



Reg. No. :

Name :

**Fourth Semester B.Tech. Degree Examination, May 2015
(2013 Scheme)**

13.404 : DATA COMMUNICATION (FR)

Time : 3 Hours

Max. Marks : 100

PART – A

(5×4 = 20 Marks)

1. Draw the block diagram of a communication model and describe the functions of each component of a communication model.
2. Compare and contrast guided and unguided transmission media.
3. Draw the constellation diagram for the following :
 - i) ASK, amplitudes of 1 and 3
 - ii) 2-PSK, amplitude of 1 at 0° and 180°.
4. Data stream consisting of 101001101 is to be transmitted. Generate a hamming code for it. Induce a single bit error at any bit position of the received code and detect it using hamming algorithm.
5. State the need for switching and list the three traditional switching methods.



PART – B

(4×20=80 Marks)

6. A) Define and discuss in detail, using an example to illustrate each of the following transmission modes :
 - i) Simplex
 - ii) Half-Duplex
 - iii) Full-Duplex. 10
- B) With a neat sketch, explain the physical description, applications and transmission characteristics of the optical fiber. 10

OR



7. A) State the Nyquist and Shannon theorems and their uses with appropriate examples. 10
- B) i) Consider a noiseless channel with the bandwidth of 3000 Hz transmitting a signal with two signal levels. Find the maximum bit rate. 3
- ii) A signal to noise ratio is given in decibels. Assume that $SNR_{dB} = 36$ and the channel bandwidth is 2 MHz. Find the theoretical capacity. 3
- iii) Consider a channel with 1 MHz bandwidth. The SNR for this channel is 63. Find bit rate and signal level for that channel. 4
8. A) Explain in detail and compare the following modes of data transmission on a communication link. Use diagrams. 14
- i) Parallel transmission ii) Serial transmission.
- B) Using the Nyquist theorem, calculate the sampling rate for the following analog signals :
- A low-pass analog signal with bandwidth 2000 Hz
 - A band-pass analog signal with frequencies from 2000 to 6000 Hz. 6
- OR
9. Give a detailed account on PCM and DM. Also, list the advantages and disadvantages of PCM and DM. 20
10. A) Four 1-kbps connections are multiplexed together using synchronous TDM. A unit is 1 bit. Find the following :
- i) The duration of 1 bit before multiplexing
- ii) The transmission rate of the link
- iii) The duration of a time slot, and
- iv) The duration of a frame. 8
- B) i) A cable TV system has a number of commercial channels, all of them showing programs and advertisement alternatively. What type of multiplexing is it ? Justify your answer. 6
- ii) Two channels, one with a bit rate of 100 kbps and another with a bit rate of 200 kbps, are to be multiplexed. What is the frame rate ? What is the frame duration ? What is the bit rate of the link ? 6
- OR
11. Explain the various redundancy checks used for error detection in data communication with example. 20
12. Draw the GSM functional system architecture and name its elements and also describe its functions. 20
- OR
13. Define Spread spectrum. Differentiate between FHSS and DSSS. Explain FHSS with a neat diagram. 20