PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BCA DEGREE EXAMINATION DECEMBER 2025
(First Semester)

Branch – **COMPUTER APPLICATIONS**

STATISTICS FOR COMPUTER APPLICATIONS

Time: Three Hours Maximum: 75 Marks

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

Question No.	Question	K Level	CO
1	The empirical relationship between Mean, Median, and Mode is given by which of the following formulas? (a) Mean = 3 Median – 2 Mode (b) Mode = 3 Median – 2 Mean (c) Median = 3 Mean – 2 Mode (d) Mean = Mode + Median	K1	CO1
2	The formula for population standard deviation is: (a) $\sigma = \sqrt{[\Sigma(x - \mu)^2 / N]}$ (b) $\sigma = \Sigma(x - \mu)^2 / N$ (c) $\sigma = \sqrt{[\Sigma(x - \bar{x})^2 / (n - 1)]}$ (d) $\sigma = \Sigma(x - \mu) / N$	K2	CO1
3	The formula for Spearman's Rank Correlation Coefficient (ρ) is: (a) $\rho = 1 - (6d^2)/(n^3 + n)$ (b) $\rho = 1 - (6d^2)/(n^3 - n)$ (c) $\rho = 1 - (6d^2)/(n(n^2 - 1))$ (d) $\rho = 1 - (6d)/(n^2)$	K1	CO2
4	In regression analysis, the square of the correlation coefficient (r^2) is known as: (a) Coefficient of variation (b) Coefficient of determination (c) Regression coefficient (d) Standard error	K2	CO2
5	A test is said to be one-tailed if: (a) The rejection region is on both sides of the sampling distribution (b) The rejection region is only on one side of the sampling distribution (c) The acceptance region lies outside the tails (d) The test is performed twice	K1	CO3
6	In large sample tests for difference between two means, the null hypothesis is usually stated as: (a) $H^0: \mu^1 - \mu^2 = 0$ (b) $H_0 : \mu_1 + \mu_2 = 0$ (c) $H_0 : \mu_1 - \mu_2 > 0$ (d) $H_0 : \mu_1 = \sigma_2$	K2	CO3
7	The t-test for a single mean is generally used when: (a) Population standard deviation is known and sample size is large (b) Population standard deviation is unknown and sample size is small (c) Population mean is unknown and sample size is large (d) Both mean and standard deviation are known	K1	CO4
8	The F-test is primarily used to: (a) Test the equality of two means (b) Test the equality of two proportions (c) Test the equality of two variances (d) Test the equality of two medians	K2	CO4
9	The transportation problem in Operations Research deals with: (a) Minimizing the number of routes between two cities (b) Allocating resources from sources to destinations at minimum cost (c) Determining the shortest path in a network (d) Maximizing profit in an assignment problem	K1	CO5
10	The main purpose of PERT is to: (a) Determine the shortest route in a network (b) Plan, schedule, and control large projects with uncertain activity times (c) Allocate resources at minimum cost (d) Optimize inventory levels in production	K2	CO5

SECTION - B (35 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Question No.	Question	K Level	CO
11.a.	The following table shows the distribution of marks obtained by 50 students in a statistics examination: Marks: 0-10 (5), 10-20 (8), 20-30 (12), 30-40 (15), 40-50 (10)	K2	CO1
	(OR)		

Cont...

11.b. The following data shows the number of children in 10 families:

Number of children (x)	Number of families (f)
0	2
1	3
2	4
3	1

Calculate the standard deviation. — K2 — CO1

12.a. Explain the scatter diagram method of studying correlation.

(OR)

12.b. Ten students were ranked according to their performance in Mathematics and Statistics. Calculate Spearman's rank correlation coefficient. — K2 — CO2

Student	Rank in Mathematics (X)	Rank in Statistics (Y)
A	1	3
B	2	5
C	3	1
D	4	2
E	5	4
F	6	7
G	7	6
H	8	9
I	9	8
J	10	10

13.a. Define null hypothesis and alternative hypothesis.

(OR)

13.b. A manufacturer claims that the average lifetime of his bulbs is 1200 hours with a standard deviation of 125 hours. A random sample of 100 bulbs was tested and found to have an average lifetime of 1170 hours. Test whether the manufacturer's claim is acceptable at 5% level of significance. — K3 — CO3

14.a. Write the procedure for t-test for difference between two mean.

