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Reg. No. : .....

Name : .....

13.404 : DATA COMMUNICATION (FR)

Time : 3 Hours Max. Marks : 100

PART – A

Answer **all** questions. **Each** question carries **4** marks.

1. What are the advantages and disadvantages of microwave transmission ?
2. Compare and contrast two level PSK and four level PSK.
3. What are the applications where error correcting code is preferable than error detecting code ?
4. Name the main elements of the GPRS system architecture and describe their functions.
5. Discuss the purpose for having hierarchial GSM frame structure with neat sketch.

PART – B

Answer **one full** question from **each** Module.

MODULE – 1

6. a) The attenuation of a signal is -12dB. What is the final signal power if it was originally 4 W ? 5
   b) How does sky propagation differ from line-of-sight propagation ? 5
   c) Write short notes on Twisted pair cable connectors and Co-axial cable connectors. 10

OR

P.T.O.

7. a) A microwave transmitter has an output of 0.1 W at 2 GHz. Assume that this transmitter is used in a microwave communication system where the transmitting and receiving antennas are parabolas, each 1.2 m in diameter. If the receiving antenna is located 24 km from the transmitting antenna over a free space path, find the available signal power out of the receiving antenna in dBm units. 6

b) Describe the structure of an optical fiber and explain the mechanism of light propagation along the fiber. 6

c) Write short notes on :

i) fundamental frequency

ii) channel capacity

iii) thermal noise

iv) signal-to-noise ratio. 8

MODULE – 2

8. a) A low pass signal is sampled with a bandwidth of 300 kHz using 1024 levels of quantization.

i) Calculate the bit rate of the digitized signal.

ii) Calculate the SNR_{dB} for this signal.

iii) Calculate the PCM bandwidth of this signal. 9

b) Compare and contrast synchronous and asynchronous transmission. 6

c) What are the impacts of transmission impairments on analog and digital signals ? 5

OR

9. a) What is digital modulation ? How is it different from Analog Modulation ? Briefly differentiate between ASK, FSK, PSK. In PSK clearly distinguish between BPSK and QPSK. 10

b) Given an amplifier with an effective noise temperature of 10000 K and a 10-MHz bandwidth, what thermal noise level, in dBW, may we expect at its output ? 5

c) Explain the relationship between data rate and bandwidth. 5

MODULE – 3

10. a) Discuss in detail the following :

i) FEC ii) VRC. 10

b) Calculate the Hamming pairwise distances among the following code words :

i) 00000 ii) 000000 iii) 010101 iv) 101010 v) 110110. 10

OR

11. a) i) A bit stream 10011101 is transmitted using the standard CRC method. The generator polynomial is $x^3 + 1$. Show the actual bit string transmitted.

ii) Suppose for the above problem, the third bit from the left is inverted during transmission. Show that this error is detected at the receiver's end. 10

b) Illustrate various multiplexing techniques with appropriate examples. 10

MODULE – 4

12. a) What is circuit switching ? Discuss how packet switching is better than circuit switching for computer to computer communication. 10

b) State the main elements of WiMax network architecture and their functionality. 10

OR

13. a) Consider a CDMA system in which users A and B have the Walsh codes (– 1 1 – 1 1 – 1 1 – 1 1) and (–1 – 1 1 1 – 1 – 1 1 1) respectively.

i) Show the output at the receiver if A transmits a data bit 1 and B transmits a data bit 1. Assume the received power from B is twice the received power from A.

ii) Show the output at the receiver if A transmits a data bit 0 and B transmits a data bit 1. Assume the received power from B is twice the received power from A. 6

b) Briefly explain DSSS technique with neat block diagram. 10

c) What are the difficulties associated with wireless communication ? 4