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

COURSE NAME	**Digital Communication**
CO Description	Identify different digital signals and their parameters
LO Description	Classify different 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-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): 1. Define Binary, Tertiary, Octal, Hexadecimal signals 2. Differentiate Baseband and Broadband signals 3. Describe advantages of Digital Communication	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	0	3	1	2	

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): 1. Define Bitrate, Baudrate, Attenuation, Distortion, Jitter 2. State Nyquist theorem for noiseless channel 3. State Shannon's theorem for noisy channel 4. Calculate bitrate for given channel.	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	0	3	1	3	

COURSE NAME	**Digital Communication**
CO Description	Identify different digital signals and their parameters
LO Description	Analyze variousdigital signal

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

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	0	3	2	4	

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.	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-04	End Semester Theory Exam	**Student will be asked to**(and/or): 1. Define Nyquist Sampling Theorem. 2. Describe Quantization, Quantization levels, Quantization noise, companding. 3. Calculate bitrate of given PCM signal. 4. Explain operation of PCM encoder	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	0	3	2	5	

COURSE NAME	**Digital Communication**
CO Description	Explain different steps of signal processing in PCM and digital line codes.
LO 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	Maximum 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

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	0	3	2	6	

COURSE NAME	**Digital Communication**
CO Description	Explain different steps of signal processing in PCM and digital line codes.
LO Description	.

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	PerformPCM modulation /demodulation considering various signal processing steps Viz., Different type of Sampling, Quantization, Quantization levels, Quantization noise, Encoding. (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	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-06	End Semester practical Exam	**Student will be asked to** 1. Perform PCM modulation/demodulation on trainer kit/ simulation software	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	4	0	3	3	7	

COURSE NAME	**Digital Communication**
CO Description	Identify different digital modulation, demodulation techniques and their application.
LO Description	Illustrate different digital modulation and demodulation 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-07	Digital modulation techniques with block diagram,ASK, FSK BPSK,GMSK. Digital Demodulation techniques with block diagram,ASK, FSK, BPSK, GMSK.	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-07	End Semester Theory Exam	**Student will be asked to**(and/or): 1. Describe ASK, FSK BPSK,GMSK modulation. 2. Explain ASK, FSK BPSK,GMSK demodulation. 3. Differentiate between ASK, FSK BPSK,GMSK.	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	0	3	3	8	

COURSE NAME	**Digital Communication**
CO Description	Identify different digital modulation, demodulation techniques and their application.
LO Description	Outline various applications of digital modulation and demodulation 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-08	Applications of digital modulation techniques 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-08	Mid semester Exam Assignment, Quiz	**Student will be asked to** (and/or): 1. CompareASK, FSK BPSK,GMSK. 2. Explore Modulation,demodulation techniques usedinWi-Fi, Bluetooth, DTH, DSL Technologies, FTTH	10	Question paper , 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	0	3	3	9	

COURSE NAME	**Digital Communication**
CO Description	Identify different digital modulation, demodulation techniques and their application.
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 de-modulation– 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** 1. Perform ASK, FSK BPSK,GMSK Digital Modulation on trainer kit/ simulation software 1. Perform ASK, FSK BPSK,GMSK Digital Demodulation on trainer kit/ simulation software	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*	*4*	*0*	*3*	*4*	*10*	

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.	

	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 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. Explain need of multiplexing. 2. Describe TDM, FDM, OFDM. 3. Differentiate between TDM, FDM, OFDM. 4. Explain need of multiple access. 5. Describe& Compare TDMA, FDMA, OFDMA. 6. Differentiate between Multiplexing and Multiple Access	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	0	3	4	11	

COURSE NAME	**Digital Communication**
CO Description	Analyze different Multiplexing and Multiple Access methods and their applications.
LO 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): 1. Write carrier frequencies and channel bandwidth of Wi-Fi, DTH,DSL,FTTH,PSTN, mobile comm. 2. Differentiate FDM, TDM , OFDM.	10	Question paper, 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	0	3	4	12	

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** 1. Perform TDM,FDM,OFDM on trainer kits/Simulation software. 2. Perform TDMA,FDMA,OFDMA on trainer kits/Simulation software.	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	0	3	5	13	

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
LO-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): **1.** Explain pseudo noise sequence. **2.** Explain functional block diagram and operation of Direct sequence spread spectrum systems(DSSS) **3.** Explain functional block diagram and operation of Frequency hoppingspread spectrum system (FHSS)	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	0	3	5	14	

COURSE NAME	**Digital Communication**
CO Description	Explaindifferent Spread Spectrum methods and their applications.
LO Description	Outline different applications of DSSS and FHSS.

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	Application of DSSS, FHSS in Mobile comm., 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-14	Mid semester Exam,Assignment, Quiz	**Student will be asked to** (and/or): 1. Describe Application of,FHSS, DSSS in Mobile communication, Wi-Fi, Bluetooth, DTH, DSL Technologies, FTTH. 2. Compare FHSS and DSSS.	10	Question paper, 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	0	3	5	15	

COURSE NAME	**Digital Communication**
CO Description	Explain different Spread Spectrum methods and their applications.
LO Description	Simulate and verifyFHSS and DSSS.

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	Simulate and PerformDirect sequence spread spectrum systems(DSSS), Frequency hoppingspread spectrum system (FHSS) 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-15	Practical test in laboratory	**Student will be asked to** 1. Perform DSSS on trainer kits/Simulation software. 2. Perform FSSS on trainer kits/Simulation software.	10	Rubrics, Rating scale	Internal
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)					