

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BCom DEGREE EXAMINATION DECEMBER 2024
(Second Semester)

Branch – **COMMERCE (BUSINESS ANALYTICS)**

OPTIMIZATION TECHNIQUES FOR BUSINESS ANALYTICS

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	Linear programming problems involving two decision variables can easily be solved by a) Graphical Method b) Simplex Method c) Dual simplex method d) Gomory's method	K1	CO1
	2	Any solution to a general L.P.P. which also satisfies the non-negative restrictions is called a ----- solution to the general L.P.P a) Optimum b) Feasible c) Basic d) Unbounded	K2	CO1
2	3	In the Northwest corner method the allocations are made a) Starting from the lowest requirement and satisfying first b) Starting from the lowest cost cell c) Starting from the right -hand side top corner d) Starting from the left-hand side top corner	K1	CO2
	4	The assignment problem solved by a) Hungarian method b) Complex method c) Graphical method d) Vector method	K2	CO2
3	5	Game theory models are classified by the a) Number of Players b) Sum of all payoffs c) Number of Strategies d) All of these	K1	CO3
	6	The games with saddle points are a) Probabilistic in nature b) Normative in nature c) Stochastic in nature d) Deterministic in mature	K2	CO3
4	7	The full form of PERT is a) Program Evaluation and Review Technique b) Program Evaluation and Rate Technology c) Program Evaluation and Robot Technique d) Program Evaluation and Robot Technology	K1	CO4
	8	What is the definition of critical path a) It's a path that connects the starting and ending nodes b) It combines all of the paths c) It is the shortest path d) It is the most direct route	K2	CO4
5	9	The time between the starting of the first job and completion of the last job in sequencing problems is called a) Total time b) Assignment time c) Elapsed time d) idle time	K1	CO5
	10	A sequencing problem is infeasible in case of a) 1 machine 'n' jobs b) 2 machines and 'n' jobs c) 3 machines and 'n' jobs d) 2 jobs and 'n' machines	K2	CO5

