QP Code : **14927**

(3 Hours)   [Total Marks : 80

Instructions:

1. Question No: 1 is compulsory.
2. Answer any three from the remaining questions.

1. a) State and prove Sampling Theorem. (5)
   b) Draw and explain the block diagram of a digital communication system. (5)
   c) Explain how FSK can be generated using ASK. (5)
   d) Explain the need for modulation in a communication system. (5)

2. a) Generate Huffman's code for the five symbols of a source having (10) probabilities: 0.5, 0.25, 0.125, 0.0625, and 0.0625. Find entropy of the source, average code word length and efficiency of the code.
   b) Explain with neat block diagram the working of a super-heterodyne AM (10) receiver.

3. a) Draw the spectrum of an AM waveform if the modulating signal is
   $m(t) = (\cos 2000\pi t + 0.5 \cos 4000\pi t)$ and carrier is $c(t) = 1.5 \cos (1000\pi t)$. (10)
   Calculate total power and power of sidebands.
   b) What is a balanced modulator? With the help of waveforms, prove that the (10) carrier is getting suppressed.

4. a) A message 101101 is to be transmitted in cyclic code with a generator (10) polynomial $G(D) = D^4 + D^3 + 1$. Obtain the transmitted code word. How many check bits does the encoded message contain? Draw the encoding arrangement for the same.
   b) Explain Delta modulation transmitter and receiver with the help of a neat (10) block diagram. What is slope overload and hunting error?

5. a) Explain the functioning of Foster-Seely discriminator with the help of a neat (10) circuit diagram and phasor diagram.
   b) State and prove the properties of Fourier Transform. (10)

6. Write short notes on any three : (20)
   a) OFC.
   b) Quantization process.
   c) Shannon-Hartley Theorem.
   d) Pre-Emphasis and De-Emphasis.

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Correction Attached