R20 Regulation *Subject code: 3B3CA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech III Semester Supplementary Examinations, July 2024

PROBABILITY & STATISTICS AND COMPLEX VARIBLE
(Mechanical Engineering)

Maximum Marks: 70 Date:18.07.2024 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	Define Poisson distribution.	1	L1
2	If X_1, X_2 are two random variables and a ,b are constants then $E(aX_1 + bX_2)$?	1	L1
3	If $f(x) = k(2x^2)$ in $0<x<2$, then find k?	2	L1
4	Write the probability density function of Normal distribution.	2	L1
5	Define type II error.	3	L1
6	Find population correction factor if n =5 and N=30	3	L1
7	Define small sample.	4	L1
8	Write the one assumption of student's t- test	4	L1
9	Find the value of $\oint_C \frac{e^z}{z-4}dz$ where C is $\|z\| = 2$	5	L1
10	Show that $u(x,y) = x^3 - 3xy^2$ is harmonic	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)			
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). [10]	1	L2
	OR		
12	Derive the mean and variance of binomial distributions. [10]	1	L2
13	A continuous random variable 'X' is defined by $f(x) = \begin{cases} \frac{1}{16}(3+x)^2, & \text{if } -3 \le x \le -1 \\ \frac{1}{16}(6-2x^2), & \text{if } -1 \le x < 1 \\ \frac{1}{16}(3-x)^2, & \text{if } 1 \le x \le 3 \\ 0 & \text{elsewhere} \end{cases}$ Verify that f(x) is a density function & also find the Mean of 'x' [10]	2	L2

<table>
<tr><td></td><td>OR</td><td></td><td></td></tr>
<tr><td>14</td><td>If mean = 70, standard deviation is 16. Find:
(i) p ($38 \leq x \leq 46$) , (ii) p($62 \leq x \leq 86$) [10]</td><td>2</td><td>L2</td></tr>
<tr><td>15</td><td>A population consists of six numbers 4,8,12,16,20and 24.Consider all possible samples of size two Which can be drawn with out 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. [10]</td><td>3</td><td>L2</td></tr>
<tr><td></td><td>OR</td><td></td><td></td></tr>
<tr><td>16</td><td>Random samples of 400 men and 600 women were asked whether they would like to have a flyover near the residence, 200 men and 325 women were in favour of the proposal. Test the hypothesis that proportions of men and women in favor of the proposal are same, at 5% level. [10]</td><td>3</td><td>L2</td></tr>
<tr><td>17</td><td>A random sample of 10 boys had the following I.Q's :
70,120,110,101,88,83,95,98,107,100.
Do these data support the assumption of a population mean I.Q of 100. [10]</td><td>4</td><td>L2</td></tr>
<tr><td></td><td>OR</td><td></td><td></td></tr>
<tr><td>18</td><td>From the following data ,find whether there is any significant liking in the habit of taking soft drinks among the categories of employees. [10]
<table>
<tr><td></td><td>clerk</td><td>Teachers</td><td>Officers</td></tr>
<tr><td>Pepsi</td><td>10</td><td>25</td><td>65</td></tr>
<tr><td>Thumsup</td><td>15</td><td>30</td><td>65</td></tr>
<tr><td>Fanta</td><td>50</td><td>60</td><td>30</td></tr>
</table></td><td>4</td><td>L2</td></tr>
<tr><td>19</td><td>Show that $u(x,y) = e^x cosy$ is harmonic and find its harmonic conjugate v(x,y), also the analytic function. [10]</td><td>5</td><td>L2</td></tr>
<tr><td></td><td>OR</td><td></td><td></td></tr>
<tr><td>20</td><td>Evaluate the integrals around c:|z|=2 , $\int_c \frac{e^z}{(z-1)(z-4)} dz$ [10]</td><td>5</td><td>L2</td></tr>
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