

RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE		FORMAT-3	Sheet No. 1/5
Branch	Electronics & Tele-communication		Semester	4	
Course Code	E03	Course Name	Digital Communication		
Course Outcome 1	Identify different digital signals and their parameters			Teach Hrs	Marks
Learning Outcome 1	Classify different digital signals (Cognitive)			6	10
Contents	Analog vs Digital Signal, Types of Digital signal: Binary, Tertiary, Octal, Hexadecimal, Advantages of Digital Communication, Baseband Transmission vs Broadband Transmission				
Method of Assessment	External				
Learning Outcome 2	Define different parameters related to digital signals (Cognitive)			8	10
Contents	Bitrate, Bandwidth, Baud-rate, Transmission impairment: Attenuation, Distortion, Noise, BER, Jitter, Nyquist rate for noiseless channel, Shannon capacity for noisy channel, Frequency and Time-Domain representation of periodic and non-periodic Digital Signal, frequency, bandwidth				
Method of Assessment	External				
Learning Outcome 3	Analyze various digital signals (Psychomotor)			6	10
Contents	Time-Domain representation of periodic and non-periodic digital signal Calculation of frequency & bandwidth and other parameters.				
Method of Assessment	Internal				

RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE		FORMAT-3	Sheet No. 2/5
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Branch	Electronics & Tele-communication		Semester	3
Course Code	E03	Course Name	Analog Circuits	
Course Outcome 2	Explain different steps of signal processing in PCM and digital line codes.		Teach Hrs	Marks
Learning Outcome 4	Describe various signal processing methods in pulse code modulation (Cognitive)		8	10
Contents	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			
Method of Assessment	External			
Learning Outcome 5	Compare various digital line codes (Cognitive)		5	10
Contents	Digital Line Codes: non return-to-zero (NRZ), return-to-zero (RZ), Manchester code			
Method of Assessment	External			
Learning Outcome 6	Verify PCM modulation / demodulation. (Psychomotor)		6	10
Contents	Perform PCM modulation /demodulation considering various signal processing steps Viz., Different type of Sampling, Quantization, Quantization levels, Quantization noise, Encoding. (On Trainer Kits/ Simulation Software)			
Method of Assessment	External			

THE COURSE					
Branch	Electronics & Tele-communication			Semester	3
Course Code	E03	Course Name	Analog Circuits		
Course Outcome 3	Identify different digital modulation, demodulation techniques and their application.			Teach Hrs	Marks
Learning Outcome 7	Illustrate different digital modulation and demodulation techniques (Cognitive)			8	10
Contents	Digital modulation techniques with block diagram, ASK, FSK BPSK, GMSK. Digital Demodulation techniques with block diagram, ASK, FSK, BPSK, GMSK.				
Method of Assessment	External				
Learning Outcome 8	Outline various applications of digital modulation and demodulation techniques. (Cognitive)			6	10
Contents	Applications of digital modulation techniques in Mobile communication, Wi-Fi, Bluetooth, DTH, DSL Technologies, FTTH				
Method of Assessment	Internal				
Learning Outcome 9	Verify digital modulation and demodulation (Psychomotor)			8	10
Contents	Perform digital modulation – ASK, FSK, BPSK & GMSK and observe output waveform and verify it. Perform digital demodulation – ASK, FSK, BPSK & GMSK and observe output waveform and verify it (On Trainer Kits/ Simulation Software)				
Method of Assessment	External				

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE		FORMAT-3	Sheet No. 4/5
Branch	Electronics & Tele-communication		Semester	3

Course Code	E03	Course Name	Analog Circuits	
Course Outcome 4	Analyze different Multiplexing and Multiple Access methods and their applications.		Teach Hrs	Marks
Learning Outcome 10	Compare different Multiplexing and Multiple Access techniques. (Cognitive)		8	10
Contents	Difference between Multiplexing and Multiple Access. Need of multiplexing, Comparison of Time division multiplexing (TDM), Frequency division multiplexing (FDM), Orthogonal Frequency Division Multiplexing (OFDM). Need of multiple Access, Comparison of Time Division Multiple access (TDMS), Frequency Division Multiple access (FDMA), Code Division Multiple access (CDMA)			
Method of Assessment	External			
Learning Outcome 11	List out various applications of Multiplexing and Multiple Access techniques. (Cognitive)		6	10
Contents	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.			
Method of Assessment	Internal			
Learning Outcome 12	Verify different Multiplexing and Multiple Access techniques. (Psychomotor)		8	10
Contents	Perform and verify different Multiplexing and Multiple Access techniques- FDM, TDM, OFDM, FDMA, TDMA, CDMA, OFDMA. (On Trainer Kits/ Simulation Software)			
Method of Assessment	Internal			

RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE		FORMAT-3	Sheet No. 5/5
Branch	Electronics & Tele-communication			Semester	
Course Code	E03	Course Name	Analog Circuits		
Course Outcome 5	Explain different Spread Spectrum methods and their applications.			Teach Hrs.	Marks
Learning Outcome 13	(Cognitive) Compare different Spread Spectrum methods			8	10
Contents	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 hopping spread spectrum system (FHSS)				
Method of Assessment	External				
Learning Outcome 14	(Cognitive) Outline different applications of DSSS and FHSS			6	10
Contents	Application of DSSS, FHSS in Mobile communication, Wi-Fi, Bluetooth, DTH, DSL Technologies, FTTH.				
Method of Assessment	Internal				
Learning Outcome 15	(Psychomotor) Simulate and verify FHSS and DSSS.			8	10
Contents	Simulate and Perform Direct sequence spread spectrum systems (DSSS), Frequency hopping spread spectrum system (FHSS) and verify it. (On Trainer Kits/ Simulation Software)				
Method of Assessment	Internal				

