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

| Branch | Electronics & Tele-communication | Semester | 3 |
|---|---|---|---|

| Course Code | | Course Name | Analog Communication |
|---|---|---|---|

| | | | |
|---|---|---|---|
| **Course Outcome 1** | Explain basic block of communication system and classify various signal, system & noise | Teach Hrs | Marks |
| **Learning Outcome 1** | Describe basic components of communication system and concept of modulation, its needs. *(Cognitive)* | 6 | |
| **Contents** | Block diagram of electronic communication system, distinguish between analog and digital communication,<br>Modulation, Need for modulation and types of analog modulation techniques.<br>**(Theory)** | | |
| **Method of Assessment** | External | | |
| **Learning Outcome 2** | Compare different signals, systems and noise. *(Cognitive)* | 10 | |
| **Contents** | Definition of signal and system<br>**Signal:** Analog, digital, deterministic, random, energy, power, odd, even, periodic and aperiodic<br>**System**: Linear & non-linear, time variant & invariant, causal & non-causal system.<br>**Noise:** Classification of noise, noise measurement – SNR, Noise figure, Equivalent noise temperature, Probability of error (basic definition no derivation)<br>**(Theory)** | | |
| **Method of Assessment** | Internal | | |
| **Learning Outcome 3** | Perform spectrum analysis of signal and evaluate different parameters. *(Psychomotor)* | 6 | |
| **Contents** | Classification of EM spectrum<br>Measure amplitude and frequency of different signals using CRO or Spectrum Analyser. | | |
| **Method of Assessment** | External | | |

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

| Branch | Electronics & Tele-communication | Semester | 3 |
|---|---|---|---|

| Course Code | | Course Name | Analog Communication |
|---|---|---|---|

| Course Outcome 2 | Compare analog modulation techniques. | Teach Hrs | Marks |
|---|---|---|---|
| Learning Outcome 4 | Examine various aspect of amplitude modulation in different domains. *(Psychomotor)* | 12 | |
| Contents | **(Theory)**<br>Definition, waveform of AM, expressions of modulated signal, modulation index in terms of various voltage components (modulating voltage, carrier voltage, maximum voltage and minimum voltage), modulation index in case of simultaneous modulations, LSB and USB, Bandwidth, Power in AM wave. Solve elementary problems on modulation index, bandwidth and power.<br>**(Practical)**<br>To modulate a high frequency carrier with sinusoidal signal to obtain AM signal.<br>Measure modulation index of an AM envelope | | |
| Method of Assessment | Internal | | |
| Learning Outcome 5 | Explain block diagram of AM transmitter and suppression of carrier methods.*(Cognitive)* | 8 | |
| Contents | Block diagram and description of AM transmitter using low level and high level modulation.<br>Suppression of carrier: BalancedModulator (using diode), Suppression of Sideband using filter method | | |
| Method of Assessment | Internal | | |
| Learning Outcome 6 | Distinguish various analog modulation techniques.*(Cognitive)* | 8 | |
| Contents | **SSB**: Power and Bandwidth requirement, Generation using filter method and phase shift method.<br>Concept of VSB.<br>Comparison and application of AM, DSB-SC, SSB and VSB. | | |
| Method of Assessment | External | | |

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

| Branch | Electronics & Tele-communication | Semester | 3 |
|---|---|---|---|
| Course Code | | Course Name | Analog Communication |

| Course Outcome 3 | Analyze waveform of Angle Modulation. | Teach Hrs. | Marks |
|---|---|---|---|
| Learning Outcome 7 | Explain frequency modulation schemes and its relation with phase modulation. *(Cognitive)* | 8 | |
| Contents | Phase and frequency modulation and relation between phase and frequency modulation.<br>**Frequency Modulation**: definition and waveform, expressions of frequency deviation, modulation index. Relationship between frequency deviation and modulation index. Narrowband and wideband FM, Carlson's rule for bandwidth, SNR and bandwidth trade-off. | | |
| Method of Assessment | External | | |
| Learning Outcome 8 | Describe the FM generation using direct & indirect method. *(Cognitive)* | 8 | |
| Contents | Direct method for FM generation: Block diagram and basic description<br>Indirect method for FM generation: Block diagram and description of Armstrong method<br>Block diagram and description of FM transmitter. | | |
| Method of Assessment | External | | |
| Learning Outcome 9 | Install and operate angle modulation circuits on kits/simulation software. *(Psychomotor)* | 6 | |
| Contents | Modulate a high frequency carrier with sinusoidal signal to obtain FM signal.<br>Determine Modulation Index of Frequency Modulated wave. | | |
| Method of Assessment | Internal | | |

