PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2025
(Third Semester)

Common to Branches – **COMPUTER SCIENCE & COMPUTER TECHNOLOGY**

STATISTICS AND OPERATIONS RESEARCH

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	The median is the value that (a) Occurs most frequently (b) Divides the data into two equal halves (c) Has the smallest deviation (d) Is affected by extreme values	K1	CO1
	2	The square of the standard deviation is (a) Variance (b) Mean (c) Mode (d) Coefficient of variation	K2	CO1
2	3	The value of Karl Pearson's correlation coefficient (r) lies between (a) 0 and 1 (b) –1 and +1 (c) 0 and ∞ (d) –∞ and +∞	K1	CO2
	4	If r = 0, the regression lines are (a) Identical (b) Parallel to each other (c) Perpendicular to each other (d) Coincide	K2	CO2
3	5	The level of significance represents (a) Probability of Type I error (b) Probability of Type II error (c) Power of the test (d) Confidence coefficient	K1	CO3
	6	The null hypothesis (H_0) usually states that (a) There is no difference or no effect (b) There is a significant difference (c) Sample size is large (d) Mean equals variance	K2	C03
4	7	F-test is used to compare (a) Two means (b) Two proportions (c) Two variances (d) Two correlations	K1	CO4
	8	Mention the other name of non-parametric test? (a) Distribution-free tests (b) Parametric tests (c) Large sample tests (d) Small sample tests	K2	C04
5	9	What is the main objective of the transportation problem? (a) Maximize profit (b) Minimize transportation cost (c) Minimize production cost (d) Balance supply and demand	K1	CO5
	10	The critical path is (a) The longest path in the network (b) The shortest path (c) The path with least cost (d) The path with most float	K2	CO5

