

Reg. No.:

### Question Paper Code: 50781

### B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Fourth Semester

Biomedical Engineering

MA 6451 – PROBABILITY AND RANDOM PROCESSES

(Common to Electronics and Communication Engineering/Robotics and ridio storg eds brul 8 L Automation Engineering) is good a property

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Time: Three Hours

Maximum: 100 Marks the propendity that a target is ilentrayed on any one

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#### Answer ALL questions

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- Write the formula for moment generating function of binomial distribution.
- Suppose that the duration X in minutes of long distance calls from your home,

follows exponential law with p.d.f. f(x)= what is P(X > 5)? times are assumed to be independent random variables with pid.f.s

- 3. Find the value of k, if f(x, y) = k (1 x) (1 y) in 0 < x, y < 1 and f(x, y) = 0, otherwise, is to be the joint density function. There
- 4. The regression equations are 3x + 2y = 26 and 6x + y = 31. Find the means of X and Y.

- 5. What do you mean by wide sense stationary process?
- 6. State the postulates of a Poisson process.
- 7. Prove that  $R(\tau)$  is maximum at  $\tau = 0$ .

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- 15. a) If  $\{X(t)\}$  is a WSS process and if  $Y(t) = \int h(u) X(t-u) du$ , prove that : (16)

- i)  $R_{XY}(T) = R_{XX}(T) * h(-T)$ , where \* denotes convolution
- ii)  $R_{yy}(T) = R_{xy}(T) * h(T)$ , where \* denotes convolution
- iii)  $S_{XY}(\omega) = S_{XX}(\omega)H^*(\omega)$ ,  $H^*(\omega)$  is the complex conjugate of  $H(\omega)$
- iv)  $S_{XY}(\omega) = S_{XX}(\omega) |H(\omega)|^2$ . (OR)
- b) i) If X(t) is the input voltage to a circuit and Y(t) is the output voltage, {X(t)} is a stationary random process with  $\mu_x = 0$ , and  $R_{xx}(\tau) = e^{-\alpha/\tau}$ . Find  $\mu_y$ ,  $S_{yy}(\omega)$  and  $R_{yy}(T)$ , if the power transfer function is  $H(\omega) = \frac{R}{R + iL\omega}$ . (8)
  - ii) A system has an impulse response  $h(t) = e^{-\beta t}$  U(t), find the power spectral density of the output Y(t) corresponding to the input X(t). (8)

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Reg. No.:

## Question Paper Code: 52765

#### B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Fourth Semester A constant and the state of the state of

Biomedical Engineering
MA 2261 – PROBABILITY AND RANDOM PROCESSES

(Common to Electronics and Communication Engineering)
(Regulations 2008)

Time: Three Hours

Maximum: 100 Marks

Instruction: Normal distribution table is permitted.

Answer ALL questions

PART - A

(10×2=20 Marks)

- 1. Classify the following random variables as continuous or discrete
  - i) Number of incoming calls to your mobile phone on a particular day.
  - ii) The time that you spend for studies during a day.
- 2. Under what conditions binomial distribution tends to Poisson distribution?
- 3. Find the marginal distribution of X and Y from the bivariate probability distribution given below

1	arcu.	<b>Y</b>	
	X	1	2
	1	0.1	0.2
	2	0.3	0.4

# 15. a) If X(t) is a WSS process and if $Y(t) = \int_{0}^{\infty} h(u)X(t-u)du$ then prove that.

- i)  $R_{XY}^{(\tau)} = R_{XX}(\tau) * h(-\tau)$ . (4)
- ii)  $R_{YY}^{(\tau)=R_{XY}(\tau)*h(\tau)}$ , where \* denotes convolution. (4)
- iii)  $S_{XY}(\omega) = S_{XX}(\omega) H^*(\omega)$ .
- iv)  $S_{YY}(\omega) = S_{XX}(\omega)/H(\omega)/2$ . (4)
  (OR)
- b) The autocorrelation function of the Poisson increment process is given by

$$R(\tau) = \begin{cases} \lambda^2 + \frac{\lambda}{\epsilon} \left(1 - \frac{|\tau|}{\epsilon}\right) & \text{for } |\tau| \le \epsilon \end{cases}$$

prove that its spectral density is given by 
$$S(\omega) = 2\pi\lambda^2\delta(\omega) + \frac{4\lambda\sin^2(\omega\epsilon/2)}{\epsilon^2\omega^2}$$
 (16)

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b) I we that if the mission remaining the colour beauty are a second to the first of

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