Code No. 1082

FACULTY OF MANAGEMENT

MBA II – Semester Examination, July / August 2016

Subject: Operation Research

Course No. 2.5

Time: 3 Hours **Max. Marks: 80**

PART – A (10x2 = 20 Marks)
[Short Answer Type]

Note: Answer all the questions.

1. **Explain the following briefly:**
   a) Limitations of O.R.
   b) Goal programming
   c) Unbounded solution
   d) Economic interpretation of dual
   e) Degeneracy in transportation problem
   f) Travelling salesman problem
   g) Assumptions in PERT
   h) Activities in networks
   i) Traffic intensity
   j) Mixed strategy

PART – B (5x12 = 60 Marks)
[Essay Answer Type]

Note: Answer all the questions.

2 a) Give any five managerial applications of O.R.

OR

b) Define general linear programming problem. What are its characteristics? Solve the following L.P. problem graphically:

Maximize $z = 40x_1 + 30x_2$
STC $3x_1 + x_2 \le 3000$
$x_1 \le 8000$
$x_2 \le 1200$ and
$x_1, x_2 \ge 0$.

3 a) Solve the following using simplex method:

Maximize $z = 3x_1 + 6x_2 + x_3$
STC $x_1 + x_2 + x_3 \ge 6$
$x_1 + 5x_2 - x_3 \ge 4$
$x_1 + 5x_2 + x_3 \le 24$ and
$x_1, x_2, x_3 \ge 0$

OR

…2.

b) Write the dual of the following L.P. problem and solve it:

Maximize $z = 3x_1 + x_2 + 3x_3 - x_4$

STC $2x_1 - x_2 + 3x_3 + x_4 = 1$

$x_1 + x_2 - x_3 + x_4 = 3$ and

$x_1, x_2, x_3, x_4 \geq 0.$

4 a) Explain traveling salesman problem with a suitable example.

OR

b) Find an optional solution to the following transportation problem:

		Warehouse			Supply
		W_1	W_2	W_3	
Factory	F_1	16	20	12	200
	F_2	14	8	18	160
	F_3	26	24	16	90
	Demand	180	120	150	

5 a) If the indirect cost per day for the project under consideration is Rs. 300 the normal and crash time and cost estimates for various activities are as given in the following table. Determine the optimum project duration:

Activity	Normal		Crash	
	Time (days)	Cost (Rs)	Time (days)	Cost (Rs)
1-2	4	100	3	450
1-3	4	160	2	510
2-4	4	200	4	200
2-3	9	500	4	1,000
3-5	16	2,000	8	2,960
4-5	2	60	1	140
4-6	1	100	1	100
5-7	2	2,500	1	6,000
6-7	4	2,200	3	2,340
6-8	2	700	2	700
7-8	2	2,500	1	6,000

OR

5 b) For the following project, what is the probability of completing in 55 days.

Activity	t_o	t_m	t_p
1-2	4	6	8
2-3	5	7	15
2-4	4	8	12
3-6	15	20	25
3-5	10	18	26
4-6	8	9	16
5-7	4	8	12
6-7	1	2	3
7-8	6	7	8

6 a) A firm has a single channel service station following arrival and service time probability distributions:

Inter arrival time (minutes)	Probability	Service time (minutes)	Probability
10	0.10	5	0.08
15	0.25	10	0.14
20	0.30	15	0.18
25	0.25	20	0.24
30	0.10	25	0.22
		30	0.14

The customer's arrival at the service station is a random phenomenon and the time between the arrivals varies from 10 to 30 minutes. The service time varies from 5 minutes to 30 minutes. The queuing process begins at 10 a.m. and proceeds for nearly 8 hours. An arrival immediately goes to the service facility if it is free. Otherwise it waits in a queue. The queue discipline is FIFO. If the attendant's wages are Rs. 10 per hour and the customer's waiting time costs Rs. 15 per hour, then would it be an economical propertation to engage a second attendant? Use Monte Carlo simulation.

OR

b) Solve the following game:

$$\begin{array}{cc} & \text{Player B} \\ \text{Player A} = & \begin{pmatrix} 1 & -2 & 1 \\ -1 & 3 & 2 \\ -1 & -2 & 3 \end{pmatrix} \end{array}$$

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