theory Exam	**Student will be asked to** 1. Describe LTE 4G Technology. 2. Draw LTE 4G Band allocation. 3. Define E-UTRAN, UMTS,MME,S-GW, P-GW,HSS, PDN. 4. Describe services of LTE 4G Technology. 5. Describe specifications of LTE 4G Technology.	10	Question paper, Rating scale	External
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)					

RGPV (Diploma Wing) Bhopal	**SCHEME FOR LEARNING OUTCOME**	**Branch Code**			**Course Code**			**CO Code**	**LO Code**	Format No. **4**
		E	***0***	***3***				***3***	***8***	

COURSE NAME	**Advance Communication**
CO Description	Identify 4G and beyond mobile communication generations.
LO Description	Outline 5G mobile technology

SCHEME OF STUDY							
S. No.	**Learning Content**	**Teaching – Learning Method**	**Description of T-L Process**	**Teach Hrs.**	**Pract. /Tut Hrs.**	**LRs Required**	**Remarks**

LO-8	Introduction to 5G Technology- Basic concept of New Radio(NR), Beam forming, MIMO, Millimeter wave, small cell and Spatial multiplexing) Definition of- eMBB (Enhanced mobile broadband), URLL(ultra-reliable low latency communications), mMTC (Massive Machine-Type Communications).	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	-	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-08	Internal Assessment/ Progressive test	Student will be asked to(and/or): 1. Define MIMO,SPM, Beam forming. 2. Define 5G Band allocation. **3.** Describe Services of 5G. **4.** Short notes on eMBB, URLLC and mMTC	10	Rubrics, Rating scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		E	*0*	*3*				*3*	*09*	
COURSE NAME	**Advance Communication**									

CO Description	Identify 4G and beyond mobile communication generations.
LO Description	Demonstrate the working principle of LTE 4G mobile communication.

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	**(Psychomotor)** Working principle of 4G VoLTE Smart Phone and signals on trainer kit /or simulation software. Identify different parts and components and troubleshooting.	Lab demonstration, PPT , hands on practice, lab assignments.	• 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.		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.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-09	Practical Internal	1. Demonstrate the 4G working on trainer kit/ video/simulation software 2. Measure voltages and observe waveforms on test points. 3. Identify different parts and components. 4. Troubleshoot the problem.	10	Rubrics/Rating scale**.**	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		E	0	3				4	10	

COURSE NAME	**Advance Communication**
CO Description	Elaborate Fundamentals of Optical Fiber Communication
LO Description	Describe principle of light propagation through Optical Fiber

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	**(Theory)** 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.	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.	12	-	Text Books, PPT, Handouts, chalk board, charts, Video lecture- NPTEL and others.	

	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 (only definition), Effect of Dispersion on Data rate, BDP (Bandwidth distance product) and its simple numerical.						

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
Lo-10	End Semester Theory Exam	Student will be asked to(and/or): 1. List out advantages of Optical fiber. 2. Explain structure of optical fiber. 3. Explain propagation of light through Fiber. 4. Differentiate step index and graded index. 5. Differentiate between single-mode and multimode fiber. 6. Explain propagation loss in fiber. 7. List out different type of dispersion in fiber. 8. Calculate BDP for Dispersion of 1ns/km. 9. Calculate NA for μcore=1.55, μcladding=1.45 10. Explain mode stripping.	10	Question paper , Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		E	*0*	*3*				*4*	*11*	

COURSE NAME	**Advance Communication**
CO Description	Elaborate Fundamentals of Optical Fiber Communication
LO Description	Identify Components of Optical Fiber Communication Link

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	**(Theory)** Requirements from Source of Light, Comparison of LED and LASER, Intensity modulation in transmitter, Wavelength division multiplexing . Photoreceiver: Photodiode, PIN photodiode. Splicing, Block diagram of Optical Fiber Communication Link: Modulator, Optical Fiber medium, Demodulator, Repeater, optical amplifier. Calculation of power loss in OF link (simple numerical).	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.	12	-	Text Books, PPT, Handouts, chalk board, charts, Video lecture- NPTEL and others.	