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

| Branch | Electronics & Tele-communication | Semester | |
|---|---|---|---|
| Course Code | | Course Name | Analog Communication |

| Course Outcome 4 | Compare demodulation techniques of AM signals. | Teach Hrs. | Marks |
|---|---|---|---|
| Learning Outcome 10 | Describecharacteristics of radioreceivers. *(Cognitive)* | 8 | |
| Contents | Characteristic of radio receiver, Concept of sensitivity, selectivity, fidelity, Image frequency and its rejection. Characteristic of RF amplifier, selection of IF, Double Spotting, Noise Figure. | | |
| Method of Assessment | External | | |
| Learning Outcome 11 | Categorize differenttypes of radioreceivers.*(Cognitive)* | 8 | |
| Contents | Detection of AM using Diode detector and practical diode detector. AM receiver- Block diagram of TRF, Super heterodyne and double super-heterodyne. | | |
| Method of Assessment | External | | |
| Learning Outcome 12 | Set up and select particular analog de-modulation techniques circuits. *(Psychomotor)* | 8 | |
| Contents | Check the demodulated AM signal waveform using envelope detector and draw its input output waveform.<br>Construct AM demodulator using diode circuit<br>Locate various sections of AM radio super heterodyne receiver and draw the waveforms at input and output side of each section. | | |
| 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 | | Course Name | Analog Communication |
|---|---|---|---|

| Course Outcome 5 | Compare the functioning of angle de-modulators. | Teach Hrs. | Marks |
|---|---|---|---|
| Learning Outcome 13 | Classify different FM de-modulators methods and outline need of pre-emphasis & de-emphasis circuits. *(Cognitive)* | 10 | |
| Contents | Block diagram of FM receiver with description<br>**FM demodulators:** Slope detection, Balanced slop detection, Foster Seeley discriminator and Ratio detector. Need for pre-emphasis and de-emphasis circuits, SNR improvement, concept of AFC, Merits and demerits of FM over AM | | |
| Method of Assessment | External | | |
| Learning Outcome 14 | Explain different various multiplexing techniques. *(Cognitive)* | 6 | |
| Contents | Concept of Frequency Division Multiplexing and Time Division Multiplexing and their comparison | | |
| Method of Assessment | Internal | | |
| Learning Outcome 15 | Operate different analog radio receiver. *(Psychomotor)* | 8 | |
| Contents | Locate various sections of FM receiver and examine its working.<br>Obtain the frequency response of Pre-emphasis and De-emphasis circuit.<br>Demonstration of fault finding of FM radio receivers. | | |
| Method of Assessment | External | | |

## Suggested List of Experiment

| S.N. | Experiment | CO |
|---|---|---|
| 1. | Measure amplitude and frequency of different signals using CRO or Spectrum Analyser. | CO303.1 |
| 2. | To modulate a high frequency carrier with sinusoidal signal to obtain AM signal. | CO303.2 & CO303.4 |
| 3. | Measure modulation index of an AM envelope | CO303.2 & CO303.4 |
| 4. | Simulate and realise a simple AM transmitter on bread board. | CO303.2 & CO303.4 |
| 5. | Check the demodulated AM signal waveform using envelope detector and draw its input output waveform. | CO303.2 & CO303.4 |
| 6. | Construct AM demodulator using diode circuit. | CO303.2 & CO303.4 |
| 7. | Locate various sections of AM radio super heterodyne receiver and draw the waveforms at input and output side of each section. | CO303.2 & CO303.4 |
| 8. | To study & observe the amplitude response of automatic gain controller (AGC). | CO303.2 & CO303.4 |
| 9. | Demonstration of fault finding of AM radio receivers | CO303.2 & CO303.4 |
| 10. | To modulate a high frequency carrier with sinusoidal signal to obtain FM signal. | CO303.3 & CO303.5 |
| 11. | Determine Modulation Index of Frequency Modulated wave. | CO303.3 & CO303.5 |
| 12. | Locate various sections of FM receiver and examine its working. | CO303.3 & CO303.5 |
| 13. | Obtain the frequency response of Pre-emphasis and De-emphasis circuit. | CO303.3 & CO303.5 |
| 14. | Demonstration of fault finding of FM radio receivers. | CO303.3 & CO303.5 |
| 15. | Study of frequency division multiplexing | CO303.3 & CO303.5 |

