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)=Acos(wt+θ) where A and w are constant and θ is a random variable over [0, 2π]. Show that X(t) is a 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]**

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