	Working principle and application of Optical Power meter, OTDR (optical time domain reflectometer). Principle and Block Diagram: FTTH (Fiber To The Home) technology.						

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-11	End Semester Theory Exam	**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. 4. Compare photodiode and PIN photodiode. 5. Calculate power of photo transmitter for communication link having 2 splices with 5 dBm loss each and 6 connectors with 3 dBm loss each and photo-receiver with minimum detectable power of 30 dBm. 6. Draw and explain optical fiber communication link. **7.** Describe FTTH with suitable block diagram. **8.** Differentiate between repeater and optical amplifier.	15	Question paper , Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		E	0	3				4	12	

COURSE NAME	**Advance Communication**
CO Description	Elaborate Fundamentals of Optical Fiber Communication
LO Description	Measure different parameter related to Optical fiber.

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	(**Pshycomotor**) 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 Optical fiber cable structure and function. Demonstration of different types of Connector-SC,FC,ST,SMA.	Lab demonstration, PPT , hands on practice, lab assignments.	• 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. • Live or Video demonstration of splicing the optical fiber, connectors and fiber cable.	-	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.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal

LO-12	End Semester Practical Exam	Student will be asked to 1. Perform optical fiber communication. 2. Evaluate NA, Dispersion and Power Loss. 3. Watch working of Optical fiber Splicing Machine		Rubrics, Rating scale	External
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)					

RGPV (Diploma Wing) Bhopal	**SCHEME FOR LEARNING OUTCOME**	**Branch Code**			**Course Code**			**CO Code**	**LO Code**	Format No. **4**
		E	***0***	***3***				***5***	***13***	

COURSE NAME	**Advance Communication**
CO Description	Explain the fundamentals of satellite communication System
LO Description	Explain the working Principle of satellite.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-13	**(Theory)** Working Principle/fundamental of satellite, Services offered by satellite, Types of Orbit, Polar satellite, Geo-stationary Satellite, LEO, MEO. Frequency bands used in satellite	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	10	-	Text Books, PPT, Handouts, chalk board, charts, Video lecture- NPTEL and others.	

	communication (uplink and downlink), Functional block diagram of satellite communication system. Footprint of satellite, Effective Received Power, Functional Block diagram of transponder.		their knowledge.				

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): 1. Describe working principle of Satellite. 2. Define frequency band used in satellite communication. 3. Explain with functional block diagram (any one)- Satellite, Earth station, transponder and Satellite receiver. 4. Define Footprint, Attitude control, Orbit Control, TTC. 5. Describe Geostationary Satellite. 6. Differentiate between Polar satellite, LEO, MEO satellite	10	Question Paper, Rating scale.	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Bhopal											

COURSE NAME	**Advance Communication**
CO Description	Explain the fundamentals of satellite communication System
LO Description	Compare applications of satellite.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-14	**(Theory)** Functional Block diagram of: DBS, DTH Satellite receiver, Navigational Satellite system: 3-satellite GPS (Global Positioning System), Introduction of Satellite phone.	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		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	Internal, quiz/seminar	**Student will be asked to**(and/or): 1. Explain DBS System. 2. Describe satellite phone. 3. Explain 3 satellite GPS system. 4. Explain DTH Satellite receiver with functional block diagram.	10	Question paper , Rating scale**.**	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing)	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. **4**
		E	*0*	*3*				*5*	*15*	

Bhopal											
COURSE NAME	**Advance Communication**										
CO Description	Explain the fundamentals of satellite communication System										
LO Description	Demonstrate Satellite Communication Systems										

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-15	(**Pshycomotor**) Demonstrate Satellite Communication Systems on trainer kit and/or simulation software Study of name and location different Indian and others Satellites. Study of IRNSS.	Lab demonstration, PPT, hands on practice, lab assignments.	• 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.	--	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.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-15	Practical Exam External	**Student will be asked to** 1. Study of satellite communication system. 2. List name and location of Indian and Foreign satellites. 3. Describe IRNSS ant its services. 4. Set up a satellite communication link and 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)					