| | | |
|---|---|---|
| 16. | Simulate AM, FM and SSB signal using simulation software | CO303.3 & CO303.5 |

10 Practical in a semester, as per the discretion of subject teacher.

## Suggested Activity:

| S.N. | Activity |
|---|---|
| a | List the nearby sources of manmade noise. |
| b | Collect detail of frequency used in AM/FM broadcasting. |
| c | Demonstrate Amplitude modulation and demodulation. |
| d | Present and simulate how radio works |
| e | Explore working of HAM radio and CB radio |
| f | Collect details of Frequency, Standards, Company, Model & Range of Walky-Talky, Cordless phone and Wireless set used by Police department and other security service provider. |
| g | Discover working of radio transmitting station |
| h | Explore how communication perform in state electricity board (Power line communication). |
| i | Online exploration of Air Traffic Control mechanism at airport.<br>Online exploration of how Air Traffic Control work at airport. |

## Learning Resources:

## a) Reference Books

| S.N. | Title | Author |
|---|---|---|
| **1** | Electronic Communication Systems | George Kennedy and Bernard Davis<br>Tata McGraw Hill |
| **2** | Principles of Digital Communication | Taub and Schilling<br>Tata McGraw-Hill" 28th reprint, 2003 |
| **3** | Analog and Digital Communication | Singal, T. L.<br>Tata Mcgraw Hill, India latest edition |
| **4** | Communication System | R P Singh S D Sapre<br>Tata Mcgraw Hill, India |
| **6** | Electronics Communication | Dennis Roddy and John Coolen<br>Pearson Eductation |

| | | |
|---|---|---|
| **7** | Electronics Communication System | WayenTomasi<br>Pearson Education |

## b) Software/Learning Websites:

- nptel.ac.in
- swayam.gov.in

## Major Equipment/Materials:

| | |
|---|---|
| a | CRO |
| b | Function generator |
| c | Spectrum analyser |
| d | RF generator/wideband oscillator |
| e | AM/FM radio receiver trainer Kit |
| f | AM Modulator/Demodulator |
| g | FM Modulator/Demodulator |
| h | Frequency division multiplexer/de-multiplexer |
| i | Simulation Software |

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

| | |
|---|---|
| **COURSE NAME** | **Analog Communication** |
| **CO Description** | Explain basic block of communication system and classify various signal, system & noise |
| **LO Description** | Describe basic components of communication system and concept of modulation, its needs. |

**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 | Block diagram of electronic communication system, distinguish between analog and digital communication, Modulation, Need for modulation and types of analog modulation techniques. | Interactive classroom lecture, PPT, demonstration, quiz,assignments. | Teacher will explain the contents and provide handouts to students. Teacher will conduct quiz/ assignments/ tutorial | 6 | -- | Text Books, PPT, Handouts, chalk board, charts. | |

**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)<br>1. Draw and explain block diagram of communication system.<br>2. List out advantages and disadvantages of analog and digital communication.<br>3. Basics and need of modulation<br>4. Classification of analog modulation techniques. | 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 | 0 | 2 | 1 | 2 | |

| | |
|---|---|
| **COURSE NAME** | **Analog Communication** |
| **CO Description** | Explain basic block of communication system and classify various signal, system & noise |
| **LO Description** | Compare different signals, systems and noise. |

