

Faculty of Engineering and Technology  
 Fifth Semester B.E. (Computer Science Engg.)  
 (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 :  
 Que. No. **1 OR** Que. No. **2**  
 Que. No. **3 OR** Que. No. **4**  
 Que. No. **5 OR** Que. No. **6**  
 Que. No. **7 OR** Que. No. **8**  
 Que. No. **9 OR** Que. No. **10**  
 Que. No. **11 OR** Que. No. **12**
- (3) Due credit will be given to neatness and adequate dimensions.
- (4) Illustrate the answers with necessary figures/drawings wherever necessary.
- (5) Use of Drawing instruments is permitted.
- (6) Use of Non programmable Calculator is permitted.
- (7) Assume suitable data wherever necessary.

1. (a) Distinguish between a low-pass channel and a band-pass channel in detail. 6
- (b) A TV channel has a bandwidth of 6 MHz. If we send a digital signal using one channel, what are the data rates if we use one harmonics, three harmonics and five harmonics ? 7

**OR**

- (ii) What is the frame rate ?
- (iii) What is the duration of a frame ?
- (iv) What is the data rate ? 7
- (b) Explain Digital subscriber line in detail. 7
9. (a) Differentiate between with characteristics JPEG and MPEG technique. 5
- (b) Explain comparison of various methods of compression. 6
- (c) Explain Quantization Method. 2

**OR**

10. (a) How the compression of audio and video can be done ? 4
- (b) Describe the block diagram of JPEG encoder. 6
- (c) Define digital video and compare all types of digital video. 3
11. (a) Write short note on Huffman Coding. 6
- (b) How the image compression can be done ? 3
- (c) How Relative Encoding is different from Run-length Encoding ? 4

**OR**

12. (a) Explain in detail Lempel-Ziv Encoding technique for data compression. 7
- (b) Construct a variable length coding for the string of data 50, 25, 15, 40, 75. Explain its advantages in detail. 6

2. (a) How many bits can fit on a link with a 2 ms delay if the bandwidth of the link is :
- (i) 1 Mbps
  - (ii) 10 Mbps
  - (iii) 100 Mbps ? 7
- (b) Is the frequency domain plot of a voice signal discrete or continuous ? Why ? 6
3. (a) Compare and contrast PCM and DM. 6
- (b) In a digital transmission, the sender clock is 0.2 percent faster than the receiver clock. How many extra bits per second does the sender send if the data rate is 1 Mbps ? 7

**OR**

4. (a) What is the result of the scrambling the sequence 11100000000000 using one of the following scrambling techniques ? Assume that the last non zero signal level has been positive :
- (i) B8ZS
  - (ii) HDB3 (The number of non zero pulse is odd after last substitution). 7
- (b) Define carrier signal and its role in analog transmission. 6
5. (a) What is the position of the transmission media in the OSI or the Internet model ? 5
- (b) 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  $2 \times 10^8$  m) ? 6

- (c) How does sky propagation differ from line of sight propagation ? 3

**OR**

6. (a) Explain Cellular Telephony in detail. 4
- (b) What is the difference between omnidirectional waves and unidirectional waves ? 4
- (c) A beam of light moves from one medium to another medium with less density. Critical angle is  $60^\circ$ . Do we have refraction or reflection for each of the following incident angles ? Show the bending of the light ray in each case :
- (i)  $40^\circ$
  - (ii)  $60^\circ$
  - (iii)  $80^\circ$ . 6
7. (a) Distinguish between link and channel in multiplexing. 3
- (b) Define DSSS and explain how it achieves bandwidth spreading. 4
- (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. 7

**OR**

8. (a) Two channels, one with a bit rate of 190 kpps and another with 180 kpps are to be multiplexed using pulse stuffing TDM with no synchronization bits. Answer the following :
- (i) What is the size of a frame in bit ?