

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 uplink 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

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PART -B-Long answer questions				
I-UNIT - INTRODUCTION				
S.No	Question (s)	Marks	BL	CO
1	Demonstrate the block diagram of a communication system?	10M	L3	C315.1
2	Calculate gain for system if input voltage signal is $100\cos 200t$ and output voltage is $200\cos 400t$ and express gain decibels	10M	L3	C315.1
3	A signal travels a distance of 75 ft in the time it takes to complete 1 cycle. Solve its frequency and wavelength.	5M	L3	C315.1
4	Demonstrate with neat Sketches the types of communication system based on medium /channel.	5M	L3	C315.1
5	A two-stage amplifier has input voltage of 20V and output voltage 40V for first stage and output voltage 120V for second stage. Calculate the overall gain and overall gain in dB?	10M	L3	C315.1
6	An amplifier has a gain of 45,000, which is too much for the application. With an input voltage of $20\ \mu\text{V}$, 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; A_T = total gain.	5M	L3	C315.1
7	A Communication system has five stages with gains of 12, 245, 68, 231 and attenuation of 9dB. Solve for overall gain or attenuation?	10M	L3	C315.1
8	Compare the properties of radio waves, microwaves, infrared, and visible light with respect to communication.	10M	L2	C315.1
9	Demonstrate electromagnetic spectrum, describe and compare about Visible light spectrum and UV radiation	10M	L3	C315.1
10	A cosine signal having time period of 50 ms .Calculate the wave length of the signal	5M	L3	C315.1
11	Define gain in electronic circuits. Explain the difference between voltage gain, current gain, and power gain with formulas.	10M	L2	C315.1
12	Express formulas to convert power ratios and voltage ratios into decibels. Solve at least two numerical examples.	10M	L2	C315.1
13	Conclude how modulation improves signal strength, antenna size requirements, reduces interference and provides multiplexing. Give practical examples.	10M	L4	C315.1
14	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	10M	L2	C315.1
15	A power amplifier with a 40-dB gain has an output power of 100 W. What is the input Power?	5M	L3	C315.1
16	Calculate time period frequency and wavelength for the following signals a) $100\cos 300t$ b) $20\sin 40t$	10M	L3	C315.1
17	Explain how modulation improves signal strength, antenna size requirements, reduces interference and provides multiplexing. Give practical examples	10M	L2	C315.1
18	Draw the various frequency ranges present in the electromagnetic spectrum and explain with its applications.	10M	L3	C315.1
19	Define the terms Gain, attenuation and decibels. Explain their importance in communications, with examples.	10M	L2	C315.1

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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.	10M	L3	C315.2
2	Determine carrier frequency, modulating frequency, maximum and minimum frequency, bandwidth, and power output for AM voltage: $400(1+0.4\cos(6280)t)\cos(3.14\times 10^7t)$ into 600Ω load.	10M	L3	C315.2
3	Find carrier frequency, modulation index, max deviation, and power delivered for FM signal $s(t)=12\cos(6\times 10^8t+5\sin(1250t))$ to 10Ω load.	10M	L3	C315.2
4	Describe Pulse Amplitude Modulation.	10M	L2	C315.2
5	Explain in detail types of sampling.	10M	L2	C315.2
6	Explain Pulse Code Modulation Transmitter.	10M	L2	C315.2
7	Describe Quadrature Phase Shift Keying (QPSK) Transmitter.	10M	L2	C315.2
8	With neat waveform, explain about frequency modulation.	10M	L3	C315.2
9	Illustrate ASK, FSK, PSK wave forms for the digital signal 10110.	10M	L2	C315.2
10	Explain the method to generate FM Signal.	10M	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.	10M	L3	C315.2
12	Explain in detail amplitude modulation and derive the equations up to power calculations.	10M	L2	C315.2
13	Explain Square Law Modulator and Envelope Detector with equations.	10M	L2	C315.2
14	Define frequency Modulation? Explain in detail Indirect Method	10M	L2	C315.2
15	Define Pulse Width Modulation? Explain PWM generation and PWM demodulator	10M	L2	C315.2
16	Explain the block diagram of digital communication systems and list the advantages of digital communication.	10M	L2	C315.2
17	Explain in detail Amplitude Shift keying with the help of waveforms. Explain the ASK Generation and Detection.	10M	L2	C315.2
18	Explain in detail Binary Frequency Shift keying with the help of waveforms. Explain the BFSK Transmitter.	10M	L2	C315.2
19	Explain in detail AM generation and detection.	10M	L2	C315.2
20	Illustrate the generation and detection of BPSK signal with the help of block diagram	10M	L3	C315.2