(OR)

14.b. A survey was conducted to determine whether there is a relationship between gender and preference for a particular brand of smartphone. The following data was collected from 200 respondents: — K3 — CO4

	Brand A	Brand B	Brand C	Total
Male	30	40	30	100
Female	50	30	20	100
Total	80	70	50	200

Test at 5% level of significance whether there is any association between gender and brand preference.
[χ^2 -critical = 5.99]

15.a. Find an initial basic feasible solution to the following transportation problem using the north west corner rule.

		Destination I	II	III	IV	Availability
Source	1	5	3	6	2	19
	2	4	7	9	1	37
	3	3	4	7	5	34
Requirement		16	18	31	25	

(OR) — K3 — CO5

15.b. Tasks A, B, C, ...H, I constitute a project. The notation X<Y means that the task X must be finished before y can begin. With this notation
A<D, A<E, B<F, D<F, C<G, C<H, F<I, G<I.
Draw a graph to represent the sequence of tasks and find the minimum time of completion of the project, when the time (in days) of completion of each task is as follows:

Activity	A	B	C	D	E	F	G	H	I
Duration	8	10	8	10	16	17	18	14	9

SECTION -C (30 Marks)

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

<table>
<tr><th>Question No.</th><th>Question</th><th>K Level</th><th>CO</th></tr>
<tr><td>16</td><td>From the data given below state which series is more consistent?
<table>
<tr><td>Variable:</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td><td>50-60</td><td>60-70</td></tr>
<tr><td>Series A:</td><td>10</td><td>18</td><td>32</td><td>40</td><td>22</td><td>18</td></tr>
<tr><td>Series B:</td><td>18</td><td>22</td><td>40</td><td>32</td><td>18</td><td>10</td></tr>
</table></td><td>K3</td><td>CO1</td></tr>
<tr><td>17</td><td>Calculate Karl Pearson's coefficient of correlation between expenditure on advertising and sales from the data given below.
<table>
<tr><td>Advertising expenses ('000 Rs.) :</td><td>39</td><td>65</td><td>62</td><td>90</td><td>82</td><td>75</td><td>25</td><td>98</td><td>36</td><td>78</td></tr>
<tr><td>Sales (lakh Rs.):</td><td>47</td><td>53</td><td>58</td><td>86</td><td>62</td><td>68</td><td>60</td><td>91</td><td>51</td><td>84</td></tr>
</table></td><td>K4</td><td>CO2</td></tr>
<tr><td>18</td><td>Discuss the procedure of test of significance for the difference of two proportions.</td><td>K4</td><td>CO3</td></tr>
<tr><td>19</td><td>To test the significance of variation in the retail prices of a commodity in three principal cities, Mumbai, Kolkata, and Delhi, four shops were chosen at random in each city and the prices who lack confidence in their mathematical ability observed in rupees were as follows:
<table>
<tr><td>Mumbai</td><td>15</td><td>7</td><td>11</td><td>13</td></tr>
<tr><td>Kolkata</td><td>14</td><td>10</td><td>10</td><td>6</td></tr>
<tr><td>Delhi</td><td>4</td><td>10</td><td>8</td><td>8</td></tr>
</table>
Do the data indicate that the prices in the three cities are significantly different? [The table value of $F_{0.05}$ for ν_1=2 and ν_2=9 is 4.26]</td><td>K5</td><td>CO4</td></tr>
<tr><td>20</td><td>A project consists of the following activities and time estimates:
<table>
<tr><td>Activity (Weeks)</td><td>1-2</td><td>1-3</td><td>1-4</td><td>2-5</td><td>2-6</td><td>3-6</td><td>3-7</td><td>4-7</td><td>5-8</td><td>6-8</td><td>7-8</td></tr>
<tr><td>Optimistic time (t_o)</td><td>7</td><td>10</td><td>5</td><td>50</td><td>30</td><td>50</td><td>1</td><td>40</td><td>5</td><td>20</td><td>30</td></tr>
<tr><td>Most likely time (t_m)</td><td>9</td><td>20</td><td>10</td><td>65</td><td>40</td><td>55</td><td>5</td><td>48</td><td>10</td><td>27</td><td>40</td></tr>
<tr><td>Pessimistic time (t_p)</td><td>17</td><td>60</td><td>15</td><td>110</td><td>50</td><td>90</td><td>9</td><td>68</td><td>15</td><td>52</td><td>50</td></tr>
</table>
i) Draw the PERT network diagram for the project
ii) Calculate slacks for each node.
iii) Determine the critical path.
iv) What is probability of completing the project in 125 days?</td><td>K3</td><td>CO5</td></tr>
</table>

Z-Z-Z END