

B.E. Eighth Semester (Information Technology) (CGS)
10759 : Digital & Wireless Communication : 8 IT 01

P. Pages : 2

Time : Three Hours



AU - 3036

Max. Marks : 80

- Notes :
1. Answer **three** question from Section A and **three** question from Section B.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.
 4. Illustrate your answer necessary with the help of neat sketches.

1. a) A source emits independent sequences of symbol x, y and z with probabilities 0.5, 0.3 and 0.2 respectively. Design a source encoder for a block size of 2 symbols using Shannon's algorithm. 7
- b) Prove : $H(x, y) = H(x/y) + H(y)$ 6

OR

2. a) For a source emitting symbols in independent sequences, show that the source entropy is maximum when the symbols occur with equal probabilities. 7
- b) State and explain Shannon - Fano coding theorem with example? 6
3. a) Prove that a linear block code with a min distance $d_{\min}$ can correct upto $\left[\frac{(d_{\min}-1)}{2}\right]$ error and detect upto $\left[d_{\min}-1\right]$ errors in each codeword, where $\left[\frac{(d_{\min}-1)}{2}\right]$ denotes the largest integer no greater than $\frac{(d_{\min}-1)}{2}$. 7
- b) A (15, 5) linear cyclic code has a generator polynomial : 6
- $$g(x) = 1 + x + x^2 + x^4 + x^5 + x^8 + x^{10}$$
- Find the code polynomial for the message polynomial given below in systematic form :
- i) $D(x) = 1 + x^2 + x^4$
- ii) $D(x) = 1 + x + x^3$

OR

4. a) If C is the code vector and H is the parity check matrix, show that $CH^T = 0$ with example. 7
- b) Design an encoder for the (7, 4) binary cyclic code generated by $g(x) = 1 + x + x^3$ and verify its operation using the message vector (1010). 6
5. a) Compare TDMA, FDMA and CDMA. 7
- b) Explain slow and fast frequency hopping in FHSS? 6

OR

6. a) Explain direct sequence spread spectrum. 6
- b) A PN sequence is generated using feedback shift register of length $M = 4$. The chip rate is 10^7 chips/sec. 7
- Calculate :
- i) PN sequence length.
- ii) Chip duration of the PN sequence.
- iii) PN sequence period.
7. a) Explain basic cellular Telephone A system. 7
- b) Explain segmentation and dualization. 6

OR

8. a) Explain the concept of frequency reuse? 6
- b) Consider that a geographical service area of a cellular system is 4200 km^2 . A total of 1001 radio channel are available for handling traffic. Suppose the area of a cell is 12 km^2 . How many times would the cluster of size 7 have to be replicated in order to cover entire service area? Calculate the number of channels per cell and the system capacity. 7
9. a) With the help of block diagram explain GSM Network Architecture. 8
- b) Explain IS - 95 CDMA forward channel architecture. 6

OR

10. a) Explain Architecture of CDMA system. 8
- b) Explain the frame structure of GSM Architecture. 6
11. a) Explain IEEE 802.11 system Architecture. 8
- b) What is mobile AD - HOC Network (MANET)? Explain in detail? 5

OR

12. a) Give the advantages, disadvantages & application of WLAN. 7
- b) Explain RFID Technology. 6