**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 | Definition of signal and system<br>**Signal:** Analog, digital, deterministic, random, energy, power, odd, even, periodic and aperiodic<br>**System**: Linear & non-linear, time variant & invariant, causal & non-causal system.<br>**Noise:** Classification of noise, noise measurement – SNR, Noise figure, Equivalent noise temperature, Probability of error | 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 | 2 | 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 | Mid Semester Theory Exam | **Student will be asked to**(and/or):<br>1. Draw and explain various type of signals and calculate given parameter.<br>2. Classify, explain and identify different types of system<br>3. Classify the noise.<br>4. Define and calculate various parameters related to noise | 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 | 3 | 0 | 2 | 1 | 3 | |

| | |
|---|---|
| **COURSE NAME** | **Analog Communication** |
| **CO Description** | Explain basic block of communication system and classify various signal, system & noise |
| **LO Description** | Perform spectrum analysis of signal and evaluate different parameters. |

**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 | Classification of EM spectrum<br>Measure amplitude and frequency of different signals using CRO or Spectrum Analyser. | Interactive classroom lecture, PPT , Lab demonstration, hands on practice, lab assignments. | • Teacher will explain the content in class/lab.<br>• Teacher with support from lab staff will demonstrate the procedure of lab experiments.<br>• Student will conduct lab assignment based on these experiments. | -- | 6 | Text books, PPT, Lab manual, charts, CRO, Spectrum Analyzer, 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**<br>1. Measure amplitude and frequency of different signals using CRO or Spectrum Analyzer | 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* | *3* | *0* | *2* | *2* | *4* | |

| | |
|---|---|
| **COURSE NAME** | **Analog Communication** |
| **CO Description** | Compare analog modulation techniques. |
| **LO Description** | Examine various aspect of amplitude modulation in different domains. |

**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)**<br>Definition, waveform of AM, expressions of modulated signal, modulation index in terms of various voltage components (modulating voltage, carrier voltage, maximum voltage and minimum voltage), modulation index in case of simultaneous modulations, LSB and USB, Bandwidth, Power in AM wave. Solve elementary problems on modulation index, bandwidth and power.<br>**(Practical)**<br>To modulate a high frequency carrier with sinusoidal signal to obtain AM signal. Measure modulation index of an AM | Interactive classroom lecture, PPT, Lab demonstration, hands on practice, lab assignments. | • Teacher will explain the content in class/lab.<br>• Teacher with support from lab staff will demonstrate the procedure of lab experiments.<br>• Student will conduct lab assignment based on these experiments. | 6 | 6 | Text books, PPT, Lab manual, charts, Handouts, experimental trainer instruments/kit with measuring instruments, computer with relevant simulation software and high | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | envelope | | | | | speed internet. | |

**SCHEME OF ASSESSMENT**

| S. No. | Method of Assessment | Description of Assessment | Maximum Marks | Resources Required | External / Internal |
|---|---|---|---|---|---|
| LO-04 | Practical test in laboratory | **Student will be asked to**(and/or):<br>1. Derive expression for AM signal<br>2. Solve simple numerical of AM<br>3. To modulate high frequency carrier with baseband sinusoidal signal.<br>4. Measure modulation index of an AM envelope | 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 | 0 | 2 | 2 | 5 | |

| | |
|---|---|
| **COURSE NAME** | **Analog Communication** |
| **CO Description** | Compare analog modulation techniques. |
| **LO Description** | Explain block diagram of AM transmitter and suppression of carrier 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-05 | Block diagram and description of AM transmitter using low level and high level modulation.<br>Suppression of carrier: BalancedModulator (using diode), Suppression of Sideband using filter method | 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-05 | Mid Semester Theory Exam | **Student will be asked to**(and/or):<br>1. Draw and explain block diagram of AM transmitter using low level and/or high level modulation.<br>2. Draw circuit diagram of balanced modulator and explain working of it to generate suppressed carrier signal. | 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 | 3 | 0 | 2 | 2 | 6 | |

| | |
|---|---|
| **COURSE NAME** | **Analog Communication** |
| **CO Description** | Compare analog modulation techniques. |
| **LO Description** | Distinguish various analog modulation techniques. |