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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.	Interpret and write the standard form of the following LPP. Minimize $Z = 2x_1 + x_2 + 4x_3$ Subject to the constraints $-2x_1 + 4x_2 \leq 4$ $x_1 + 2x_2 + x_3 \geq 5$ $2x_1 + 3x_3 \leq -2$ $x_1, x_2, x_3 \geq 0.$	K2	CO1																														
	(OR)																																	
	11.b.	A dietician wishes to mix two types of food in such a way that the vitamin contents of the mixture contain at least 8 units of vitamin A and 10 units of vitamin B. Food I contains 2 units per kg of vitamin A and 1 unit per kg of vitamin B while the food II contains 1 unit per kg of vitamin A and 2 units per kg of vitamin B. It costs Rs 5 per kg to purchase food I and 8 per kg to purchase food II. Interpret and formulate the problem as a LPP.																																
2	12.a.	Solve for finding the feasible solution of the following Transportation problem by North-West Corner Method. <table><tr><td></td><td>D₁</td><td>D₂</td><td>D₃</td><td>D₄</td><td>Availability</td></tr><tr><td>O₁</td><td>6</td><td>4</td><td>1</td><td>5</td><td>14</td></tr><tr><td>O₂</td><td>8</td><td>9</td><td>2</td><td>7</td><td>16</td></tr><tr><td>O₃</td><td>4</td><td>3</td><td>6</td><td>2</td><td>5</td></tr><tr><td>Requirement</td><td>6</td><td>10</td><td>15</td><td>4</td><td>35</td></tr></table>		D ₁	D ₂	D ₃	D ₄	Availability	O ₁	6	4	1	5	14	O ₂	8	9	2	7	16	O ₃	4	3	6	2	5	Requirement	6	10	15	4	35	K3	CO2
		D ₁	D ₂	D ₃	D ₄	Availability																												
	O ₁	6	4	1	5	14																												
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Requirement	6	10	15	4	35																													
(OR)																																		
12.b.	Solve the following assignment problem <table><tr><td></td><td>I</td><td>II</td><td>III</td><td>IV</td></tr><tr><td>A</td><td>10</td><td>12</td><td>19</td><td>11</td></tr><tr><td>B</td><td>5</td><td>10</td><td>7</td><td>8</td></tr><tr><td>C</td><td>12</td><td>14</td><td>13</td><td>11</td></tr><tr><td>D</td><td>8</td><td>15</td><td>11</td><td>9</td></tr></table>		I	II	III	IV	A	10	12	19	11	B	5	10	7	8	C	12	14	13	11	D	8	15	11	9								
	I	II	III	IV																														
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B	5	10	7	8																														
C	12	14	13	11																														
D	8	15	11	9																														
3	13.a.	Solve the following game and determine the value of the game <table><tr><td></td><td colspan="2">Player B</td></tr><tr><td></td><td>I</td><td>II</td></tr><tr><td rowspan="2">Player A</td><td>I</td><td>1</td><td>5</td></tr><tr><td>II</td><td>4</td><td>2</td></tr></table>		Player B			I	II	Player A	I	1	5	II	4	2	K3	CO2																	
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		I	II																															
Player A	I	1	5																															
	II	4	2																															
(OR)																																		
13.b.	Solve the following game by using graphical method <table><tr><td></td><td>I</td><td>II</td><td>III</td><td>IV</td></tr><tr><td>I</td><td>2</td><td>1</td><td>0</td><td>-2</td></tr><tr><td>II</td><td>1</td><td>0</td><td>3</td><td>2</td></tr></table>		I	II	III	IV	I	2	1	0	-2	II	1	0	3	2																		
	I	II	III	IV																														
I	2	1	0	-2																														
II	1	0	3	2																														
4	14.a.	Construct the network for the following data and find the critical path and d project duration. <table><tr><td>Activity</td><td>1-2</td><td>1-3</td><td>2-3</td><td>2-4</td><td>3-4</td><td>4-5</td></tr><tr><td>Duration</td><td>20</td><td>25</td><td>10</td><td>12</td><td>6</td><td>10</td></tr></table>	Activity	1-2	1-3	2-3	2-4	3-4	4-5	Duration	20	25	10	12	6	10	K3	CO4																
	Activity	1-2	1-3	2-3	2-4	3-4	4-5																											
Duration	20	25	10	12	6	10																												
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4	14.b.	Explain the following terms (i) Optimistic time (ii) Most likely time (iii) Pessimistic time (iv) Expected time	K3	CO4																		
5	15.a.	Infer a sequence for the five jobs that will minimize the elapsed time <table><tr><td>Job</td><td>I</td><td>II</td><td>III</td><td>IV</td><td>V</td></tr><tr><td>Machine A</td><td>2</td><td>4</td><td>5</td><td>7</td><td>1</td></tr><tr><td>Machine B</td><td>3</td><td>6</td><td>1</td><td>4</td><td>8</td></tr></table>	Job	I	II	III	IV	V	Machine A	2	4	5	7	1	Machine B	3	6	1	4	8	K2	CO5
	Job	I	II	III	IV	V																
	Machine A	2	4	5	7	1																
Machine B	3	6	1	4	8																	
(OR)																						
15.b.	Explain the processing algorithm of n jobs 2 machines																					

