

## (OLD COURSE)

QP Code : 4056

(3 Hours)

[ Total Marks : 100

- N. B. :** (1) Question No. 1 is **compulsory**.  
 (2) Solve any **four** questions out of remaining **six** questions.  
 (3) **Figures** to the **right** indicate **full** marks.  
 (4) Make suitable assumptions where necessary.

1. (a) What is the need of multiplexing? Explain TDM in detail. 5  
 (b) Write Shannon's channel capacity theorem & explain. 5  
 (c) Explain the terms noise figure, noise factor and noise temperature. 5  
 (d) Explain the terms 5
  - (i) Code word
  - (ii) Code rate
  - (iii) Code efficiency
  - (iv) Hamming distance
  
2. (a) Explain indirect (Armstrong method) of FM generation with block diagram. 10  
 (b) Draw the block diagram of super heterodyne receiver & explain the operation. 10
  
3. (a) What is VSB? Explain in detail with appropriate waveform. 10  
 (b) Explain the principle operation of frequency division multiplexing. 10
  
4. (a) Draw & explain block diagram of PCM system. 10  
 (b) A channel has B. W. of 4 KHz & signal to noise power ratio 63. 10  
 Determine the B.W. needed if S/N is reduced to 15.
  
5. (a) Information source emits one of four possible symbols once every millisecond interval. Symbols occur with probabilities. 10
  - $P_1 = 0.3$
  - $P_2 = 0.2$
  - $P_3 = 0.1$
  - $P_4 = 0.4$
  - (i) Find information content of each of these messages
  - (ii) Find entropy H
  - (iii) Find information rate R

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- (b) Compare PCM, DM, ADM. 10
6. (a) Explain ratio detector with circuit diagram. 10
- (b) An AM signal appears across a  $50\Omega$  load has the following equation:- 10
- $$v(t) = 12 (1 + \sin 12.566 \times 10^3 t) \sin 18.85 \times 10^6 t \text{ volts.}$$
- (i) Sketch the envelope of this signal in time domain.
- (ii) Calculate the modulation index, side band frequency, total power and bandwidth.
7. Write short notes on (any two) :- 20
- (a) ASK, FSK, PSK
- (b) QAM transmitter & receiver.
- (c) Mathematical expression of AM
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