Govt. Women Engineering College, Ajmer
Department of Electronics and Communication Engineering

M. Tech (Digital Communication) 1st Semester 2nd Mid Term Examination - November 2017
Subject: Digital Communication Systems   Subject Code: 1MDC2
Time: 1 Hr.   Max. Marks: 25
Student College ID:…………………………………………………………………Date of Examination: 15/11/2017

Note: The paper consists of four questions. Assume any missing data.

Q. 1.   Draw the signal constellation of a QPSK modulation scheme. Draw the block diagrams of generation and detection of coherent QPSK signals.   **[7]**

Q. 2.   Derive the relation for the average probability of symbol error for coherent binary FSK.   **[6]**

Q. 3.   The signal component of a coherent PSK system is defined by $s(t) = A_c k \sin(2\pi f_c t) \pm A_c \sqrt{1-k^2} \cos(2\pi f_c t), where\ 0 \le t \le T_b$, and the plus sign corresponds to symbol 1 and the minus sign corresponds to symbol 0. The first term represents a carrier component included for the purposes of synchronizing the receiver of the transmitter.

   (a) Draw a signal space diagram for the scheme described here; what observation can you make about this diagram?

   (b) Show that, in the presence of AWGN of zero mean and power spectral density $\frac{N_0}{2}$, the average probability of error is $P_e = \frac{1}{2} erfc\left(\sqrt{\frac{E_b}{N_0}(1-k^2)}\right), where\ E_b = \frac{1}{2}A_c^2 T_b$ **[6]**

Q. 4.   Draw the signal constellation of M-Ary QAM modulation techniques for M = 16. Draw the block diagrams of generation and detection of M-ary QAM signals.

OR

   Two passband data transmission systems are to be compared. One system uses 16-PSK and the other uses 16-QAM. Both systems are required to produce an average probability of symbol error equal to 10^-3. Compare the signal-to-noise requirements of these two systems.   **[6]**

--ALL THE BEST--