**SCHEME OF STUDY**

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | **Hrs.** | | |
| LO-06 | **SSB**: Power and Bandwidth requirement, Generation using filter method and phase shift method.<br>Concept of VSB.<br>Comparison and application of AM, DSB-SC, SSB and VSB. | Interactive classroom lecture, PPT, Video, demonstration, quiz, assignments. | Teacher will explain the contents and provide handouts to students. Teacher will conduct quiz /assignments/ /tutorial to make students practice their knowledge. | 6 | 2 | 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-06 | End Semester Theory Exam | **Student will be asked to**(and/or):<br>1. Describe the generation of SSB using filter and phase shift method<br>2. Derive various parameters of SSB<br>3. Explain the concept of VSB.<br>4. Compare various modulation techniques and list out its application | 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* | *0* | *2* | *3* | *7* | |

| | |
|---|---|
| **COURSE NAME** | **Analog Communication** |
| **CO Description** | Analyze waveform of Angle Modulation. |
| **LO Description** | Explain frequency modulation schemes and its relation with phase modulation. |

**SCHEME OF STUDY**

| S. No. | Learning Content | Teaching – | Description of T-L | Teach | Pract. | LRs Required | Remarks |
|---|---|---|---|---|---|---|---|

| | | Learning Method | Process | Hrs. | /Tut Hrs. | | |
|---|---|---|---|---|---|---|---|
| LO-07 | Phase and frequency modulation and relation between phase and frequency modulation. **Frequency Modulation**: definition and waveform, expressions of frequency deviation, modulation index. Relationship between frequency deviation and modulation index. Narrowband and wideband FM, Carlson's rule for bandwidth, SNR and bandwidth trade-off. | Interactive classroom lecture, PPT, Video, demonstration, quiz, assignments. | Teacher will explain the contents and provide handouts to students. Teacher will conduct quiz/assignments/ tutorial to make students practice their knowledge. | 6 | 2 | 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):<br>1. Describe the angle modulation and relation between frequency and phase modulation.<br>2. Drive expression for various parameters of FM and relation between them.<br>3. Classify FM - Narrowband and wideband FM<br>4. Explain Carlson's rule for bandwidth, SNR and bandwidth trade-off. | 10 | Question paper + Rating scale. | External |

**ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)**

| COURSE NAME | Analog Communication |
|---|---|
| CO Description | Analyze waveform of Angle Modulation. |
| LO Description | Describe the FM generation using direct & indirect method. |

**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 | Direct method for FM generation: Block diagram and basic description<br>Indirect method for FM generation: Block diagram and description ofArmstrong method Block diagram and description of FM transmitter. | 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-08 | End Semester Theory Exam | **Student will be asked to**(and/or):<br>1. Draw &/or describe block diagram for FM generation using direct and indirect method<br>2. Explain Block diagram of FM transmitter. | 10 | Question paper + Rating scale. | External |

**ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)**

| COURSE NAME | Analog Communication |
|---|---|
| CO Description | Analyze waveform of Angle Modulation. |
| LO Description | Install and operate angle modulation circuits on kits/simulation software. |

**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 | Modulate a high frequency carrier with sinusoidal signal to obtain FM signal. Determine Modulation Index of Frequency Modulated wave. | Lab demonstration, PPT , hands on practice, lab assignments. | • Teacher will explain the content in class/lab.<br>• Teacher with support from lab staff will demonstrate the procedure of lab experiments.<br>• 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 test in laboratory | **Student will be asked to**<br>1. Obtain FM signal and calculate given parameters. | 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 | 0 | 2 | 4 | 10 | |

| | |
|---|---|
| **COURSE NAME** | **Analog Communication** |
| **CO Description** | Compare demodulation techniques of AM signals. |
| **LO Description** | Describecharacteristics of radioreceivers |

**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 | Characteristic of radio receiver, Concept of sensitivity, selectivity, fidelity, Image frequency and its rejection. Characteristic of RF amplifier, selection of IF, Double Spotting, Noise Figure. | 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-10 | End Semester Theory Exam | **Student will be asked to**(and/or):<br>1. Characterize radio receiver and RF amplifier<br>2. Explain the given terms that used in radio receiver - sensitivity, selectivity, fidelity, Image frequency and its rejection & selection, Double Spotting, Noise Figure. | 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 | 0 | 2 | 4 | 11 | |

