23ITU419N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2025
(Fourth Semester)

Branch - **INFORMATION TECHNOLOGY**

STATISTICS FOR INFORMATION TECHNOLOGY - II

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Sampling is inevitable in the situations when a) blood test of a person b) when the population is infinite c) testing of life of dry battery cells d) all of the above	K1	CO1
	2	An estimate based on a fixed set of values of a sample always possess, a) a single value b) a value equal to one c) any value d) all of the above	K2	CO1
2	3	Whether a test is one sided or two sided depends on a) alternative hypothesis b) composite hypothesis c) null hypothesis d) simple hypothesis	K1	CO2
	4	Level of significance is the probability of a) type I error b) type II error c) not committing error d) any of the above	K2	CO2
3	5	The student's t test is applicable only when, a) the variate values are independent b) the variable is distributed normally c) the sample is not large d) all of the above	K1	CO2
	6	The mean difference between 9 paired observations is 15 and the standard deviation is 5. What is the value of t statistic is a) 27 b) 9 c) 3 d) zero	K2	CO2
4	7	What is the degrees of freedom in the case of Chi- square contingency table of order (2X2) is a) 3 b) 4 c) 2 d) 1	K1	CO3
	8	Analysis of variance utilizes a) F – test b) Z – test c) t – test d) chi – square test	K2	CO3
5	9	To test the randomness of a sample, the appropriate test is a) run test b) sign test c) median test d) U test	K1	CO3
	10	The Mann-Whitney U test is preferred then a t – test when a) data are paired b) sample sizes are small c) the assumption of normality is not met d) samples are independent	K2	CO3

Cont...

SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 × 7 = 35)

<table>
<tr><th>Module No.</th><th>Question No.</th><th>Question</th><th>K Level</th><th>CO</th></tr>
<tr><td rowspan="2">1</td><td>11.a.</td><td>Explain the concept of convenient and judgment sampling with suitable example.</td><td rowspan="2">K2</td><td rowspan="2">CO1</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>1</td><td>11.b.</td><td>Explain the Quota and snowball sampling with suitable example.</td><td></td><td></td></tr>
<tr><td rowspan="3">2</td><td>12.a.</td><td>Explain the testing procedure in single proportion test under large sample test.</td><td rowspan="3">K3</td><td rowspan="3">CO2</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>12.b.</td><td>A car company decided to introduce a new car whose mean petrol consumption is claimed to be lower than that of the existing car. A sample of 50 new cars were taken and tested for petrol consumption. It was found that mean and standard deviation of petrol consumption for the 50 cars was 30 and 3.5 km per liter respectively. Test at 5% level of significance whether the company's claim that the new car petrol consumption is 28 km per liter on the average is acceptable.</td></tr>
<tr><td rowspan="3">3</td><td>13.a.</td><td>Explain the testing procedure of two variances.</td><td rowspan="3">K3</td><td rowspan="3">CO2</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>13.b.</td><td>An IQ test was administered to 5 persons before and after they were trained. The results are given below:
<table>
<tr><th>Candidates</th><th>I</th><th>II</th><th>III</th><th>IV</th><th>V</th></tr>
<tr><td>IQ before training</td><td>110</td><td>120</td><td>123</td><td>132</td><td>125</td></tr>
<tr><td>IQ after training</td><td>120</td><td>118</td><td>125</td><td>136</td><td>121</td></tr>
</table>
Test whether there is any improvement in IQ after the training programme, test at 1% level of significance. ($t_{4\ df}$@0.01 = 4.604)</td></tr>
<tr><td rowspan="3">4</td><td>14.a.</td><td>Explain the concept of Analysis of Variance.</td><td rowspan="3">K4</td><td rowspan="3">CO3</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>14.b.</td><td>In a sample of 120 persons in a village, 76 persons were administered a new drug for preventing influenza and out of them, 24 persons were attacked by influenza and those who were not administered the new drug 12 persons were not affected by influenza.
<table>
<tr><th rowspan="2">New Drug</th><th colspan="2">Effect of Influenza</th><th rowspan="2">Total</th></tr>
<tr><th>Attacked</th><th>Not attacked</th></tr>
<tr><td>Administered</td><td>24</td><td>52</td><td>76</td></tr>
<tr><td>Not administered</td><td>32</td><td>12</td><td>44</td></tr>
<tr><td>Total</td><td>56</td><td>64</td><td>120</td></tr>
</table>
Use chi – square test for finding out whether the new drug is effective or not. ($\chi^2_{1\ df}$@5% = 3.84).</td></tr>
<tr><td rowspan="3">5</td><td>15.a.</td><td>Explain the testing procedure of sign test.</td><td rowspan="3">K4</td><td rowspan="3">CO3</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>15.b.</td><td>40 people were selected at random in the following order.
M M F F F M F F M M F M M M M F F M M F M F F M M M M F F M F M M F F M M M F
Assuming the population has 50% men and 50% women, Is true that people were selected at random. Apply run test.</td></tr>
</table>

SECTION –C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

<table>
<tr><th>Module No.</th><th>Question No.</th><th>Question</th><th>K Level</th><th>CO</th></tr>
<tr><td>1</td><td>16</td><td>Explain the methods of probability sampling.</td><td>K4</td><td>CO1</td></tr>
<tr><td>2</td><td>17</td><td>A test structure the breaking strengths of two different types of cables using a samples of $n_1 = 100$ and $n_2 = 100$ pieces of each type of cable.

<table><tr><td></td><td>Cable I</td><td>Cable II</td></tr><tr><td>Mean</td><td>1925</td><td>1905</td></tr><tr><td>Standard deviation</td><td>40</td><td>30</td></tr></table>
Do the data provide sufficient evidence to indicate a difference between the mean breaking strengths of the two cables? Use 0.01 level of significance.</td><td>K4</td><td>CO2</td></tr>
<tr><td>3</td><td>18</td><td>Two different types of drugs A and B were tried on certain patients for increasing weight, 5 persons were given drug A and 7 persons were given drug B. The increase in weight (in pounds) is given below:
<table><tr><td>Drug A</td><td>8</td><td>12</td><td>13</td><td>9</td><td>3</td><td></td><td></td></tr><tr><td>Drug B</td><td>10</td><td>8</td><td>12</td><td>15</td><td>6</td><td>8</td><td>11</td></tr></table>Do the two drugs differ significantly with regard to their effect in increasing weight? ($t_{5+7-2=10\ df}$@0.05 = 2.23)</td><td>K4</td><td>CO2</td></tr>
<tr><td>4</td><td>19</td><td>As head of a department of a consumer's research organization, you have the responsibility for testing and comparing lifetimes of four brands of electric bulbs. Suppose you test the lifetime of three electric bulbs of each of the four brands. The data is shown below, each entry representing the lifetime of an electric bulb, measured in hundreds of hours:
<table><tr><td colspan="4">Brands</td></tr><tr><td>A</td><td>B</td><td>C</td><td>D</td></tr><tr><td>20</td><td>25</td><td>24</td><td>23</td></tr><tr><td>19</td><td>23</td><td>20</td><td>20</td></tr><tr><td>21</td><td>21</td><td>22</td><td>20</td></tr></table>Can we infer that the mean lifetime of the four brands of electric bulbs are equal by applying ANOVA test .
($F_{(3,8)\ df}$@0.05 = 4.07)</td><td>K4</td><td>CO3</td></tr>
<tr><td>5</td><td>20</td><td>Explain the testing procedure of Mann-Whitney U test.</td><td>K4</td><td>CO3</td></tr>
</table>

Z-Z-Z END