

**PSG COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS)**

**BCA DEGREE EXAMINATION MAY 2024  
(First Semester)**

Branch – **COMPUTER APPLICATION**

**STATISTICS & 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	With the help of histogram we can prepare: a) Frequency polygon                      b) Frequency curve c) Frequency distributions                d) All the above	K1	CO1
	2	Extreme value have no effect on: a) Average   b) Median   c) Mode   d) Geometric mean	K2	CO1
2	3	The Correlation value r is exactly 1 indicates: a) Perfect positive                              b) Perfect negative c) Zero correlation                              d) Linear correlation	K1	CO1
	4	To test an Hypothesis about proportion of items in a data, the test is a) t- test   b) F-test                      c) Z-test   d) None of the above	K2	CO3
3	5	Equality of several normal population means can be tested by: a) F-test   b) Z-test                      c) t- test   d) None of the above	K1	CO3
	6	The value of coefficient of contingency lies between: a) 0 and ∞   b) 0 and 1                      c) 0 to 100   d) -1 and +1	K2	CO3
4	7	Any feasible solution which optimizes the objective function of an LPP is called a) Bounded Solution                              b) Optimal Solution c) Unique solution                              d) None of the above	K1	CO4
	8	The optimal solution from both the Primal and Dual LPP should be: a) Equal   b) Unequal                      c) Zero   d) None of the above	K2	CO4
5	9	In a Transportation problem, the number of allocations is equal to m+n-1 is called, a) Non-degenerate solution                      b) Degenerate solution c) Unique solution                              d) None of the above	K1	CO4
	10	The Critical path method was developed by: a) Kelly   b) Walker                      c) D.W. Miller   d) Both(a) and (b)	K2	CO5

**SECTION - B (35 Marks)**

Answer **ALL** questions

ALL questions carry **EQUAL** Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO																			
1	11.a.	Draw a Histogram for the following data.	K3	CO1																			
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Class</td> <td>0-10</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> <td>70-80</td> <td>80-90</td> </tr> <tr> <td>f</td> <td>4</td> <td>6</td> <td>7</td> <td>14</td> <td>16</td> <td>14</td> <td>8</td> <td>16</td> <td>5</td> </tr> </table>			Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	f	4	6	7	14	16	14	8	16
	Class	0-10			10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90											
f	4	6	7	14	16	14	8	16	5														
(OR)																							
11.b.		The following is the distribution of marks of 80 students in a class. Apply coefficient of variation.																					
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Marks</td> <td>0-10</td> <td>10-20</td> <td>20-30</td> <td>30-40</td> <td>40-50</td> </tr> <tr> <td>No. of students</td> <td>12</td> <td>13</td> <td>21</td> <td>19</td> <td>15</td> </tr> </table>			Marks	0-10	10-20	20-30	30-40	40-50	No. of students	12	13	21	19	15							
		Marks			0-10	10-20	20-30	30-40	40-50														
No. of students	12	13	21	19	15																		

Cont...

