# BASICS OF COMMUNICATION SYSTEMS



III B.Tech., I-Sem., Starting Date of the Semester: 18-06-2025 w.e.f.: 18-06-2025; Academic Year: 2025-2026

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **PART -A-Short answer questions** | | | | |
| **I-UNIT - INTRODUCTION** | | | | |
| **S.No** | **Question (s)** | **Marks** | **BL** | **CO** |
| 1 | Sketch the Basic block diagram of Communication | 1 | L3 | C315.1 |
| 2 | Define frequency translation? | 1 | L1 | C315.1 |
| 3 | Point out the need for modulation in communication. | 1 | L4 | C315.2 |
| 4 | Define attenuation and its process. | 1 | L1 | C315.1 |
| 5 | What is meant by amplifier and list its important parameters. | 1 | L1 | C315.1 |
| 6 | List out the applications of frequency translation. | 1 | L1 | C315.1 |
| 7 | Describe the reason gain or attenuation is commonly expressed in decibels (dB) instead of linear units. | 1 | L2 | C315.1 |
| 8 | Draw the Electromagnetic spectrum with major 7 bands and label them properly. | 1 | L1 | C315.1 |
| 9 | Describe the formulas used to calculate power and voltage gains in decibels (dB), and specify the typical ranges for gain and attenuation on both linear  and dB scales. | 1 | L2 | C315.1 |
| 10 | List out few applications of Radio frequency Band and UV band from the Electromagnetic spectrum. | 1 | L1 | C315.1 |
|  | | | | |
| **II-UNIT- SIMPLE DESCRIPTION ON MODULATION** | | | | |
| **S.No** | **Question (s)** | **Marks** | **BL** | **CO** |
| 1 | Define Amplitude Modulation and frequency Modulation. | 1 | L1 | C315.2 |
| 2 | Define modulation index in AM, and its importance and types. | 1 | L1 | C315.2 |
| 3 | What is the typical bandwidth of FM used in commercial broadcasting? | 1 | L2 | C315.2 |
| 4 | List out the different modulation techniques? With its hierarchy. | 1 | L2 | C315.2 |
| 5 | State the expression of modulation index for both AM and FM. | 1 | L2 | C315.2 |
| 6 | List out advantages of FM over AM. | 1 | L2 | C315.2 |
| 7 | Draw the ASK waveform for digital data 10110? | 1 | L2 | C315.2 |
| 8 | How many frequencies are used in binary FSK? Describe briefly. | 1 | L2 | C315.2 |
| 9 | Identify the advantages of digital communication over Analog communication. | 1 | L2 | C315.2 |
| 10 | Draw PAM, PWM wave forms with respect to message and carrier  waveforms. | 1 | L2 | C315.2 |
|  | | | | |
| **III-UNIT- TELECOMMUNICATION SYSTEMS** | | | | |
| **S.No** | **Question (s)** | **Marks** | **BL** | **CO** |
| 1 | What is Paging System? | 1 | L1 | C315.3 |
| 2 | Compose different network topologies in brief. | 1 | L5 | C315.3 |
| 3 | Examine how internet telephony is advantage as compared to traditional Telephone system. | 1 | L2 | C315.3 |
| 4 | Sketch the block diagram of Internet Telephony? | 1 | L3 | C315.3 |
| 5 | Describe Network fundamentals briefly. | 1 | L2 | C315.3 |
| 6 | Identify necessary requirements for an effective and efficient network. | 1 | L2 | C315.3 |
| 7 | What hardware is needed to make up a local area network? | 1 | L2 | C315.3 |
| 8 | Define ethernet LAN. | 1 | L1 | C315.3 |
| 9 | What is PSTN? | 1 | L1 | C315.3 |
| 10 | List out any 3 differences between VOIP and Traditional Telephone. | 1 | L2 | C315.3 |



