



B.Tech III Semester Supplementary Examinations, December 2024

PROBABILITY & STATISTICS AND COMPLEX VARIABLES
(Mechanical Engineering)

Maximum Marks: 70

Date: 02.12.2024

Duration: 3 hours

- Note:**
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks		(10X2M=20) Marks)	CO	Bloom Tx
1	Write about Discrete random variables?		1	L1
2	The mean and variance of a binomial distribution are 6 & 3 respectively find the mode of the binomial distribution.		1	L1
3	Explain Continuous random variables.		2	L1
4	Write the probability density function of Normal distribution.		2	L1
5	Define point estimation and interval estimation.		3	L1
6	Define critical region.		3	L1
7	Write the one assumption of student's t- test?		4	L1
8	Define small sample.		4	L1
9	Write the definition of Harmonic function?		5	L1
10	Evaluate $\int_0^{1+i} (x^2 - iy) dz$ along the path $y=x^2$		5	L1

Part-B

Answer All the following questions.		(5X10M=50Marks)	CO	Bloom Tx
11	Let X denote the maximum of the two numbers that appears when a pair of dice is thrown once. Determine the i) Discrete probability distribution ii) Expectation iii) variance iv) v(3X + 4) and E(3X + 4). [10M]		1	L2
OR				
12	Derive the mean and variance of binomial distributions. [10M]		1	L2
13	Probability density function of random variable 'x' is $f(x) = K(1-x^2)$; $0 < x < 1$. = 0 other wise. Find K, mean & Variance. [10M]		2	L2
OR				
14	Find the mean and S.D of the normal distribution in which 7% of the items are under 35 and 89% are under 63. [10M]		2	L2

15	A population consists of five numbers ,3,6,9,15and 27. Consider all possible samples of size three Which can be drawn without replacement from this population. Find i) The population mean. ii) The standard deviation of the population. iii) The mean of the sampling distribution of means. iv) standard deviation of the sampling distribution of means. [10M]	3	L2																						
OR																									
16	A) A sample of size 100 was taken whose variance is 16 and mean 4. Construct 99% confidence interval for the mean. And also find maximum error of mean at 95% confidence? [5M] B) A sample of 60 students have a mean weight of 50 kgs. Can this be regarded as a sample from a population with mean weight 25 kgs and standard deviation 12kgs. [5M]	3	L2																						
17	The means of two random samples of sizes 9 and 7 are 196.42 and 198.82 respectively. The sum of the squares of the deviations from the mean are 26.94 and 18.73 respectively, can the sample be considered to have been from the same normal population [10M]	4	L2																						
OR																									
18	Use F- test to the following data to test the significance of variances [10M] <table border="1" style="margin-left: 20px;"> <tr> <td>X</td> <td>67</td> <td>24</td> <td>57</td> <td>55</td> <td>63</td> <td>54</td> <td>56</td> <td>68</td> <td>33</td> <td>43</td> </tr> <tr> <td>Y</td> <td>70</td> <td>38</td> <td>58</td> <td>58</td> <td>56</td> <td>67</td> <td>68</td> <td>75</td> <td>42</td> <td>38</td> </tr> </table>	X	67	24	57	55	63	54	56	68	33	43	Y	70	38	58	58	56	67	68	75	42	38	4	L2
X	67	24	57	55	63	54	56	68	33	43															
Y	70	38	58	58	56	67	68	75	42	38															
19	Prove that the function $f(z)$ defined by $f(z) = \begin{cases} \frac{x^3(1+i)-y^3(1-i)}{x^2+y^2} & z \neq 0 \\ 0 & z = 0 \end{cases}$ is continuous and the C-R equations are satisfied at the origin yet $f'(0)$ does not exist. [10M]	5	L2																						
OR																									
20	Evaluate $\int_C \frac{1}{z^8(z+4)} dz$ where C is the circle $ z = 2$ [10M]	5	L2																						