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="3">1</td><td>11.a.</td><td>Calculate arithmetic mean for the following data:
<table><tr><td>X</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr><tr><td>f</td><td>5</td><td>9</td><td>12</td><td>17</td><td>14</td><td>10</td><td>6</td></tr></table></td><td rowspan="3">K3</td><td rowspan="3">CO1</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>11.b.</td><td>Find the standard deviation for the number of days patient admitted in the hospital:
<table><tr><td>Days of confinement</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td></tr><tr><td>No.of patients</td><td>18</td><td>14</td><td>9</td><td>3</td><td>1</td></tr></table></td></tr>
<tr><td rowspan="3">2</td><td>12.a.</td><td>Define Simple Correlation and its types in brief.</td><td rowspan="3">K4</td><td rowspan="3">CO2</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>12.b.</td><td>Calculate the regression equation of X on Y from the data given below.
<table><tr><td>x</td><td>12</td><td>14</td><td>15</td><td>14</td><td>18</td><td>17</td></tr><tr><td>y</td><td>42</td><td>40</td><td>45</td><td>47</td><td>39</td><td>45</td></tr></table></td></tr>
<tr><td rowspan="3">3</td><td>13.a.</td><td>What is hypothesis and explain different types of hypotheses with an example.</td><td rowspan="3">K4</td><td rowspan="3">CO3</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>13.b.</td><td>A sample of 900 items has mean 3.4 and standard deviation 2.61. Can the sample be regarded as drawn from a population with mean 3.25 at 1% level of significance?
(The table value of z at 1% level is 2.58)</td></tr>
<tr><td rowspan="3">4</td><td>14.a.</td><td>Two samples gave the following results.,
n_1=10, $s_1^2 = 9$
n_2=12, $s_2^2 = 9$
Test whether the samples came from the population with same variances.
(Table value of F for (9,11) df at 5% level is 2.90)</td><td rowspan="3">K2</td><td rowspan="3">CO4</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>14.b.</td><td>Write a short note on non parametric test and state any five tests.</td></tr>
<tr><td rowspan="3">5</td><td>15.a.</td><td>Solve the assignment problem by using Hungarian method. Assign the jobs for different machines so as to minimize the total cost.
<table><tr><th>Jobs</th><th colspan="5">Machines</th></tr><tr><th></th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th></tr><tr><td>1</td><td>13</td><td>8</td><td>16</td><td>18</td><td>19</td></tr><tr><td>2</td><td>9</td><td>15</td><td>24</td><td>9</td><td>12</td></tr><tr><td>3</td><td>12</td><td>9</td><td>4</td><td>4</td><td>4</td></tr><tr><td>4</td><td>6</td><td>12</td><td>10</td><td>8</td><td>13</td></tr><tr><td>5</td><td>15</td><td>17</td><td>18</td><td>12</td><td>20</td></tr></table></td><td rowspan="3">K4</td><td rowspan="3">CO5</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>15.b.</td><td>Explain the concept of Programme Evaluation and Review Technique (PERT) and its procedure to find the critical path.</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>Obtain the coefficient of variation for the given data: 27, 28, 56, 59, 63, 75</td><td>K3</td><td>CO1</td></tr>
<tr><td>2</td><td>17</td><td>Calculate the Spearman's rank correlation coefficient for the following data.
<table>
<tr><td>Marks in Tamil</td><td>75</td><td>40</td><td>52</td><td>65</td><td>60</td></tr>
<tr><td>Marks in English</td><td>25</td><td>42</td><td>35</td><td>29</td><td>33</td></tr>
</table></td><td>K4</td><td>CO2</td></tr>
<tr><td>3</td><td>18</td><td>Two sales man A and B are working in a certain district. From a sample survey conducted by the head office, the following results were obtained. State whether there is any significant difference in the average sales between the two salesman
<table>
<tr><td></td><td>A</td><td>B</td></tr>
<tr><td>No. of sales</td><td>20</td><td>18</td></tr>
<tr><td>Average sales</td><td>170</td><td>205</td></tr>
<tr><td>Standard deviation</td><td>20</td><td>25</td></tr>
</table>
(The table value of t at 1% level is 2.58)</td><td>K4</td><td>CO3</td></tr>
<tr><td>4</td><td>19</td><td>There are three brands of a certain powder. A set of 120 sample values is examined and found to be allocated among four groups (A,B,C and D) and three brands (I, II, III) as shown here.,
<table>
<tr><th>Brands</th><th colspan="4">Groups</th></tr>
<tr><th></th><th>A</th><th>B</th><th>C</th><th>D</th></tr>
<tr><td>I</td><td>0</td><td>4</td><td>8</td><td>15</td></tr>
<tr><td>II</td><td>5</td><td>8</td><td>13</td><td>6</td></tr>
<tr><td>III</td><td>18</td><td>19</td><td>11</td><td>13</td></tr>
</table>
Using One way ANOVA, test whether there is any significant difference in brand preference.
(Table value of F at 5% level for (2,9)df=4.26)</td><td>K4</td><td>CO4</td></tr>
<tr><td>5</td><td>20</td><td>Consider the following project whose activities alone with PERT time estimates, the optimistic time (a), most likely (m), and the pessimistic time (b) and given as follows.,
<table>
<tr><td>Activity</td><td>a(days)</td><td>m(days)</td><td>b(days)</td></tr>
<tr><td>1-2</td><td>12</td><td>14</td><td>21</td></tr>
<tr><td>1-3</td><td>7</td><td>10</td><td>16</td></tr>
<tr><td>3-5</td><td>4</td><td>6</td><td>10</td></tr>
<tr><td>3-4</td><td>36</td><td>40</td><td>60</td></tr>
<tr><td>4-6</td><td>12</td><td>15</td><td>24</td></tr>
<tr><td>5-6</td><td>6</td><td>8</td><td>12</td></tr>
<tr><td>6-7</td><td>9</td><td>12</td><td>18</td></tr>
<tr><td>6-8</td><td>6</td><td>10</td><td>15</td></tr>
<tr><td>7-8</td><td>4</td><td>5</td><td>7</td></tr>
<tr><td>8-9</td><td>8</td><td>10</td><td>14</td></tr>
</table>
Construct the network diagram and find the critical path. Determine the project completion time and its variance.</td><td>K5</td><td>CO5</td></tr>
</table>

Z-Z-Z END