



17535

14115

3 Hours/100 Marks

Seat No.

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- Instructions:** (1) **All** questions are **compulsory**.
(2) Answer **each** next main Question on a new page.
(3) Illustrate your answers with **neat** sketches **wherever** necessary.
(4) Assume suitable data, if **necessary**.
(5) **Use** of non-programmable Electronic Pocket Calculator is **permissible**.
(6) Mobile phone, Pager and **any** other Electronic Communication devices are **not permissible** in Examination Hall.
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MARKS

1. A) Attempt **any three** :

12

- State Shannon Hartley theorem. What is its implications ?
- State Sampling Theorem. Explain aliasing effect with neat diagram.
- How does FDM technique combines multiple signals into one ?
- Compare DSSS and FHSS system w.r.t.
 - definition
 - chip rate
 - modulation technique used
 - effect of fading.

B) Attempt **any one** :

6

- Draw the block diagram of digital communication system. What is need of channel modelling ? Explain any one model in brief.
- Generate CRC code for data word 1101101001 by using divisor as 1101. State 2 advantages of CRC method.

P.T.O.



2. Attempt **any two** : 16
- a) Draw the neat block diagram of PCM transmitter and receiver. Explain the same with waveforms.
 - b) Draw the block diagram of QPSK transmitter and receiver. Explain its working principle. Draw its constellation diagram.
 - c) With neat sketch describe the working of OFDM multi carrier system.
3. Attempt **any four** : 16
- a) With the help of relevant block diagram, explain the working principle of adaptive delta modulation transmitter.
 - b) Describe the concept of slope-overload distortion in a DM system. Draw neat waveform. How it can be avoided.
 - c) Compare TDMA, FDMA and CDMA techniques based
 - i) definition
 - ii) bandwidth available
 - iii) synchronization
 - iv) application.
 - d) Draw the DPSK transmitter and outline its working principle.
 - e) Write the bandwidth requirement for BASK, BFSK, BPSK, QPSK.
4. A) Attempt **any three** : 12
- a) Discuss the characteristics of communication channels w.r.t.
 - i) bit rate
 - ii) bandwidth
 - iii) repeater distance
 - iv) application.



MARKS

- b) Explain companding. Sketch the input-output characteristics of a compressor and an expander.
- c) What are maximal-length sequence ? Generate maximum-length sequence of length 7 with feedback taps = [3, 1].
- d) Draw NRZ-I, manchester, differential manchester and AMI waveforms of line codes for data stream 1101001.

4. B) Attempt **any one** :

6

- a) A discrete memory less source has the letters A, B, C, D, E, F and G with corresponding probabilities {0.08, 0.2, 0.12, 0.15, 0.03, 0.02, 0.4}.
 - i) Derive Huffman code for the above source and determine the average length of the code word.
 - ii) Determine the coding efficiency of the Huffman code designed.
- b) Draw the block diagram of a BFSK/FHSS transmitter and explain its working. State any two advantages.

5. Attempt **any two** :

16

- a) Describe the North American digital multiplexing hierarchy with neat diagram.
- b) With the help of block diagram explain the working principle of QAM system.
- c) Draw block diagram of direct sequence spread spectrum and explain its working principle.



6. Attempt **any four** :

16

- a) State any two advantages and two disadvantages of PCM system.
 - b) State the principle of orthogonality. Explain the concept of single carrier and multi carrier system.
 - c) Describe M-ary encoding. State any two advantages and one disadvantage of it.
 - d) With example explain how hamming code is used for single bit error correction.
 - e) Compare QAM and QPSK (any four points).
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