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|---|---|
| **COURSE NAME** | **Analog Communication** |
| **CO Description** | Compare demodulation techniques of AM signals. |
| **LO Description** | Categorize differenttypes of radioreceivers |

**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 | Detection of AM using Diode detector and practical diode detector.<br>AM receiver- Block diagram of TRF, Super heterodyne and double super-heterodyne. | 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 | End Semester Theory Exam | **Student will be asked to**(and/or):<br>1. Explain detection of AM signal using diode detector.<br>2. Describe block diagram of AM receivers | 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | E | 0 | 3 | 3 | 0 | 2 | 4 | 12 | |

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|---|---|
| **COURSE NAME** | **Analog Communication** |
| **CO Description** | Compare demodulation techniques of AM signals. |
| **LO Description** | Set up and select particular analog de-modulation techniques circuits |

**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 | Check the demodulated AM signal waveform using envelope detector and draw its input output waveform.<br>Construct AM demodulator using diode circuit<br>Locate various sections of AM radio super heterodyne receiver and draw the waveforms at input and output side of each section. | Lab demonstration, PPT , hands on practice, lab assignments. | • Teacher will explain the content in class/lab.<br>• Teacher with support from lab staff will demonstrate the procedure of lab experiments.<br>• Student will conduct lab assignment based on these experiments. | -- | 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**(and/or):<br>1. Demodulated AM signal using envelope detector and draw input output waveform<br>2. Identify various sections of AM radio super heterodyne receiver and draw input and output side waveform of each section. | | Rubrics, Rating scale | Internal |
| **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** |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *E* | *0* | *3* | *3* | *0* | *2* | *5* | *13* | |

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|---|---|
| **COURSE NAME** | **Analog Communication** |
| **CO Description** | Compare the functioning of angle de-modulators. |
| **LO Description** | Classify different FM de-modulators methods and outline need of pre-emphasis & de-emphasis circuits. |

**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 | Block diagram of FM receiver with description **FM demodulators:** Slope detection, Balanced slop detection, Foster Seeley discriminator and Ratio detector. Need for pre-emphasis and de-emphasis circuits, SNR improvement, concept of AFC, Merits and demerits of FM over AM | Interactive classroom lecture, PPT, Video, demonstration, quiz, assignments. | Teacher will explain the contents and provide handouts to students. Teacher will conduct quiz/ assignments/ tutorial to make students practice their knowledge. | 10 | -- | 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):<br>1. Describe block diagram of different FM demodulators.<br>2. Explain the need and concept of pre-emphasis, de-emphasis circuits, SNR improvement, AFC.<br>3. List out merits and demerits of FM over AM | 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 | 0 | 2 | 5 | 14 | |

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|---|---|
| **COURSE NAME** | **Analog Communication** |
| **CO Description** | Compare the functioning of angle de-modulators. |
| **LO Description** | Explain different various multiplexing 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-14 | Concept of Frequency Division Multiplexing and Time Division Multiplexing and their comparison | 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-14 | Seminar presentation | **Student will be asked to**<br>1. Present on FDM or TDM or on their comparison | | 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 | 0 | 2 | 5 | 15 | |

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|---|---|
| **COURSE NAME** | **Analog Communication** |
| **CO Description** | Compare the functioning of angle de-modulators. |
| **LO Description** | Operate different analog radio receiver. |

**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 | Locate various sections of FM receiver and examine its working.<br>Obtain the frequency response of Pre-emphasis and De-emphasis circuit.<br>Demonstration of fault finding of FM radio receivers. | Lab demonstration, PPT, hands on practice, lab assignments. V-Lab. | • Teacher will explain the content in class/lab.<br>• Teacher with support from lab staff will demonstrate the procedure of lab experiments.<br>• Student will conduct lab assignment based on these experiments. | -- | 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**(and/or):<br>1. Identify various section of FM receiver (or)<br>2. Plot frequency response of Pre-emphasis and De-emphasis circuit (or)<br>3. Demonstrate fault finding of FM radio receiver | 10 | Rubrics/Rating scale | External |

**ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)**