

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

**BCom DEGREE EXAMINATION MAY 2018
(Fourth Semester)**

Branch - **COMMERCE WITH COMPUTER APPLICATIONS**

OPERATIONS RESEARCH

Time : Three Hours

Maximum : 75 Marks

SECTION-A (20 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks (10x2 = 20)

- 1 Write down the standard form of LPP.
- 2 Define surplus variable.
- 3 What is an assignment problem?
- 4 Define Economic Order Quantity (EOQ)
- 5 What is a replacement problem?
- 6 Define money value fixed replacement mode:
- 7 State any two characteristics of queuing system
- 8 What is 'no pricing rule'?
- 9 Define dummy activity.
- 10 What is mean by total float?

SECTION - B (25 Marks)

Answer **ALL** Questions

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

- 11 a Write atleast five applications of LPP.

OR

- b Define duality in LPP. Write the dual of the following primal :

$$\begin{aligned} \text{Min } Z &= 10x_1 + 15x_2 \\ \text{Subject to } &5x_1 + 7x_2 > 80 \\ &6x_1 + 7x_2 \leq 100 \\ &x_1, x_2 > 0 \end{aligned}$$

Find the initial basic feasible solution by least cost method :

	W ₁	W ₂	W ₃	W ₄	Availability
F ₁	48	60	56	58	140
F ₂	45	55	^*	60	260
F ₃	50	65	60	62	360
F ₄	52	64	s>	61	220
Requirement	200	320	250	210	

OR

- b Find the optimum order quantity for a product for which the price breaks are as follows :

Quantity	Unit cost (Rs.)
$0 < Q_1 < 500$	10.00
$500 < Q_2$	9.25

The monthly demand for the product is 200 units, the cost of storage is 2% of the unit cost and the cost of ordering is Rs. 350.

- i 3 a Explain the group replacement with example.

OR

- b The data collected in running a machine, the cost of which Rs. 60,000 are given below :

Year :	1	2	3	4	5
Resale value (Rs.) :	42,000	30,000	20,400	14,400	9,650
Cost of spares (Rs.) :	4,000	4,270	4,880	5,700	6,800
Cost of labour (Rs.) :	14,000	16,000	18,000	21,000	25,000

Determine the optimum period for replacement of the machine.

14 a Explain the characteristics of queuing Models.

OR

b What are the basic steps used in sequencing?

15 a Explain the rules of network construction.

OR

b Explain (i) Pessimistic time (ii) Optimistic time.

SECTION - C (30 Marks!)

Answer any **THREE** Questions

ALL Questions Carry **EQUAL** Marks (3x10 = 30)

16 Use simplex method to solve the following LPP :

$$\text{Max } z = 4x_1 + 5x_2$$

$$\text{Subject to } 20x_1 + x_2 \leq 50$$

$$2x_1 + 5x_2 \leq 100$$

$$2x_1 - 3x_2 \leq 90$$

$$x_1, x_2 \geq 0$$

17 Solve the following minimal assignment problem :

	Machine			
	A	B	C	D
1	41	72	39	52
2	22	29	49	65
3	27	39	60	51
4	45	50	48	52

18 The following failure rates have been observed for a certain type of light bulbs :

Week	:	1	2	3	4	5
Percent failing by end of week :		10	25	50	80	100

There are 1000 bulbs in use, and it costs Rs. 2 to replace an individual bulb which has burnt out. If all bulbs were replaced simultaneously it would cost 50 paise per bulb. It is proposed to replace all bulbs at fixed intervals, whether or not they have burnt out and to continue replacing burnt out bulbs as they fail. At what intervals should all the bulbs be replaced?

19 Explain the optimal sequence algorithm for n-jobs and two machines.

20 A project has the following time schedule :

Activity	Time in months	Activity	Time in months
1-2		4-6 *	
1-3	2	5-8	1
1-4	1	6-9	5
2-5	4	7-8	4
3-6	8	8-9	3
3-7	5		

Construct PERT network and compute

(i) Total float for each activity.

(ii) Critical path and its duration.

Z-Z-Z

END