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PART -B-Long answer questions				
III-UNIT- TELECOMMUNICATION SYSTEMS				
S.No	Question (s)	Marks	BL	CO
1	Explain about OSI Protocol in detail.	10M	L2	C315.3
2	List the five IEEE Standards used in networking.	5M	L1	C315.3
3	Explain how data is transmitted in a bus topology	5M	L2	C315.3
4	Discuss in detail about any two types of networks	10M	L2	C315.3
5	Explain in detail about Token Ring LAN?	10M	L2	C315.3
6	Discuss about any two hardware devices used in LAN?	10M	L2	C315.3
7	Discuss about Paging System in details?	10M	L2	C315.3
8	Describe the characteristics of MAN	5M	L2	C315.3
9	Discuss in detail about Star topology?	10M	L3	C315.3
10	Describe the difference between a router and a switch.	5M	L2	C315.3
11	Use the block diagram to demonstrate how a long-distance call is established in Analog telephone system	10M	L2	C315.3
12	Explain the difference between a hub and a switch.	5M	L2	C315.3
13	Is tree topology more reliable than bus topology? Justify your answer.	5M	L3	C315.3
14	Sketch and explain about transmitted voice call over VoIP.	10M	L2	C315.3
15	Explain the difference between LAN and WAN	5M	L2	C315.3

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PART -B-Long answer questions

IV-UNIT- SATELLITE COMMUNICATION

S.No	Question (s)	Marks	BL	CO
1	Explain the advantages and disadvantages of satellite communication.?	10M	L2	C315.4
2	Explain in detail about Geo Stationary Orbit (GEO)	5M	L2	C315.4
3	a) Discuss in detail about Low Earth Orbit (LEO)?	5M	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.	5M	L3	C315.4
4	Describe about Multimode Optical fibers with neat diagrams?	10M	L2	C315.4
5	a) Describe the various applications of satellite communication in daily life.	5M	L2	C315.4
	b) Discuss in detail about the tracking subsystem of satellite communication	5M	L2	C315.4
6	Draw the block diagram of a ground station and explain the uplink and downlink process.	10M	L3	C315.4
7	Explain in detail about Optical Principles	10M	L2	C315.4
8	Analyze the roles of transmitter and receiver blocks in the Optical fiber communication system with a neat diagram.	10M	L4	C315.4
9	Explain the purpose of subsystems in a satellite	10M	L2	C315.4
10	Explain how GPS determines the location of person.	10M	L2	C315.4
11	Explain the working principle of an optical transmitters with a neat sketch?	10M	L2	C315.4
12	Illustrate a block diagram of a WDM system. Use WDM to transmit multiple signals over a single fiber.	10M	L3	C315.4
13	Apply Snell's law to derive the equation of Numerical Aperture in optical fiber cable,	10M	L3	C315.4
14	a) Describe about Single mode Optical fibers with neat diagrams?	5M	L2	C315.4
	b) Apply Snell's law to derive the equation of Critical angle in optical fiber cable	5M	L3	C315.4

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S.No	Question (s)	Marks	BL	CO
1.	Explain the advantages and disadvantages of UWB in wireless communication.	10M	L2	C315.6
2.	Discuss about the topologies used in ZigBee network	10M	L2	C315.5
3.	Demonstrate the use of RFID in the electronic toll collection system.	10M	L3	C315.6
4.	Demonstrate the use of infrared technology in a TV remote system.	10M	L3	C315.6
5.	Explain how Ultra-Wideband differs from conventional narrowband communication.	5M	L2	C315.6
6.	Describe about any two IEEE 802.11 WLAN standard.	10M	L2	C315.5
7.	Discuss in detail about WCDMA	10M	L2	C315.5
8.	List out the types of Multiple Access Systems. Explain the working of CDMA scheme with an example.	10M	L2	C315.5
9.	Describe the architecture of GSM in detail with neat block diagram	10M	L2	C315.5
10.	Explain about the Bluetooth technology in detail	10M	L2	C315.5
11.	Discuss about the two commonly used techniques for spreading the spectrum	5M	L2	C315.5
12.	Describe about the frequency allocation spectrum of AMPS System	10M	L2	C315.5
13.	Explain the differences between wired LAN and wireless LAN	5M	L2	C315.5
14.	Describe the services offered by GSM	5M	L2	C315.5
15.	Discuss about infrared wireless technology?	5M	L2	C315.6
16.	Explain the disadvantages of infrared wireless technology.	5M	L2	C315.6