SEAT No. :

P-5048

[6187]-449

T.E. (E&TC) (Insem.)
DIGITAL COMMUNICATION
(2019 Pattern) (Semester - I) (304181)

Time : 1 Hour]   *[Max. Marks : 30*

Instructions to the candidates:

   1)   *Answer any one question out of Q.No. 1 or 2 and Q.No. 3 or 4.*

   2)   *Neat diagrams must be drawn wherever necessary.*

   3)   *Figures to the right side indicate full marks.*

   4)   *Assume suitable data if necessary.*

Q1) a)   A random process is defined as $x(t) = A.\cos(w_c t + \phi)$ where ϕ is uniformly distributed random variable in the range $(-\pi, +\pi)$ is a wide sense stationary process. **[8]**

      b)   Show that the total normalised noise power can be obtained by superposition of the powers of individual noise components. **[5]**

      c)   Define ergodic random process. **[2]**

OR

Q2) a)   What is narrowband noise? Explain generation of narrowband noise from its in-phase & quadrature components. **[8]**

      b)   Find the PSD at the output of filter with $H(f) = j2\pi f$ when a R-P. $x(t) = A.\cos(2\pi f_c t + \theta)$ is applied at the input, where θ is uniformly distributed R.V. over the integral $(0, 2\pi)$. **[5]**

      c)   Explain thermal noise. **[2]**

Q3) a)   With the help of block diagram explain. QPSK MODEM. Write the equation of QPSK signal, probability of error, required bandwidth of QPSK. **[8]**

      b)   In a digital CW modulation scheme, the bit rate of NRZ data stream is 1 mbps and carries frequency of transmission is 100 MHz. Find the symbol rate of transmission and bandwidth requirement of the channel for BPSK and 16-ary PSK systems. **[5]**

      c)   What is matched filter? **[2]**

Q4) a) Draw the diagram of integrates and dump receives filter and explain its working. Also, derive the equation of SMR at the output. **[8]**

b) Compare QPSK and BFSK digital modulation schemes. **[5]**

c) With the help of spectrum state the bandwidth requirement of BFSK. **[2]**

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