

(3 Hours)

[Total Marks : 100

N.B. (1) Question No. 1 is **compulsory**.(2) Attempt any **four** questions from the remaining **six** questions.(3) Answer to questions should be **grouped** and written **together**.

1. (a) An AM signal appears across a 50Ω load has the following equation :— **10**
 $V(t) = 12 (1 + \sin 12.566 \times 10^3 t) \sin 18.85 \times 10^6 t$ Volts.
 (i) Sketch the envelope of this signal in time domain.
 (ii) Calculate the modulation index, side band frequencies, total power and bandwidth.
- (b) Explain Ratio detector with circuit diagram and explain why Ratio detector preferred **10**
 over Foster-Seeley detector for FM demodulation.
2. (a) Explain the transmitter and receiver for the Adaptive delta modulation system. **10**
 (b) Explain : (i) Shannon Hartley capacity theorem. **5**
 (ii) Shannon limit. **5**
3. (a) Explain : (i) Intersymbol Interference and equalization. **8**
 (ii) White Gaussian noise. **2**
- (b) What is line coding ? Draw the waveforms if the sequence is transmitted using — **10**
 (i) Unipolar Rz (iv) Split Phase Manchester
 (ii) Polar Rz (v) M ary where $M = 4$
 (iii) AMI
 Assume the binary sequence 1 1 0 1 0 0 1 1
4. (a) Write a short note on :—
 (i) Viterbi Algorithm **5**
 (ii) Cyclic Code. **5**
- (b) The generator matrix of (6, 3) systematic block code is given by — **10**
- $$G = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{bmatrix}$$
- (i) Find the code Vectors.
 (ii) Find the parity check matrix.
 (iii) Find the error syndrome.
5. (a) Explain the QAM Transmitter and Receiver. **10**
 (b) Explain Differentially Encoded PSK and also show that in DEPSK error occur in pair. **10**
6. (a) State and prove the sampling theorem for Low pass filters. **10**
 (b) Explain TDM and FDM. **10**
7. Write short notes on any **three** of the following :— **20**
 (a) Pre-emphasis and De-emphasis (c) Thermal Noise
 (b) Ring Modulator (d) Companding.