2	12.a.	Apply the Coefficient of Correlation between X- Advertisement Expenditure and Y-Sales. <table border="1"> <tr> <td>X</td> <td>10</td> <td>12</td> <td>18</td> <td>8</td> <td>13</td> <td>20</td> <td>22</td> <td>15</td> <td>5</td> <td>17</td> </tr> <tr> <td>Y</td> <td>88</td> <td>90</td> <td>94</td> <td>86</td> <td>87</td> <td>92</td> <td>96</td> <td>94</td> <td>88</td> <td>85</td> </tr> </table>	X	10	12	18	8	13	20	22	15	5	17	Y	88	90	94	86	87	92	96	94	88	85	K3	CO3							
	X	10	12	18	8	13	20	22	15	5	17																						
Y	88	90	94	86	87	92	96	94	88	85																							
12.b.	(OR) The mean life time of sample of 100 light tubes produced by a company is computed to be 1570 hours with a standard deviation of 120 hours. The company claims that the average life of the tubes produced by the company is 1600 hours. Using the level of significance of .05 is the claim acceptable?																																
3	13.a.	Explain the testing procedure of F-test for testing two variances.	K5	CO3																													
	13.b.	(OR) A Typist in a company commits the following number of mistakes per page in typing 432 pages? <table border="1"> <tr> <td>No. of mistakes per page</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td>No. of pages</td> <td>223</td> <td>142</td> <td>48</td> <td>15</td> <td>4</td> <td>0</td> </tr> </table> Fit a Poisson law to the above information.			No. of mistakes per page	0	1	2	3	4	5	No. of pages	223	142	48	15	4	0															
No. of mistakes per page	0	1	2	3	4	5																											
No. of pages	223	142	48	15	4	0																											
4	14.a.	Food X contains 6 units of vitamins A per gram and 7 units of vitamin B per gram and costs 12 paisa per gram. Food Y contains 8 units of vitamins A per gram and 12 units of vitamin B per gram and costs 20 paisa per gram. Daily minimum requirements of vitamin A and vitamin B are 100 units and 120 units respectively. Find the minimum cost of product mix using graphic method.	K4	CO4																													
	14.b.	(OR) Solve by graphical method: Maximize $Z=3X_1+4X_2$ Subject to $4X_1+2X_2 \leq 80$ $2X_1+5X_2 \leq 180$ and $X_1, X_2 \geq 0$																															
5	15.a.	Find an initial basic feasible solution by North West Corner method. <table border="1"> <tr> <td></td> <td>D<sub>1</sub></td> <td>D<sub>2</sub></td> <td>D<sub>3</sub></td> <td>D<sub>4</sub></td> <td>Supply</td> </tr> <tr> <td>O<sub>1</sub></td> <td>11</td> <td>13</td> <td>17</td> <td>14</td> <td>250</td> </tr> <tr> <td>O<sub>2</sub></td> <td>16</td> <td>18</td> <td>14</td> <td>10</td> <td>300</td> </tr> <tr> <td>O<sub>3</sub></td> <td>21</td> <td>24</td> <td>13</td> <td>10</td> <td>400</td> </tr> <tr> <td>Demand</td> <td>200</td> <td>225</td> <td>275</td> <td>250</td> <td></td> </tr> </table>		D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	Supply	O <sub>1</sub>	11	13	17	14	250	O <sub>2</sub>	16	18	14	10	300	O <sub>3</sub>	21	24	13	10	400	Demand	200	225	275	250		CO5
		D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	Supply																											
O <sub>1</sub>	11	13	17	14	250																												
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O <sub>3</sub>	21	24	13	10	400																												
Demand	200	225	275	250																													
15.b.	(OR) A Project is as follows: <table border="1"> <tr> <td>Activity</td> <td>A</td> <td>B</td> <td>C</td> <td>D</td> <td>E</td> <td>F</td> <td>G</td> </tr> <tr> <td>Duration (in days)</td> <td>4</td> <td>9</td> <td>3</td> <td>8</td> <td>7</td> <td>2</td> <td>5</td> </tr> <tr> <td>Preceding activity</td> <td>-</td> <td>-</td> <td>A</td> <td>B</td> <td>B</td> <td>D</td> <td>E</td> </tr> </table> Construct the network and find the critical path and the project duration.	Activity	A	B	C	D	E	F	G	Duration (in days)	4	9	3	8	7	2	5	Preceding activity	-	-	A	B	B	D	E								
Activity	A	B	C	D	E	F	G																										
Duration (in days)	4	9	3	8	7	2	5																										
Preceding activity	-	-	A	B	B	D	E																										

