

Reg. No.:....

Name :

Fifth Semester B.Tech. Degree Examination, November 2014 (2008 Scheme) 08.501 : ENGINEERING MATHEMATICS – IV (ERFBH)

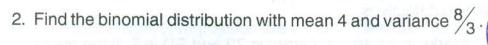
Time: 3 Hours Max. Marks: 100

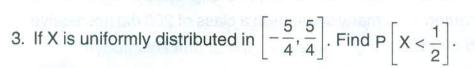
Instruction: Answer all questions from Part – A and one full question from each Module in Part – B.

PART – A

 $(10\times4=40 \text{ Marks})$

1. If X has the pdf f(x) = $\begin{cases} \frac{K}{4}, & -2 < x < 2 \\ 0, & \text{elsewhere} \end{cases}$ find K and P (2x + 3 > 5).





- 4. The amount of time that a watch will run without having to be reset is a random variable having an exponential distribution with mean 120 days. Find the probability that such a watch will not have to be reset in atleast 180 days.
- 5. From the following data, find the correlation coefficient $\overline{X} = 5.5$, $\overline{Y} = 4$, $\sum X^2 = 385$, $\sum Y^2 = 192$, $\sum (X + Y)^2 = 947$ and n = 10.
- 6. The mean of a sample of size 20 from a population with SD 8 was found to be 81.2. Find a 90% confidence interval for the mean.
- 7. What are the steps in testing a statistical hypothesis?



- If X (t) = A sin (ωt) where A and W are constants. Find the auto correlation of X²(t).
- 9. Find the mean and variance of the stationary process $R_x(\tau) = 16 + \frac{9}{1 + 6\tau^2}$
- 10. Suppose that X (t) is a Poisson process with E [X (9)] = 6. Find the mean and variance of X (8). Also find P [X (2) \leq 2].

Answer one full question from each Module.

Module - I

- a) In a lot of 500 solenoids, 25 are defective, find the probabilities of a sample of 20 solenoids chosen at random may have
 - i) no defectives
 - ii) two defectives
 - iii) not more than two defectives.
 - b) The average test marks in a particular class is 79 and SD is 5. If the marks are normally distributed, how many students in a class of 200 did not receive marks between 75 and 82.
 - c) A random variable X has a uniform distribution over (-2, 2). Compute
 (i) P [|X| < 1] (ii) P [|X -1| < 1].

OR

- 12. a) Find the mean and variance of Binomial distribution.
 - b) It X is a Poisson variate such that P[X = 3] = 3P[X = 4] + 5P[X = 5], find the SD.
 - c) At an examination 10% of the students got less than 30 marks and 97% got less than 62 marks. Assuming normal distribution, find μ and σ .



Module - II

13. a) Fit a parabola $y = a + bx + cx^2$ to the following data

x: 0 1 2 3 4 5 y: 14 18 23 29 36 40

b) From the following data, find y when x = 45

Mean 53 142 SD 130 165 and $\sum (x - \overline{x})(y - \overline{y}) = 1220$ and n = 10.

c) A random sample of size 25 drawn from a population having SD 10 is having mean 20. Find 90% confidence interval of the population mean.

OR

14. a) Find the coefficient of correlation from the following data:

28 41 40 38 35 33 32 36 33 x: 23 34 33 34 30 26 28 31 36 38

- b) Two lines of regression are x + 6y = 6 and 3x + 2y = 10 and variance of x = 12, find \overline{x} , \overline{y} , γ and σ_y^2 .
 - c) Given $n_1 = 50$, $n_2 = 60$, $\overline{X}_1 = 5.3$, $\overline{X}_2 = 5.82$, $\sigma_1 = 0.5$, $\sigma_2 = 0.6$, test the hypothesis that $\mu_1 = \mu_2$ agaist $\mu_1 > \mu_2$

Module - III

15. a) The joint distribution of X and Y is given by

X	1	2	3
1	1/12	0	1/18
2	1/6	1/9	1/4
3	0	1/5	2/15

Find the marginal and conditional distributions.



- b) Show that the process X (t) = A sin t + B cos t where A and B are independent variables with zero mean and equal variance, is WSS.
- c) The tpm of a Markov chain $\{X_n\}$ having 3 states 0, 1, 2, is

$$P = \begin{bmatrix} 0.75 & 0.25 & 0 \\ 0.25 & 0.50 & 0.25 \\ 0 & 0.75 & 0.25 \end{bmatrix} \text{ and the initial distribution is } P (0) = \left(\frac{1}{3}, \frac{1}{3}, \frac{1}{3}\right).$$

Find
$$P[X_3 = 2, X_2 = 1, X_1 = 1, X_0 = 2].$$

OR

- 16. a) Suppose X (t) is a process with $\mu(t) = 3$ and R $(t_1, t_2) = 9 + 4e^{-\frac{1}{2}t_2}$ Find the variance and covariance of X (5) and X (8).
 - b) If $R(\tau) = 1 + e^{-c |\tau|}$, find the spectral density.

c) The tpm of a Markov chain
$$\{X_n\}$$
 having 3 states 1, 2 and 3 is $P = \begin{bmatrix} 0.1 & 0.6 & 0.3 \\ 0.3 & 0.4 & 0.3 \\ 0.2 & 0.2 & 0.6 \end{bmatrix}$

and the initial distribution is
$$\left(\frac{1}{3}, \frac{1}{3}, \frac{1}{3}\right)$$
. Find P [X₃ = 2].

 $(20\times3=60 \text{ Marks})$