Department of Electronics and Communication Engineering
National Institute of Technology Srinagar-190006

Major Examination (25 June, 2016)

Course: B.Tech. 4th Semester (IT)
Subject: Communication Systems
Maximum marks: 50 **Time:** 02 hours

NOTE: (i) Attempt any four questions. All questions carry equal marks.

(ii) Draw neat and clean figures where ever necessary

Q.1) (a) Explain the generation of SSB-SC modulation by Phase discrimination method in detail with all the necessary equations and diagrams. [6]

(b) A sinusoidal message signal is transmitted through PCM system such that maximum quantization error should be at most 2% of peak to peak amplitude of the message signal. Find the minimum possible number of bits per sample required? [4]

(c) What are the advantages of F.M over AM? [2.5]

(Q.2) (a) Explain the working of DPCM(Differential Pulse Code Modulation) transmitter in detail and show how it overcomes the disadvantage of PCM. [6.5]

(b) Describe the operation of PSK transmitter and receiver. [6]

(Q.3) (a) An unmodulated FM transmitter power is given by 100 Watts . With modulation it is observed that strength of the first order sideband in the spectrum is zero. Find

(i) Power of the carrier frequency component? [3]
(ii) Total sideband power? [2]
(iii) Total 2nd order side band power? [2]

Given $J_0(3.8) = 0.4, J_1(4) = 0.37, J_2(3.8) = 0.2$

(b) Explain the process of quantization in detail. [5.5]

(Q.4) Short answer type questions.

(a) When a signal $m(t) = 10\cos(2\pi \times 10^3 t)$ is transmitted through a 4-bit PCM system. Then determine maximum quantization error and bit rate for the system? [2]
(b) Differentiate between ASK and FSK modulation schemes. [2]
(c) Explain briefly the disadvantages of Delta Modulation. [2]
(d) Draw the block diagram of PCM. [1]
(e) Define Noise figure and Figure of Merit. [1]
(f) State Sampling theorem and also explain aliasing. [2]
(g) Condition for avoiding diagonal clipping in envelope detector. [1]
(h) Draw the spectrum of white noise. [1.5]

(Q.5) (a) Derive the expression for Figure of Merit of DSB receiver. [5]

(b) Explain the operation of superheterodyne receiver in detail. Also, explain double spotting and how it is overcome. [7.5]