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
| **IV-UNIT- SATELLITE COMMUNICATION** | | | | |
| **S.No** | **Question (s)** | **Marks** | **BL** | **CO** |
| 1 | Define Satellite Communication? | 1 | L1 | C315.4 |
| 2 | What is the difference between a geostationary orbit and a low Earth orbit  (LEO)? | 1 | L2 | C315.4 |
| 3 | Discuss Global Positioning System (GPS)? | 1 | L1 | C315.4 |
| 4 | What are some challenges in satellite network design? | 1 | L2 | C315.4 |
| 5 | Define Wavelength Division Multiplexing? | 1 | L1 | C315.4 |
| 6 | Describe Orbital Plane in brief. | 1 | L2 | C315.4 |
| 7 | Define critical angle | 1 | L1 | C315.4 |
| 8 | Demonstrate the types of fiber optic cables? | 1 | L1 | C315.4 |
| 9 | What is a satellite transponder? | 1 | L1 | C315.4 |
| 10 | Describe Importance of Different Frequencies for the upline and downlink  stations. | 1 | L2 | C315.4 |
|  | | | | |
| **V-UNIT- CELLULAR AND MOBILE COMMUNICATIONS** | | | | |
| **S.No** | **Question (s)** | **Marks** | **BL** | **CO** |
| 1 | List out different Zigbee network topologies | 1 | L1 | C315.5 |
| 2 | Define a Base Station. | 1 | L1 | C315.5 |
| 3 | List out the two popular Wireless PAN technologies. | 1 | L2 | C315.5 |
| 4 | Define Direct Sequence Spread Spectrum (DSSS.) | 1 | L1 | C315.5 |
| 5 | Define frequency reuse concept. | 1 | L1 | C315.5 |
| 6 | State the services offered by GSM. | 1 | L2 | C315.5 |
| 7 | Define a Handoff in cellular communication | 1 | L1 | C315.5 |
| 8 | Define Cell splitting in cellular communication. | 1 | L2 | C315.5 |
| 9 | State the advantage of UWB Network. | 1 | L1 | C315.6 |
| 10 | State the disadvantage of Infrared wireless communication. | 1 | L1 | C315.6 |

# BASICS OF COMMUNICATION SYSTEMS



III B.Tech., I-Sem., Starting Date of the Semester: 18-06-2025 w.e.f.: 18-06-2025; Academic Year: 2025-2026

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **PART -B-Long answer questions** | | | | |
| **I-UNIT - INTRODUCTION** | | | | |
| **S.No** | **Question (s)** | **Marks** | **BL** | **CO** |
|  | Demonstrate the block diagram of a communication system? |  | L3 | C315.1 |
|  | Calculate gain for system if input voltage signal is 100cos200t and output voltage is 200cos 400t and express gain decibels |  | L3 | C315.1 |
|  | A signal travels a distance of 75 ft in the time it takes to complete 1 cycle. Solve its frequency and wavelength. |  | L3 | C315.1 |
|  | Demonstrate with neat Sketches the types of communication system based  on medium /channel. |  | L3 | C315.1 |
|  | A two-stage amplifier has input voltage of 20 and output voltage 40V for first stage and input voltage of 60 and output voltage 120Vfor second stage. Calculate the overall gain and overall gain in dB? |  | L3 | C315.1 |
|  | An amplifier has a gain of 45,000, which is too much for the application. With an input voltage of 20 *μ*V, find what attenuation factor is needed to keep the output voltage from exceeding 100 mV? Let *A*1= amplifier gain  =45,000;  *A*2 = attenuation factor; *AT* = total gain. |  | L3 | C315.1 |
|  | A Communication system has five stages with gains of 12, 245, 68, 231 and attenuation of 9dB. Solve for overall gain or attenuation? |  | L3 | C315.1 |
|  | Compare the properties of radio waves, microwaves, infrared, and visible light with respect to communication. |  | L2 | C315.1 |
|  | Demonstrate electromagnetic spectrum, describe and compare about Visible light spectrum and UV radiation |  | L3 | C315.1 |
|  | A cosine signal having time period of 50 ms .Calculate the wave length of the signal |  | L3 | C315.1 |
|  | Define gain in electronic circuits. Explain the difference between voltage gain, current gain, and power gain with formulas. |  | L2 | C315.1 |
|  | Express formulas to convert power ratios and voltage ratios into decibels. Solve at least two numerical examples. |  | L2 | C315.1 |
|  | Conclude how modulation improves signal strength, antenna size requirements, reduces interference and provides multiplexing. Give practical  examples. |  | L4 | C315.1 |
|  | What is frequency translation in communication systems? Explain its  importance in transmitter and receiver design. Describe the process of frequency up-conversion and down-conversion |  | L2 | C315.1 |
|  | A power amplifier with a 40-dB gain has an output power of 100 W. What is the input Power? |  | L3 | C315.1 |
|  | Calculate time period frequency and wavelength for the following signals a)100cos300t b)20sin40t |  | L3 | C315.1 |
|  | Explain how modulation improves signal strength, antenna size requirements, reduces interference and provides multiplexing. Give practical  examples |  | L2 | C315.1 |
|  | Draw the various frequency ranges present in the electromagnetic spectrum and explain with its applications. |  | L3 | C315.1 |
|  | Define the terms Gain, attenuation and decibels. Explain their importance  in communications, with examples. |  | L2 | C315.1 |



