Code No. 9092

FACULTY OF MANAGEMENT

MBA II – Semester Examination, May/June 2017

Subject: Operations 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) Characteristics of OR.
 b) Non-linear programming
 c) Linear programming problem
 d) Primal – Dual relationship
 e) Travelling salesman problem
 f) Restricted assignment problem
 g) Assumptions in PERT
 h) Total and free floats
 i) Queue discipline
 j) Pay-off matrix

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

Note: Answer all the questions using internal choice.

2 a) Define Operations Research (O.R). Explain its nature and give the managerial applications of O.R.

OR

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

Maximize $z = 7x_1 + 3x_2$
STC $\quad\quad x_1 + 2x_2 \geq 3$
$\quad\quad\quad\quad x_1 + x_2 \leq 4$
$\quad\quad\quad\quad x_1 \leq \dfrac{5}{2}$
$\quad\quad\quad\quad x_2 \leq \dfrac{3}{2}$ and
$\quad\quad\quad\quad x_1, x_2 \geq 0$

3 a) Given the L.P. problem solve using simplex method.
Maximization $z = 200x_1 + 150x_2 + 150x_3$
STC $\quad\quad\quad 10x_1 + 3x_2 + 10x_3 \leq 100$
$\quad\quad\quad\quad\quad 5x_1 + 5x_2 + 5x_3 \leq 60$ and
$\quad\quad\quad\quad\quad x_1, x_2, x_3 \geq 0$

OR

…2.

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

Maximize $z = x_1 + x_2 + x_3$
STC $\quad\quad x_1 - 3x_2 + 4x_3 = 5$
$\quad\quad\quad\quad x_1 - 2x_2 \leq 3$
$\quad\quad\quad\quad 2x_1 - x_3 \geq 4$ and
$\quad\quad\quad\quad x_1, x_2, x_3 \geq 0$

4 a) Find an optimal solution to the following transportation problem:

		Destination					Supply
		D_1	D_2	D_3	D_4	D_5	
	S_1	5	8	6	6	3	8
Source	S_2	4	7	7	6	5	5
	S_3	8	4	6	6	4	9
Demand		4	4	5	4	8	

OR

b) Find an optimal solution to the following assignment problem.

		Job			
		a	b	c	d
Contractor	1	10	24	30	15
	2	16	22	28	12
	3	12	20	32	10
	4	9	26	34	16

5 a) Determine the maximal flow and the optimum flow in even are for the following network.
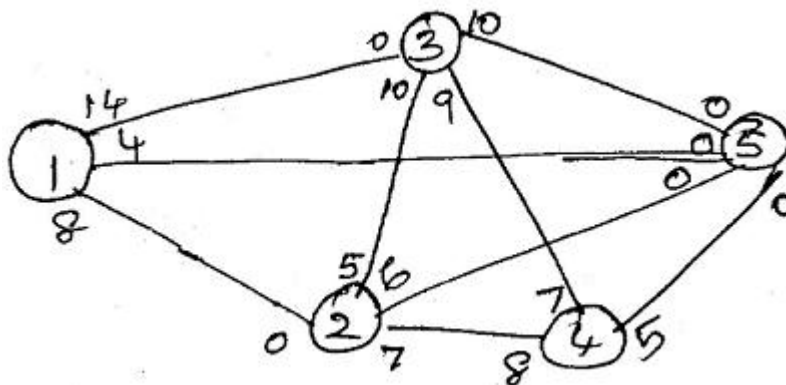
OR

…3.

b) A small project has the following details:

Activity	Predecessor	Activity time (days)		
		Optimistic	Pessimistic	Likely
A	--	3	11	7
B	A	14	28	21
C	A	11	17	14
D	A, C	2	2	2
E	B	2	8	3.5
F	D, E	10	21	14
G	E, F	3	5	4
H	E, F	4	8	4.5
I	G, H	1	4	2

i) Draw the network diagram and compute the expected completion time of the project.
ii) Find the total and free float for non-critical activities.
iii) What is the probability that the length of the project does not exceed 56 days?

6 a) Solve the following game:

Player B

$$\text{Player A} = \begin{pmatrix} 10 & 5 & 2 \\ 13 & 12 & 13 \\ 16 & 14 & 10 \end{pmatrix}$$

OR

b) Observations of past data show the following patterns in respect of inter arrival durations and service durations in a single channel queuing system. Simulate the queue behaviour for a period of 60 minutes and estimate the probability of the service being idle and the mean time by a customer waiting to be served.

Inter arrival time		Service time	
Minutes	Probability	Minutes	Probability
2	.15	1	0.10
4	0.23	3	0.22
6	0.35	5	0.35
8	0.17	7	0.23
10	0.10	9	0.10

Random numbers (Start at North-West corner and proceed along the row)

97	14	72	10
21	81	87	90
38	10	29	17
11	68	99	51
40	30	52	71

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