

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2018
(Fourth Semester)

Branch -SOFTWARE SYSTEMS
(Five year integrated)

OPERATIONS RESEARCH

Time: Three Hours

Maximum: 75 Marks

Answer ALL questions
ALL questions carry EQUAL marks (5x15 = 75)

1 a Define OR and state the canonical and standard form of LPP. (5)

Solve the LPP by using graphical method :

$$\text{Minimize } Z = 20x_1 + 40x_2$$

Subject to the constraints

$$36x_1 + 6x_2 > 108$$

$$3x_1 + 12x_2 > 36$$

$$20x_1 + 10x_2 > 100 \text{ and } x_1, x_2 > 0 \quad (10)$$

OR

Use simplex method to solve the following LPP

$$\text{Maximize } z = 4x_1 + 10x_2$$

Subject to the constraints

$$2x_1 + x_2 < 50, 2x_1 + 5x_2 < 100$$

$$2x_1 + 3x_2 < 90 \text{ and } x_1, x_2 > 0 \quad (15)$$

2 a Find IBFS to the following transportation problem with Vogel's approximation method (10)

		Destination				Supply
		D ₁	D ₂	D ₃	D ₄	
Origin	O ₁	5	1	3	3	34
	O ₂	3	3	5	4	15
	O ₃	6	4	4	3	12
	O ₄	4	1	4	2	19
Demand		21	25	17	17	

b State the procedure of North West Corner method. (5)

OR

c Define assignment problem and state its types. (5)

d Five men are available to do five different jobs from the cost records, that in the time (hrs) each man takes to do each job is known and is given. Solve the problem by assignment method : (10)

		Jobs				
		1	2	3	4	5
Men	A	2	9	2	7	1
	B	6	8	7	6	1
	C	4	6	5	3	1
	D	4	2	7	3	1
	E	5	3	9	5	1

A firm is considering replacement of a machine whose cost price is Rs. 17,500 and the scrap value is Rs. 500. The maintenance

Year :	1	2	3	4	5	6	7	8
Maintenance Cost (Rs.) :	200	300	3500	1200	1800	2400	3300	4500

When should the machine be replaced? (8)

Explain the types of replacement models. (7)
OR

c An individual is planning to purchase a car. A new car will cost Rs. 1,20,000. The resale value of the car at the end of the year is 85% of the previous year value. Maintenance and operation costs during the first year are Rs. 20,000 and they increase by 15% every year. The minimum resale value of car can be Rs. 40,000. When should the car be replaced to minimize average annual cost? (15)

a Explain the following : (i) Maximin (ii) Minimax (iii) Value of the game (iv) Saddle point. (8)

b For the game with the following payoff matrix, determine the optimum strategies and value of the game. (7)

	Player B	
	B ₁ B ₂	
Player A	5	1
	3	4

OR

c Define queuing system and explain the characteristics of queuing system. (10)

d In a bank, at every 15 minutes one customer arrives for cashing the cheque. The staff at the only payment counter takes 10 minutes for serving a customer on an average. State the average queue length. (5)

a A small project consists of seven activities for which the relevant data are given below :

Activity :	A	B	C	D	E	F	G
Preceding Activities :	-	-	-	A, B	A, B	C, D, E	C, D, E
Activity duration (days) :	4	7	6	5	7	6	5

(i) Draw the network and find the project completion time.
(ii) Calculate total float for each of the activities and highlight the critical path. (15)

OR

b A project has the following characteristics and time estimate. Construct the PERT network. Find the critical path and the project duration. (10)

Activity	1-2	2-3	2-4	3-5	4-5	4-6	5-7	6-7	7-8	7-9	8-10	9-10
Optimistic time :	1	1	1	3	2	3	4	6	2	4	1	3
Most likely time :	1.5	2	3	4	3	5	5	7	4	6	2	5
Pessimistic time :	5	3	5	5	4	7	6	8	6	8	3	7

c State the difference between PERT and CPM. (5)