# BASICS OF COMMUNICATION SYSTEMS

III B.Tech., I-Sem., Starting Date of the Semester: 18-06-2025 w.e.f.: 18-06-2025; Academic Year: 2025-2026

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **PART -B-Long answer questions (20M)** | | | | |
| **II-UNIT- SIMPLE DESCRIPTION ON MODULATION** | | | | |
| **S.No** | **Question (s)** | **Marks** | **BL** | **CO** |
| 1 | With neat waveforms, explain about phase modulation. |  | L3 | C315.2 |
| 2 | Determine carrier frequency, modulating frequency, maximum and minimum frequency, bandwidth, and power output for AM voltage:  400(1+0.4cos(6280)t).cos(3.14×107t) into 600Ω load. |  | L3 | C315.2 |
| 3 | Find carrier frequency, modulation index, max deviation, and power  delivered for FM signal s(t)=12cos(6×108t+5sin(1250t)) to 10Ω load. |  | L3 | C315.2 |
| 4 | Describe Pulse Amplitude Modulation. |  | L2 | C315.2 |
| 5 | Explain in detail types of sampling. |  | L2 | C315.2 |
| 6 | Explain Pulse Code Modulation Transmitter. |  | L2 | C315.2 |
| 7 | Describe Quadrature Phase Shift Keying (QPSK) Transmitter. |  | L2 | C315.2 |
| 8 | With neat waveform, explain about frequency modulation. |  | L3 | C315.2 |
| 9 | Illustrate ASK, FSK, PSK wave forms for the digital signal 10110. |  | L2 | C315.2 |
| 10 | Explain the method to generate FM Signal. |  | L3 | C315.2 |
| 11 | Given FM signal: 107.6MHz modulated with 7KHz sine wave and 50KHz deviation – Find carrier swing, maximum and minimum frequencies,  modulation index. |  | L3 | C315.2 |
| 12 | Explain in detail amplitude modulation and derive the equations up to power  calculations. |  | L2 | C315.2 |
| 13 | Explain Square Law Modulator and Envelope Detector with equations. |  | L2 | C315.2 |
| 14 | Define frequency Modulation? Explain in detail Indirect Method |  | L2 | C315.2 |
| 15 | Define Pulse Width Modulation? Explain PWM generation and PWM  demodulator |  | L2 | C315.2 |
| 16 | Explain the block diagram of digital communication systems and list the  advantages of digital communication. |  | L2 | C315.2 |
| 17 | Explain in detail Amplitude Shift keying with the help of waveforms.  Explain the ASK Generation and Detection. |  | L2 | C315.2 |
| 18 | Explain in detail Binary Frequency Shift keying with the help of waveforms.  Explain the BFSK Transmitter. |  | L2 | C315.2 |
| 19 | Explain in detail AM generation and detection. |  | L2 | C315.2 |
| 20 | Ilustrate the generation and detection of BPSK signal with the help of block diagram |  | L3 | C315.2 |

# BASICS OF COMMUNICATION SYSTEMS



III B.Tech., I-Sem., Starting Date of the Semester: 18-06-2025 w.e.f.: 18-06-2025; Academic Year: 2025-2026

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **PART -B-Long answer questions** | | | | |
| **III-UNIT- TELECOMMUNICATION SYSTEMS** | | | | |
| **S.No** | **Question (s)** | **Marks** | **BL** | **CO** |
| 1 | Explain about OSI Protocol in detail. |  | L3 | C315.3 |
| 2 | Discuss about Internet Telephony? |  | L2 | C315.3 |
| 3 | Discuss about the model of Telephone System? |  | L2 | C315.3 |
| 4 | Discuss about LAN Hardware? |  | L2 | C315.3 |
| 5 | Explain in detail about Token Ring LAN? |  | L2 | C315.3 |
| 6 | Explain about Ethernet? |  | L2 | C315.3 |
| 7 | Discuss about Paging System in details? |  | L2 | C315.3 |
| 8 | Explain Local area network and its types in brief. |  | L2 | C315.3 |
| 9 | Discuss in detail about any five network topologies? |  | L3 | C315.3 |
| 10 | Classify and explain different LAN interconnection technologies. |  | L2 | C315.3 |
| 11 | Use the block diagram to demonstrate how a long-distance call is established  in Analog telephone system |  | L2 | C315.3 |
| 12 | What is Ethernet LAN? Explain its working. |  | L2 | C315.3 |
| 13 | Define LAN? Explain its key characteristics and how it differs from other  types of networks like WANs. |  | L2 | C315.3 |
| 14 | Sketch and explain about transmitted voice call over VoIP. |  | L2 | C315.3 |
| 15 | Distinguish between Ethernet LAN and Wi-Fi |  | L2 | C315.3 |

