

Total No. of Questions : 4]

SEAT No. :

PC-48

[Total No. of Pages : 2

[6360]-49

T.E. (E & TC) (Insem)

DIGITAL COMMUNICATION

(2019 Pattern) (Semester - I) (304181)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates :

- 1) Answer Q1 or Q2, Q3 or Q4.
- 2) Neat Diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.

Q1) a) Consider a random process $X(t)$ given by $X(t) = A \cos(\omega t + \theta)$ where A and ω are constant and θ is a random variable over $[0, 2\pi]$. Show that $X(t)$ is ergodic in both the mean and autocorrelation. [8]

b) Let $X(t) = K + 3t$ where K is a random variable with $\bar{K} = 0$ and $\bar{K}^2 = 5$. Show that $\bar{X}(t) = 3t$ and $R_x(t_1, t_2) = 5 + 9t_1, t_2$ Where $R_x(t_1, t_2)$ is autocorrelation function and $\bar{X}(t)$ is mean value of $X(t)$. [7]

OR

Q2) a) What is white noise? Explain. What is narrowband noise? Explain [8]

b) A wide sense stationary process is passed through LTI system with impulse response $h(t)$. Find the relationship between input and output mean value. [7]

Q3) a) Draw the block diagram and explain in detail the BPSK transmitter and receiver. Also draw diagram of the geometric representation of BPSK system and comment on its Euclidean distance. [8]

b) In a digital CW communication system, the bit rate of NRZ data stream is 1 Mbps and carrier frequency of transmission is 100 MHz. Find the symbol rate of transmission and bandwidth requirement of the channel in following cases of different techniques used. [7]

- i) BPSK system
- ii) QPSK system
- iii) 16-ary PSK system.

OR

P.T.O.

- Q4) a)** With a neat diagram explain generation , reception and geometric representation of BFSK system. [8]
- b) Compare BPSK, BFSK, QPSK [7]