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	Solve the following LPP by graphical method Maximize $Z = 2x_1 + 10x_2$ Subject to the constraints $2x_1 + 5x_2 \leq 16$ $6x_1 \leq 30$ $x_1, x_2 \geq 0$	K3	CO1																																																				
2	17	Solve for finding the feasible solution of the following Transportation problem by Vogel's approximation method. <table border="1"><tr><td></td><td>D₁</td><td>D₂</td><td>D₃</td><td>D₄</td><td>Supply</td></tr><tr><td>F₁</td><td>3</td><td>2</td><td>7</td><td>6</td><td>50</td></tr><tr><td>F₂</td><td>7</td><td>5</td><td>2</td><td>3</td><td>60</td></tr><tr><td>F₃</td><td>2</td><td>5</td><td>4</td><td>5</td><td>25</td></tr><tr><td>Demand</td><td>60</td><td>40</td><td>20</td><td>15</td><td>135</td></tr></table>		D ₁	D ₂	D ₃	D ₄	Supply	F ₁	3	2	7	6	50	F ₂	7	5	2	3	60	F ₃	2	5	4	5	25	Demand	60	40	20	15	135	K3	CO2																						
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3	18	Solve the following game by using principles of dominance rule <table border="1"><tr><td colspan="2" rowspan="2"></td><td colspan="5">Player B</td></tr><tr><td>I</td><td>II</td><td>III</td><td>IV</td><td>V</td></tr><tr><td rowspan="4">Player A</td><td>I</td><td>4</td><td>6</td><td>5</td><td>10</td><td>6</td></tr><tr><td>II</td><td>7</td><td>8</td><td>5</td><td>9</td><td>10</td></tr><tr><td>III</td><td>8</td><td>9</td><td>11</td><td>10</td><td>9</td></tr><tr><td>IV</td><td>6</td><td>4</td><td>10</td><td>6</td><td>4</td></tr></table>			Player B					I	II	III	IV	V	Player A	I	4	6	5	10	6	II	7	8	5	9	10	III	8	9	11	10	9	IV	6	4	10	6	4	K3	CO3															
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	IV	6	4	10	6	4																																																		
4	19	A project has following characteristics <table border="1"><tr><th>Activity</th><th>Most optimistic time</th><th>Most pessimistic time</th><th>Most likely time</th></tr><tr><td>1-2</td><td>1</td><td>5</td><td>1.5</td></tr><tr><td>2-3</td><td>1</td><td>3</td><td>2</td></tr><tr><td>2-4</td><td>1</td><td>5</td><td>3</td></tr><tr><td>3-5</td><td>3</td><td>5</td><td>4</td></tr><tr><td>4-5</td><td>2</td><td>4</td><td>3</td></tr><tr><td>4-6</td><td>3</td><td>7</td><td>5</td></tr><tr><td>5-7</td><td>4</td><td>6</td><td>5</td></tr><tr><td>6-7</td><td>6</td><td>8</td><td>7</td></tr><tr><td>7-8</td><td>2</td><td>6</td><td>4</td></tr><tr><td>7-9</td><td>5</td><td>8</td><td>6</td></tr><tr><td>8-10</td><td>1</td><td>3</td><td>2</td></tr><tr><td>9-10</td><td>3</td><td>7</td><td>5</td></tr></table> Construct a PERT network and find critical path and project completion time.	Activity	Most optimistic time	Most pessimistic time	Most likely time	1-2	1	5	1.5	2-3	1	3	2	2-4	1	5	3	3-5	3	5	4	4-5	2	4	3	4-6	3	7	5	5-7	4	6	5	6-7	6	8	7	7-8	2	6	4	7-9	5	8	6	8-10	1	3	2	9-10	3	7	5	K3	CO4
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5	20	Explain and find the optimum sequence, the total minimum elapsed time and idle time for the following sequencing problem <table><tr><td>Job</td><td>I</td><td>II</td><td>III</td><td>IV</td><td>V</td><td>IV</td></tr><tr><td>Machine A</td><td>1</td><td>3</td><td>8</td><td>5</td><td>6</td><td>3</td></tr><tr><td>Machine B</td><td>5</td><td>6</td><td>3</td><td>2</td><td>2</td><td>10</td></tr></table>	Job	I	II	III	IV	V	IV	Machine A	1	3	8	5	6	3	Machine B	5	6	3	2	2	10	K3	CO5
Job	I	II	III	IV	V	IV																			
Machine A	1	3	8	5	6	3																			
Machine B	5	6	3	2	2	10																			

Z-Z-Z

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