**BASICS OF COMMUNICATION SYSTEMS**



**III B.Tech., I-Sem., Starting Date of the Semester: 18-06-2025 w.e.f.: 18-06-2025; Academic Year: 2025-2026**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **PART -B-Long answer questions** | | | | |
| **IV-UNIT- SATELLITE COMMUNICATION** | | | | |
| **S.No** | **Question (s)** | **Marks** | **BL** | **CO** |
| 1 | Explain the benefits and limitations of satellite communication.? |  | L2 | C315.4 |
| 2 | Explain in detail about Geo Stationary Orbit and Medium Earth Orbit? |  | L2 | C315.4 |
| 3 | a) Discuss in detail about Low Earth Orbit (LEO)? |  | L2 | C315.4 |
| b) Calculate the Critical angle, Numerical Aperture, Acceptance  angle if the core refractive index is 1.5 and cladding refractive index is 1.46. |  | L3 | C315.4 |
| 4 | Describe about Multimode Optical fibers with neat diagrams? |  | L2 | C315.4 |
| 5 | a) Describe the various applications of satellite communication in daily life. |  | L2 | C315.4 |
| b) Discuss in detail about the tracking subsystem of satellite  communication |  | L2 | C315.4 |
| 6 | Draw the block diagram of a ground station. Use the diagram to explain the uplink and downlink process. |  | L3 | C315.4 |
| 7 | Explain in detail about Optical Principles |  | L2 | C315.4 |
| 8 | Analyze the roles of transmitter and receiver blocks in the Optical fiber communication system with a neat diagram. |  | L4 | C315.4 |
| 9 | Explain the purpose of subsystems in a satellite |  | L2 | C315.4 |
| 10 | Explain how GPS determines the location of person. |  | L2 | C315.4 |
| 11 | Explain the working principle of an optical transmitters with a neat sketch**?** |  | L2 | C315.4 |
| 12 | Illustrate a block diagram of a WDM system.Use WDM to transmit multiple signals over a single fiber. |  | L3 | C315.4 |
| 13 | Apply Snell’s law to derive the equation of Numerical Aperture in  optical fiber cable, |  | L3 | C315.4 |
| 14 | Explain the working principle of an optical receivers with a neat sketch**?** |  | L2 | C315.4 |
| 15 | a) Describe about Single mode Optical fibers with neat diagrams? |  | L2 | C315.4 |
| b)Apply Snell’s law to derive the equation of Critical angle in optical  fiber cable |  | L3 | C315.4 |

**BASICS OF COMMUNICATION SYSTEMS**



**III B.Tech., I-Sem., Starting Date of the Semester: 18-06-2025 w.e.f.: 18-06-2025; Academic Year: 2025-2026**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **PART -B-Long answer questions** | | | | |
|  | | | | |
| **S.No** | **Question (s)** | **Marks** | **BL** | **CO** |
| 1 | Explain the advantages and disadvantages of UWB in wireless communication. |  | L2 | C315.6 |
| 2 | Discuss about the topologies used in ZigBee network |  | L2 | C315.5 |
| 3 | Explain about the functions of GSM services in detail |  | L2 | C315.5 |
| Demonstrate the use of infrared technology in a TV remote system. |  | L3 | C315.5 |
| 4 | Demonstrate the use of RFID in the electronic toll collection system. |  | L3 | C315.6 |
| 5 | Explain how Ultra-Wideband differs from conventional narrowband communication. |  | L2 | C315.5 |
| Explain in detail about Wireless MAN network |  | L2 | C315.5 |
| 6 | Describe about the IEEE 802.11 WLAN standard. |  | L2 | C315.5 |
| 7 | Discuss in detail about WCDMA |  | L2 | C315.5 |
| 8 | List out the types of Multiple Access Systems. Explain the working of CDMA scheme. |  | L2 | C315.5 |
| 9 | Describe the architectureof GSM in detailwith neat block diagram |  | L2 | C315.5 |
| 10 | Explain about the Bluetooth technology in detail |  | L2 | C315.5 |
| 11 | Describe about the frequency allocation spectrum of AMPS System |  | L2 | C315.5 |
| 12 | Define personal-area network (PAN) and wireless local area network (WLAN)? |  | L3 | C315.5 |
| 13 | What are services offered by GSM |  | L2 | C315.5 |
| 14 | Discuss about infrared wireless technology? |  | L2 | C315.6 |
| 15 | List the Advantages and Disadvantages of UWB? |  | L2 | C315.6 |