

Faculty of Engineering & Technology
Fifth Semester B.E. (Computer Technology) (C.B.S.)
Examination

DATA COMMUNICATION

Time : Three Hours]

[Maximum Marks : 80

INSTRUCTIONS TO CANDIDATES

- (1) All questions carry marks as indicated.
- (2) Solve **SIX** questions as follows :
Solve Question 1 OR Question No. 2.
Solve Question 3 OR Question No. 4.
Solve Question 5 OR Question No. 6.
Solve Question 7 OR Question No. 8.
Solve Question 9 OR Question No. 10.
Solve Question 11 OR Question No. 12.
- (3) Due credit will be given to neatness and adequate dimensions.
- (4) Illustrate your answers wherever necessary with the help of neat sketches.
- (5) Use of Drawing instruments is permitted.
- (6) Use of Non-programmable Calculator is permitted.
- (7) Assume suitable data wherever necessary.

1. (a) Differentiate between :

(i) Analog and digital signals

(ii) Synchronous and asynchronous transmission. 7

(b) A sine wave is offset by $\frac{1}{6}$ cycle with respect to time 0. What is its phase in degrees and radians? 6

OR

2 (a) A non periodic composite signal has a bandwidth of 200 kHz, with a middle frequency of 140 kHz and peak amplitude 20 V. Draw a frequency domain of the signal. 7

(b) What is the required bandwidth of a low pass channel if we need to send 1 Mbps by using baseband transmission? 6

3. (a) Write in detail three techniques of a digital to digital conversion. 5

(b) What is the Nyquist sampling rate for each of the following signals?

(i) A low-pass signal with bandwidth of 200 KHz.

(ii) A band-pass signal with bandwidth of 200 KHz if the lowest frequency is 100 KHz? 8

OR

4. (a) We have a baseband channel with 1 MHz bandwidth. What is the data rate for this channel if we use one of the following line coding schemes :

(i) NRZ-L

(ii) Manchester

(iii) MLT-3

(iv) 2B1Q.

8

(b) Distinguish between data rate and signal rate. 5

5. (a) A light signal is travelling through a fiber. What is the delay in the signal if the length of the fiber-optic cable is 10 m, 100 m and 1 km (assume a propagation speed of 2×10^8 m/s).

5

(b) What is the purpose of the cladding in an optical fiber ?

4

(c) Explain cellular telephony in detail.

5

OR

6. (a) How does sky propagation differ from the line-of-sight propagation ?

4

(b) Calculate the bandwidth of the light for the following ranges (assume propagation speed 2×10^8 m/s) :

(i) 1000 to 1200 nm

(ii) 1000 to 1400 nm.

6

(c) What is the significance of twisting in twisted-pair cable ?

4

7. (a) Define the analog and digital hierarchy used by telephone companies and list different levels of the hierarchy. 7
- (b) Four channels, two with a bit rate of 200 kbps and two with 150 kbps, are to be multiplexed using multiple slot TDM with no synchronization bits. Answer the following :
- (i) What is the size of a frame in bits ?
- (ii) What is the frame rate ?
- (iii) What is the duration of a frame ?
- (iv) What is the data rate ? 7

OR

8. (a) We need to transmit 100 digitized voice channels using a pass-band channel of 20 kHz. What should be the ratio of bits/Hz if we use no guard band ? 6
- (b) Describe the goal of multiplexing in detail. 4
- (c) Define FHSS and explain how it achieves bandwidth spreading. 4
9. (a) What is the purpose of HTTP transfer ? 3
- (b) What is a URL and what are its components ? 3
- (c) What is the difference between an active document and a dynamic document ? 3

(d) Explain RTP protocol of network layer in detail.

4

OR

10. (a) What does CGF stand for and what are its functions ? 3

(b) Explain digitizing audio and video techniques. 3

(c) How is HTTP similar to WWW ? 4

(d) What is proxy server and how is it related to HTTP ? 3

11. (a) Construct a variable length coding for the string of data 50, 25, 15, 40, 75. 4

(b) Explain in detail Lempel-Ziv Encoding Technique. 7

(c) How the image compression can be done ? 2

OR

12. (a) Explain in detail Run-Length Encoding. 7

(b) How the JPEG and MPEG differ in nature. 6