



II B.Tech I Sem Supplementary Examination, July-2022
Probability Statistics and Complex Variables
 (MECHANICAL)

Time: 3 Hours.

Max. Marks: 70

Note: 1. Answer any FIVE questions.

2. Each question carries 14 marks and may have a, b as sub questions.

- 1 a) The probability density function of a continuous random variable is given by $f(x) = kx(2-x)$, $0 \leq x \leq 2$. Find the value of k, mean and variance of x 7M C01 BL3
- b) Find the mean of the following discrete random variable X, whose p.m.f. is 7M C01 BL3
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|------|-----|-----|-----|-----|-----|
| X | 0 | 1 | 2 | 3 | 4 |
| P(x) | 1/8 | 3/8 | 1/8 | 2/8 | 1/8 |
- 2 The probabilities that students A, B, C, D solve a problem are $1/3$, $2/5$, $1/5$ and $1/4$ respectively. If all of them try to solve the problem, that is the probability that the problem is solved. 14M C01 BL3
- 3 a) Fit a Binomial distribution for the following data and compare the theoretical frequencies with actual ones 7M C02 BL3
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|---|---|----|----|----|----|---|
| X | 0 | 1 | 2 | 3 | 4 | 5 |
| f | 2 | 14 | 20 | 34 | 22 | 8 |
- b) In a bolt factory machines A, B, C manufacture 20% 30% and 50% of the total of their output and 6%, 3% and 2% are defective. A bolt is drawn at random and found to be defective. Find the probabilities this is manufactured from i) Machine A ii) Machine B iii) Machine C. 7M C02 BL3
- 4 In a normal distribution 31% of the items are under 45 and 8% of the items are over 64 find the mean and standard deviation of the normal distribution. 14M C02 BL3
- 5 a) In a random sample of 125 cola drinkers, 68 said they prefer thumsup to Pepsi. Test the null hypothesis $P=0.5$ against the alternative hypothesis $P>0.5$ 7M C03 BL3
- b) In a sample of 1000 students 500 use ball pens and in another sample of 3500 students 1400 use ball pens. Test the significance between the difference of two proportions at 5% level 7M C03 BL3
- 6 An ambulance service claims that it takes on the average less than 10 minutes to reach its destination in emergency calls. A sample of 36 calls has a mean of 11 min. and the variance of 16 minutes. Test the significance at 0.05 levels 14M C03 BL3
- 7 a) If $f(z) = u + iv$ is analytic, prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) |Re f(z)|^2 = 2[f'(z)]^2$ 7M C04 BL3
- b) Show that the function $f(z) = \sqrt{|xy|}$ is not analytic at the origin even though Cauchy Riemann equations are satisfied 7M C04 BL3
- 8 Using Cauchy's integral formula to evaluate $\oint \frac{z}{(z-1)(z-2)^2} dz$ where c is the circle $|z-2| = \frac{1}{2}$ 14M C05 BL3