Suggested List of Experiments*:

S.N.	Experiment	CO
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1	Generate Digital Signals on Function Generator and observe waveforms and parameters of signal on CRO/DSO	CO403.1
2	Perform PCM modulation /demodulation on Trainer Kits/ Simulation Software and observe waveforms on CRO/DSO	CO403.2
3	Perform ASK, FSK, BPSK, GMSK modulation on Trainer Kits/ Simulation Software and observe waveforms on CRO/DSO	CO403.3
4	Perform ASK, FSK, BPSK, GMSK demodulation on Trainer Kits/ Simulation Software and observe waveforms on CRO/DSO	CO403.3
5	Perform FDM, TDM , OFDM multiplexing/ de-multiplexing on Trainer Kits/ Simulation Software and observe waveforms on CRO/DSO	CO403.4
6	Perform FDMA, TDMA ,CDMA, OFDMA access methods on Trainer Kits/ Simulation Software and observe waveforms on CRO/DSO	CO403.4
7	Perform FHSS, DSSS on Trainer Kits/ Simulation Software and observe waveforms on CRO/DSO	CO403.5

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.	Trainer kits

Suggestions for Practicals:

Experiments are expected to be performed

1. Using Trainer kits.
2. On simulation software (Sciencetech - Simtel Digital Communication System Simulation Software etc.
3. On virtual lab platforms available online

Reference Books/Web Portals:

S.N.	Title	Author
1	Modern Digital and Analog Communication Systems	B.P. Lathi
2	Digital Communication	Sanjay Sharma
3	Fundamentals of Digital Communication	Upamanyu Madhow
4	Analog and digital communication	T.L Singal
5	Communication Systems: Analog and Digital	R .P Singh and S D Sapre
6	www.Nptel.ac.in	
7	www.Swayam.gov.in	

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, Baud rate, Transmission impairment: Attenuation, Distortion, Noise, BER, Jitter, Nyquist rate for noiseless channel, Shannon capacity for 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): <ol style="list-style-type: none"> 1. Define Bitrate, Baud rate, 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	
					<i>E</i>	<i>0</i>	<i>3</i>	<i>4</i>	<i>0</i>	<i>3</i>		<i>1</i>
COURSE NAME	Digital Communication											
CO Description	Identify different digital signals and their parameters											
LO Description	Analyze various digital 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.	<ul style="list-style-type: none"> 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): <ol style="list-style-type: none"> Define Nyquist Sampling Theorem. Describe Quantization, Quantization levels, Quantization noise, companding. Calculate bitrate of given PCM signal. Explain operation of PCM encoder 	10	Question paper, Rating scale	External								

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	
					<i>E</i>	<i>0</i>	<i>3</i>	<i>4</i>	<i>0</i>	<i>3</i>		<i>2</i>
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	Perform PCM 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.	<ul style="list-style-type: none"> 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
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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
		<i>E</i>	<i>0</i>	<i>3</i>	<i>4</i>	<i>0</i>	<i>3</i>	<i>3</i>	<i>7</i>	

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
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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
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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
		<i>E</i>	<i>0</i>	<i>3</i>	<i>4</i>	<i>0</i>	<i>3</i>	<i>3</i>	<i>8</i>	

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
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LO-08	Mid semester Exam Assignment, Quiz	Student will be asked to (and/or): 1. Compare ASK, FSK BPSK, GMSK. 2. Explore Modulation, demodulation techniques used in Wi-Fi, Bluetooth, DTH, DSL Technologies, FTTH	10	Question paper , Rating scale	Internal
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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
		<i>E</i>	<i>0</i>	<i>3</i>	<i>4</i>	<i>0</i>	<i>3</i>	<i>3</i>	<i>9</i>	

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.	<ul style="list-style-type: none"> 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
		<i>E</i>	<i>0</i>	<i>3</i>	<i>4</i>	<i>0</i>	<i>3</i>	<i>4</i>	<i>10</i>	

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)							
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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)

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

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

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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)

<p>ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)</p>
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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.	<ul style="list-style-type: none"> 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 hopping spread 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 hopping spread 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
					<i>E</i>	<i>0</i>	<i>3</i>	<i>4</i>	<i>0</i>	<i>3</i>	
COURSE NAME	Digital Communication										
CO Description	Explain different 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
					<i>E</i>	<i>0</i>	<i>3</i>	<i>4</i>	<i>0</i>	<i>3</i>	
COURSE NAME	Digital Communication										
CO Description	Explain different Spread Spectrum methods and their applications.										
LO Description	Simulate and verify FHSS 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 Perform Direct sequence spread spectrum systems (DSSS), Frequency hopping spread spectrum system (FHSS) and verify it. (On Trainer Kits/ Simulation Software)	Lab demonstration, PPT , hands on practice, lab assignments.	<ul style="list-style-type: none"> 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
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ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

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