

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

**BCom DEGREE EXAMINATION MAY 2019
(Fourth Semester)**

Branch – **COMMERCE (BUSINESS ANALYTICS)**

OPERATIONS RESEARCH

Time : Three Hours

Maximum : 75 Marks

SECTION-A (20 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks (10 x 2 = 20)

- 1 Define degenerate solution of LPP.
- 2 Define basic feasible solution of a linear programming problem.
- 3 Define unbalanced transportation problem.
- 4 Write a note on mathematical formulation of an assignment problem.
- 5 Define saddle point of a game.
- 6 What do you mean by (i) pure strategy (ii) mixed strategy?
- 7 Explain CPM and PERT in a network analysis.
- 8 What are the three types of estimates in network diagram?
- 9 Define sequencing of jobs.
- 10 Write a short note on idle time.

SECTION - B (25 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks (5 x 5 = 25)

- 11 a Solve graphically :

$$\text{Max } z = 5x_1 + 7x_2$$

$$\text{Subject to } x_1 + x_2 \leq 4$$

$$3x_1 + 8x_2 \leq 24$$

$$10x_1 + 7x_2 \leq 35; \quad x_1, x_2 \geq 0$$

OR

- b Solve using simplex method :

$$\text{Max } z = 5x_1 + 3x_2$$

$$\text{Subject to } x_1 + x_2 \leq 2; \quad 5x_1 + 2x_2 \leq 10$$

$$3x_1 + 8x_2 \leq 12; \quad x_1, x_2 \geq 0$$

- 12 a Solve using Least Cost entry method :

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400

Requires 200 225 275 250

OR

- b Solve the assignment problem which minimizes the total man hours :

	A	B	C	D	← (Men)
Jobs	1	2	3	4	
	0	25	15	20	
	15	30	5	15	
	35	20	12	24	
	17	25	24	20	

Cont...

- 13 a Find the minimax & maximum for $\begin{pmatrix} 5 & 3 & 6 \\ 2 & 1 & 3 \\ 6 & 2 & 1 \end{pmatrix}$.

OR

- b Use Dominance property to find the value of the game :

Player B

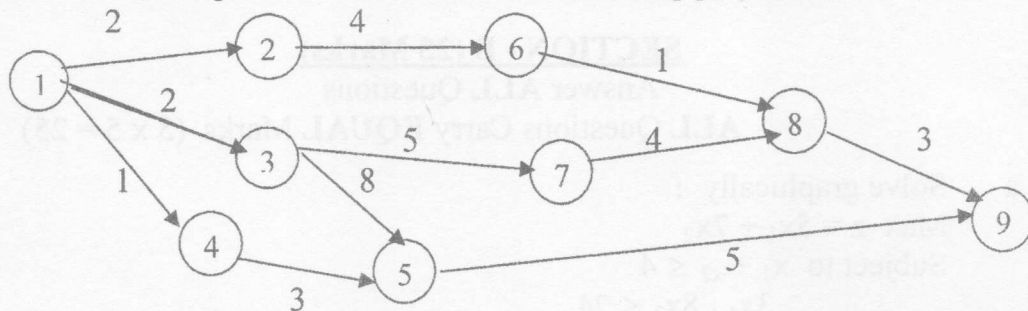
Player A	$\begin{pmatrix} 3 & -2 & 4 \\ -1 & 4 & 2 \\ 2 & 2 & 6 \end{pmatrix}$
----------	---

- 14 a Draw the network diagram of the following project. Also find the total float for each activity :

Activity	Preceding Activity	Duration (days)
1-2	--	20
1-3	--	25
2-3	1-2	10
2-4	1-2	12
3-4	1-3, 2-3	5
4-5	2-4, 3-4	10

OR

- b Find the critical path & total float of the following project :



- 15 a In a factory, there are six jobs to perform each of which should go through two machines A & B in the order A - B. Determine the optimal sequence that minimize the total elapsed time :

Job	J ₁	J ₂	J ₃	J ₄	J ₅	J ₆
Machine A	1	3	8	5	6	3
Machine B	5	6	3	2	2	10

OR

- b Write the procedure to find the optimal sequence of processing of n-jobs on m-machines.

SECTION - C (30 Marks)

Answer any **THREE** Questions

ALL Questions Carry **EQUAL** Marks (3 x 10 = 30)

- 16 Solve using simplex method :
- Min $z = x_2 - 3x_3 + 2x_5$
- Subject to $3x_2 - x_3 + 2x_5 \leq 7$
- $-2x_2 + 4x_3 \leq 12$
- $-4x_2 + 3x_3 + 8x_5 \leq 10$
- and $x_2, x_3, x_5 \geq 0$

- 17 Solve the assignment problem :

	I	II	III	IV	V
1	11	17	8	16	20
2	9	7	12	6	15
3	13	16	15	12	16
4	21	24	17	28	26
5	14	10	12	11	15

- 18 Solve the game graphically :

		Player B		
Player A	3	-3	4	
	-1	1	-3	

- 19 Draw the network diagram of :

Activity	Predecessor
A	-
B	-
C	A
D	B
E	C
F	B
G	C, D
H	G, F
I	E
J	H,
K	J

- 20 Find the sequence that minimize the total time required to performing the following jobs on 3 machines in the order ABC :

	Jobs					
Processing time (hours) on :	1	2	3	4	5	6
Machine A :	8	3	7	2	5	1
Machine B :	3	4	5	2	1	6
Machine C :	6	7	6	9	10	9

Z-Z-Z

END