

GANPAT UNIVERSITY

B. Tech Semester - IV (CE/IT) Regular/OLD Examination May-June 2012
2CE404/2IT404/CE404/IT404 : BASICS OF COMMUNICATION SYSTEMS

[Total Marks: 70]

Time: 3 Hours]

Instructions:

1. Attempt all questions.
2. Figures to the right indicate full marks.
3. Each section should be written in a separate answer book.

SECTION-I

Q-1. Answer the following

- (A) Categorize the four basic topologies in terms of line configuration [3]
 (B) What is the difference between half-duplex and full-duplex transmission modes? [3]
 (C) For n devices in a network, what is the number of cable links required for a mesh, ring, bus, and star topology? [3]
 (D) When a party makes a local telephone call to another party, is this a point-to-point or multipoint connection? Explain your answer. [3]

OR

Q-1. Answer the following

- (A) What are headers and trailers, and how do they get added and removed? [3]
 (B) What are the responsibilities of the data link layer in the Internet model? [3]
 (C) What is the difference between a port address, a logical address, and a physical address? [3]
 (D) What is the difference between network layer delivery and transport layer delivery? [3]

Q-2. Answer the following

- (A) If a periodic signal is decomposed into five sine waves with frequencies of 100, 300, 500, 700 and 900 Hz, what is its bandwidth? Draw the spectrum, assuming all components have a maximum amplitude of 10 V. [3]
 (B) What is the required bandwidth of a low-pass channel if we need to send 1 Mbps by using baseband transmission? [3]
 (C) The loss in a cable is usually defined in decibels per kilometer (dB/km). If the signal at the beginning of a cable with -0.3 dB/km has a power of 2 mW, what is the power of the signal at 5 km? [3]
 (D) Distinguish between a low-pass channel and a band-pass channel. [2]

OR

Q-2. Answer the following

- (A) Define baseline wandering and its effect on digital transmission. [3]
 (B) Define block coding and give its purpose. [3]
 (C) Compare and contrast PCM and DM. [3]
 (D) List three techniques of digital-to-digital conversion. [2]

Q-3. Answer the following

- (A) Define analog-to-analog conversion? [3]
 (B) Define carrier signal and its role in analog transmission. [3]
 (C) Distinguish between a link and a channel in multiplexing. [3]
 (D) Distinguish between synchronous and statistical TDM. [3]

[P.T.O]

SECTION - II

- Q-4. Answer the following**
- (A) Define the digital hierarchy used by telephone companies and list different levels of the hierarchy. [3]
 - (B) Distinguish between multilevel TDM, multiple slots TDM, and pulse-stuffed TDM. [3]
 - (C) Assume that a voice channel occupies a bandwidth of 4 kHz. We need to multiplex 10 voice channels with guard bands of 500 Hz using FDM. Calculate the required bandwidth. [3]
 - (D) Given the following periods, calculate the corresponding frequencies. [3]
a. 5 s b. 12 μ s c. 220 ns

OR

- Q-4. Answer the following**
- (A) How do guided media differ from unguided media? [3]
 - (B) Name the advantages of optical fiber over twisted-pair and coaxial cable. [3]
 - (C) If the peak voltage value of a signal is 20 times the peak voltage value of the noise, what is the SNR? What is the SNRdB? [3]
 - (D) What is the Nyquist sampling rate for each of the following signals? [3]
a. A low-pass signal with bandwidth of 200 KHz?
b. A band-pass signal with bandwidth of 200 KHz if the lowest frequency is 100 KHz?

- Q-5. Answer the following**
- (A) What is the role of the address field in a packet traveling through a datagram network? [3]
 - (B) What is the role of the address field in a packet traveling through a virtual-circuit network? [3]
 - (C) We need a three-stage space-division switch with $N=100$. We use 10 crossbars at the first and third stages and 4 crossbars at the middle stage. Draw the configuration diagram using the Clos criteria. [3]
 - (D) What is refraction? What is reflection? [2]

OR

- Q-5. Answer the following**
- (A) Compare and contrast a circuit-switched network and a packet-switched network. [3]
 - (B) Compare space-division and time-division switches. [3]
 - (C) We have a baseband channel with a 1-MHz bandwidth. What is the data rate for this channel if we use one of the following line coding schemes? [3]
a. NRZ-L
b. Manchester
c. MLT-3
d. 2B1Q
 - (D) How does sky propagation differ from line-of-sight propagation? [2]

- Q-6. Answer the following**
- (A) What is LATA? What are intra-LATA and inter-LATA services? [3]
 - (B) What is DSL technology? What are the services provided by the telephone companies using DSL? Distinguish between a DSL modem and a DSLAM. [3]
 - (C) Compare and contrast a traditional cable network with a hybrid fiber-coaxial network. [3]
 - (D) Distinguish between CM and CMTS. [3]

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