JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -3 EXAMINATION- 2024
B.Tech-I Semester (BT)

COURSE CODE (CREDITS):18B11MA312 (4) MAX. MARKS: 35
COURSE NAME: PROBABILITY AND STATISTICAL TECHNIQUES
COURSE INSTRUCTORS: MDS MAX. TIME: 2 Hours

Note: *(a)All questions are compulsory.*
(b) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems
(c) Scientific Calculator is allowed.

<table>
<tr><th>Q.No</th><th>Question</th><th>CO</th><th>Marks</th></tr>
<tr><td>Q1</td><td>(a) Scott measured the height of all the people in his choir. The values, in cm, are given as:
154,180,176,153, 162,165,154,186, 190,187,176,176, 172,182,177,169
Draw a stem-and-leaf diagram to represent Scott's data (key 11|5 = 115).
(b) For the following frequency distribution
<table>
<tr><td>Class interval</td><td>0 – 8</td><td>8 – 16</td><td>16 – 24</td><td>24 – 32</td><td>32 – 40</td><td>40 – 48</td></tr>
<tr><td>frequency</td><td>8</td><td>7</td><td>16</td><td>24</td><td>15</td><td>7</td></tr>
</table>
Calculate mean by assuming $A(assumed\ mean) = 8$</td><td>CO-1</td><td>2+3</td></tr>
<tr><td>Q2</td><td>The mean inside diameter of a sample of 200 washers produced by a machine is 0.502 cm and the standard deviationis 0.005 cm . The purpose for which these washers are intended allows a minimum tolerance in the diameter 0.496 $cm$to 0.508 cm, otherwise the washers are considered defective. Determine the percentage of defective washers produced by the machine assume the diameters are normally distributed.</td><td>CO-2</td><td>5</td></tr>
<tr><td>Q3</td><td>The nicotine content in milligrams of the samples of tobacco were found as follows:
<table>
<tr><td>Sample A</td><td>24</td><td>27</td><td>26</td><td>21</td><td>25</td><td></td></tr>
<tr><td>Sample B</td><td>27</td><td>30</td><td>28</td><td>31</td><td>22</td><td>16</td></tr>
</table>
Can it be said that the two samples come from normal populations with the same mean.</td><td>CO-3</td><td>5</td></tr>
<tr><td>Q4</td><td>A sample of 400 items is taken is taken from a population whose standard deviation is 10. The mean of the sample is 40. Test whether the sample has came from the population with mean 38. Also calculate 95% confidence interval for the population mean.</td><td>CO-3</td><td>4</td></tr>
<tr><td>Q5</td><td>A TV channel programme manager wants to know whether there are any significant differences among male and female viewers between the type of the programmes they watch. A survey conducted for the purpose gives the following results.
<table>
<tr><th>Type of TV programme</th><th colspan="3">Viewers Sex</th></tr>
<tr><th></th><th>Male</th><th>Female</th><th>Total</th></tr>
<tr><td>News</td><td>30</td><td>10</td><td>40</td></tr>
<tr><td>Serials</td><td>20</td><td>40</td><td>60</td></tr>
<tr><td>Total</td><td>50</td><td>50</td><td>100</td></tr>
</table>
Calculate χ^2 statistic and determine whether type of TV programme is independent of the viewers' sex. Take 0.10 significance level.</td><td>CO-3</td><td>6</td></tr>
<tr><td>Q6.</td><td>Calculate rank correlation coefficient from the following data:
<table>
<tr><td>x</td><td>78</td><td>89</td><td>97</td><td>69</td><td>59</td><td>79</td><td>68</td></tr>
<tr><td>y</td><td>125</td><td>137</td><td>156</td><td>112</td><td>107</td><td>136</td><td>124</td></tr>
</table></td><td>CO-4</td><td>4</td></tr>
</table>

Q7	Three sets of five mice were randomly selected to be placed in a standard maze but with different color doors. The response is the time required to complete the maze as seen below. Perform the appropriate analysis to test if there is an effect due to door color. Given that 1% tabulated value of F for 2 and 12 degree of freedom is 6.927.	CO-5	6

Color	Red	9	11	10	9	15
	Green	20	21	23	17	30
	Black	6	5	8	14	7

t Table

cum. prob	$t_{.50}$	$t_{.75}$	$t_{.80}$	$t_{.85}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$	$t_{.999}$	$t_{.9995}$
one-tail	0.50	0.25	0.20	0.15	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
two-tails	1.00	0.50	0.40	0.30	0.20	0.10	0.05	0.02	0.01	0.002	0.001
df											
1	0.000	1.000	1.376	1.963	3.078	6.314	12.71	31.82	63.66	318.31	636.62
2	0.000	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	22.327	31.599
3	0.000	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	10.215	12.924
4	0.000	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	0.000	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5.893	6.869
[redacted]											
11	0.000	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	0.000	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	0.000	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	3.852	4.221

Chi-square distribution table

df	$\chi^2_{.995}$	$\chi^2_{.990}$	$\chi^2_{.975}$	$\chi^2_{.950}$	$\chi^2_{.900}$	$\chi^2_{.100}$	$\chi^2_{.050}$	$\chi^2_{.025}$	$\chi^2_{.010}$	$\chi^2_{.005}$
1	0.000	0.000	0.001	0.004	0.016	2.706	3.841	5.024	6.635	7.879
2	0.010	0.020	0.051	0.103	0.211	4.605	5.991	7.378	9.210	10.597
3	0.072	0.115	0.216	0.352	0.584	6.251	7.815	9.348	11.345	12.838
4	0.207	0.297	0.484	0.711	1.064	7.779	9.488	11.143	13.277	14.860
5	0.412	0.554	0.831	1.145	1.610	9.236	11.070	12.833	15.086	16.750

(Standard) Normal Probability Table

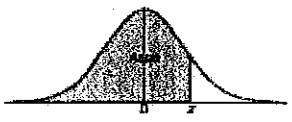

Table A.3 Areas under the Normal Curve

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
−1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681
−1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
−1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
−1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
−1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1460	0.1446	0.1423	0.1401	0.1379

Z-Table

Level of significance, α	0.10	0.05	0.01	0.005	0.002
Critical values of z for one-tailed tests	−1.28 *or* 1.28	−1.645 *or* 1.645	−2.33 *or* 2.33	−2.58 *or* 2.58	−2.88 *or* 2.88
Critical values of z for two-tailed tests	−1.645 *and* 1.645	−1.96 *and* 1.96	−2.58 *and* 2.58	−2.81 *and* 2.81	−3.08 *and* 3.08