

PART B — (5 × 16 = 80 marks)

11. (a) (i) How an AM wave is demodulated using envelope detector? Derive the expression for RC time constant and also state the necessity of choosing correct value of RC time constant and brief the limitation. (10)
- (ii) A radio telephone transmitter using AM has unmodulated carrier output of 20kW and can be modulated to a maximum depth of 80% with a sinusoidal modulating voltage without causing overloading. Find the value to which unmodulated carrier power may be increased without resulting in overloading if the maximum permitted modulation index is restricted to 60%. (6)

Or

- (b) (i) Brief the relation between FM and PM. (3)
- (ii) Explain the generation of FM using Amstrong method. (8)
- (iii) When the modulating frequency in a FM system is 400 Hz, modulating voltage is 2.4 V and the modulation index is 60. Calculate the maximum frequency deviation. What is the modulation index when the modulation frequency is reduced to 250 Hz and the modulating voltage is raised to 3.2 V? (5)
12. (a) (i) Explain the process of detecting BFSK using coherent and Noncoherent receiver. Also sketch the signal space representation of Orthogonal and Non orthogonal BFSK signals. (10)
- (ii) Using Coherent BPSK receiver, list the steps involved during detection process. (6)

Or

- (b) Illustrate the working principle of QPSK transmitter and receiver. Also sketch the QPSK waveform for the bit pattern 0110100. (16)
13. (a) (i) Analyze the process of encoding speech signal using PCM technique. (12)
- (ii) Compare and contrast the PCM and Delta modulation system. (4)

Or

- (b) (i) With the neat sketch, explain how the slope over load distortion is removed using Adaptive Delta Modulation technique. (8)
- (ii) Brief the reason for the cause of intersymbol Interference (ISI) and state the techniques to overcome it. (8)

14. (a) Narrate the concept of Slow-frequency Hop and Fast-frequency Hop spread spectrum with an example. (16)

Or

- (b) (i) Analyze the performance of Direct sequence spread spectrum system using processing gain and probability error. (10)
- (ii) The direct sequence spread spectrum communication system has the following parameters.

Data sequence bit duration = 4.095 ms

PN chip duration = 1 μ s

$E_b/N_0 = 10$ for average probability of error less than 10^{-5}

Calculate the processing gain and jamming margin. (6)

15. (a) (i) With the neat sketch explain satellite system link model. (10)
- (ii) List the advantages and disadvantages of Geosynchronous satellites. (6)

Or

- (b) For a point to point optical link, analyze the link power budget and rise time budget. (16)