**SECTION -C (30 Marks)**

Answer ANY THREE questions

ALL questions carry EQUAL Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO																						
1	16	The following table gives the marks of 7 students. Determine Mean, Median and Mode. <table border="1"> <tr> <td>Marks</td> <td>11-20</td> <td>21-30</td> <td>31-40</td> <td>41-50</td> <td>51-60</td> <td>61-70</td> <td>71-80</td> </tr> <tr> <td>No.of students</td> <td>42</td> <td>38</td> <td>120</td> <td>84</td> <td>48</td> <td>36</td> <td>31</td> </tr> </table>	Marks	11-20	21-30	31-40	41-50	51-60	61-70	71-80	No.of students	42	38	120	84	48	36	31	K5	CO1						
		Marks	11-20	21-30	31-40	41-50	51-60	61-70	71-80																	
No.of students	42	38	120	84	48	36	31																			
2	17	From the data given below, find: a) the two regression equations b) the most likely marks in Statistics(Y) when the marks in Mathematics (X) is 30. <table border="1"> <tr> <td>X</td> <td>25</td> <td>28</td> <td>35</td> <td>32</td> <td>31</td> <td>36</td> <td>29</td> <td>38</td> <td>34</td> <td>32</td> </tr> <tr> <td>Y</td> <td>43</td> <td>46</td> <td>49</td> <td>41</td> <td>36</td> <td>32</td> <td>31</td> <td>30</td> <td>33</td> <td>39</td> </tr> </table>	X	25	28	35	32	31	36	29	38	34	32	Y	43	46	49	41	36	32	31	30	33	39	K4	CO2
X	25	28	35	32	31	36	29	38	34	32																
Y	43	46	49	41	36	32	31	30	33	39																

3	18	<p>The following table gives the production in kg of three Seeds A, B and C of Wheat sown in 12 plots:</p> <table border="1" data-bbox="500 453 1078 567"> <tbody> <tr> <td>Seeds A</td> <td>14</td> <td>16</td> <td>18</td> <td></td> <td></td> </tr> <tr> <td>Seeds B</td> <td>14</td> <td>13</td> <td>15</td> <td>22</td> <td></td> </tr> <tr> <td>Seeds C</td> <td>18</td> <td>16</td> <td>19</td> <td>19</td> <td>20</td> </tr> </tbody> </table> <p>Is there any significant difference in the production of three Seeds.</p>	Seeds A	14	16	18			Seeds B	14	13	15	22		Seeds C	18	16	19	19	20	K4	CO3														
Seeds A	14	16	18																																	
Seeds B	14	13	15	22																																
Seeds C	18	16	19	19	20																															
4	19	<p>Determine the decision variables by Simplex method.            Maximize <math>Z=5X_1+3X_2</math>            Subject to <math>X_1 + X_2 \leq 2</math>  <math>5X_1 + 2X_2 \leq 10</math>  <math>3X_1 + 8X_2 \leq 12</math>            and <math>X_1, X_2 \geq 0</math></p>	K4	CO4																																
5	20	<p>A Small project is composed of seven activities whose time estimates are given in the following table:</p> <table border="1" data-bbox="500 947 1198 1114"> <thead> <tr> <th>Activity</th> <th>1-2</th> <th>1-3</th> <th>1-4</th> <th>2-5</th> <th>3-5</th> <th>4-6</th> <th>5-6</th> </tr> </thead> <tbody> <tr> <td><math>t_o</math></td> <td>1</td> <td>1</td> <td>2</td> <td>1</td> <td>2</td> <td>2</td> <td>3</td> </tr> <tr> <td><math>t_m</math></td> <td>1</td> <td>4</td> <td>2</td> <td>1</td> <td>5</td> <td>5</td> <td>6</td> </tr> <tr> <td><math>t_p</math></td> <td>7</td> <td>7</td> <td>8</td> <td>1</td> <td>14</td> <td>8</td> <td>15</td> </tr> </tbody> </table> <p>i) Draw the project network and identify all the paths through it.            ii) Determine the expected project length.            iii) Calculate the Standard deviation and variance of the project length.</p>	Activity	1-2	1-3	1-4	2-5	3-5	4-6	5-6	$t_o$	1	1	2	1	2	2	3	$t_m$	1	4	2	1	5	5	6	$t_p$	7	7	8	1	14	8	15	K4	CO5
Activity	1-2	1-3	1-4	2-5	3-5	4-6	5-6																													
$t_o$	1	1	2	1	2	2	3																													
$t_m$	1	4	2	1	5	5	6																													
$t_p$	7	7	8	1	14	8	15																													

Z-Z-Z

END