PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BCom DEGREE EXAMINATION MAY 2018
(Third Semester)

Branch - **e-COMMERCE**

OPERATIONS RESEARCH

Time : Three Hours Maximum : 75 Marks

SECTION-A (20 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (1 0 x 2 = 20)

1 Define Linear Programming Problem.
2 Write standard form of LPP.
3 Define Transportation Problem.
4 When the assignment problem is said to be unbalanced?
5 What is meant by Group replacement Policy?
6 Give the average cost per unit t i m e incurred over the period n, when the time t is a discrete variable?
7 Define Sequencing Problem.
8 Define Traffic Intensity.
9 Define Network.
10 Define Total Float.

SECTION - B (25 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 5 = 25)

11 a A manufacturing firm has discontinued production of a certain profitable product line, and this has created considerable excess production capacity. Management is considering to devote this excess capacity to produce one or more of three products 1.2 and 3. The available excess capacity on the machines which might limit output, and number of machine hours required for each unit of the respective product are summarized in the following table.

Machine Type	Product 1 :	Product 2	Product 3	Available excess capacity (in machine hours per week)
Milling machine	8	_	3	250
Lathe	4		0	150
Grinder	2		1	50

The per unit contribution would be Rs.20, Rs.6 and Rs.8 respectively for product 1,2 and 3. Formulate the mathematical model.

OR

b Solve the following LPP bv Graphical method.

Maximize $z = 8x] + 6x_2$
Subject to $4xi + 2x_2 < 60$,
$2x, + 4x_2 < 48$,
$X| > 0, x_2 > 0$

12 a A manufacturer has to supply his customers 600 units of his product over year. Shortage are not allowed and the shortage costs amounts to Re.0.60 per units per year. The set-up per run is Rs.80. Find the optimum run size and the minimum average yearly cost.

OR

b Four jobs can be processed on four different machines, one job on one machine. Resulting time in minutes vary with assignments. They are given below.

12 bCont...

Jobs	Machines A	B	C	D
I	9	26	17	11
II	13	28	4	26
III	38	19	18	15
IV	19	26	24	10

13 a The cost of machine is Rs.6100 and its scrap value is only Rs.100. The maintenance costs are as follows:

Year	1	2	3 4 5	6	7	8
Maintenance Cost (in Rs.)	100	250	400 600 900	1200	1600	2000

When should the machine replaced?

OR

b The cost of machine is Rs.3000. Its running cost and resale value are as follows. Find when the machine should be replaced.

Year 1	2 3 4 5	6	7
Runnins cost (Rs.) 600	700 800 900 1000	1200	1500
Re-sale value (Rs.) 2000 1333 1000 750 500		300	300

14 a Explain the characteristic of queues.

OR

b Five jobs are performed first on machine X and then on machine Y. The time taken in hours by each job one each machine is given below.

Job	A	B	C	D	E
Machine X	6	2	10	4	i:
Machine Y	3	7	8	9	›

Determine the optimal sequence jobs that minimize the total elapsed time to complete the job.

Consider the data of the project, find its critical path and project duration.

Activity	A	B	C	D	E	F
Predecessor	-		A	A	B.C	D.E
Duration	4	7	2	9	h	5

OR

b A Project has the following time schedule:

Activity	1-2	1-3	2-4	2-5	3-4	4-5
Activity duration time (in days)	8	4	2	10	5	3

Construct the network and compute (i) total, free and independent float and (ii) critical path and its duration.

SECTION - C (30 Marks)

Answer any THREE Questions

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

16 Use Simplex method to solve the following I.PP

Maximize $z = 4x_t - 10x_2$

Subject to $2xi + x_2 < 50$.

$2X[+ 5x_2 < 100.$

$2x, + 3x_2 < 90$

$x, > 0. x_2 > 0$

17 Solve the transportation problem.

From	To I	II	III	IV	Availability
A	15	10	17	18	2
B	16	13	12	13	6
C	12	17	20	11	7
Requirement	3	3	4	5	

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

Week 1	2	3	4	5
Percentage of failure ^ by the end of the w eek	25	50	80	100

There are 1000 bulbs in use. It costs Rs.4 to replace on individual bulb which has burnt out. If all bulbs are replaced simultaneously, it costs Rs.l 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 he replaced.

19 A Telephone booth with Pci'> n arrivals has spaced 10 minutes apart on the average and exponential call lengths averaging 3 minutes.

(i) What is he probability that .:o arrival will have to wait more than 10 minutes before the phone w tree?

(ii) What is the probability tlvn n \ ill take him more than 10 minutes altogether to wait for the o n one and complete his call?

20 A Project schedule has the foil ing characteristics:

Task	(L2)	(1.3) 1. - i (2,5)	(2,6)	(3,6)	(4,7)	(5,7)	(6,7)
Least Time	5	18 > 16	15	6	7	7	3
Greatest Time	10	22 - ■ 20	25	12	12	9 ! 5	
Most Likely Time	8	20 53 | 18	20	9	10	8 4	

What is the probability that the obs on the critical path will be completed in 41.5 days.

Z-Z-Z END