Paper Code: MBA-024	**Roll No.**									

MBA
(SEM II) EVEN SEMESTER THEORY EXAM, 2015-16
OPERATION RESEARCH

[Time: 3hrs] **[Max. Marks: 100]**

Note- Attempt all questions. All questions carry equal marks.

1. Attempt any four parts of the following:- **[5x4=20]**

(a) Briefly discuss the role of sensitivity analysis in linear programming.
(b) What are different types of environment under decision theory?
(c) Define float. Discuss in brief different types of float.
(d) Write the principal assumptions made while dealing with sequencing problems.
(e) What is dominance rule under Game theory?
(f) Why do arrivals and services follow Poisson and exponential distributions respectively?

2. Attempt any two parts of the following:- **[10x2=20]**

(a) "Operation research advocates a systems approach and is concerned with optimisation". Discuss.

(b) Using Simplex method, solve the problem

$Max\ Z = 2x_1 + 5x_2 + 7x_3$
Subject to,
$3x_1 + 2x_2 + 4x_3 \leq 100$
$x_1 + 4x_2 + 2x_3 \leq 100$
$x_1 + x_2 + 3x_3 \leq 100$
$x_1, x_2, x_3 \geq 0$

(c) A producer of boats has estimated the following distribution of demand for a particular kind of boat:

No. of demand	0	1	2	3	4	5	6
Probability	0.14	0.27	0.27	0.18	0.09	0.04	0.01

Each boat cost him Rs.7000 and he sells them for Rs. 10,000 each. Any boats that are left unsold at the end of season must be disposed of for Rs. 6000 each. How many boats should be in stock so as to maximise his expected profit?

3. Attempt any two parts of the following:- **[10x2=20]**

(a) Suggest optimum solution to the following assignment problem and also the maximum sales.

Salesmen	Market (Sales)			
	I	II	III	IV
A	44	80	52	60
B	60	56	40	72
C	36	60	48	48
D	52	76	36	40

(b) Solve the following LPP by graphical method:-

$Max\ \ Z = 5x_1 + 7x_2$
Subject to,
$X_1 + x_2 \leq 4$
$3x_1 + 8x_2 \leq 24$
$10x_1 + 7x_2 \leq 35$
$X_1, x_2 \geq 0$

(c) Find the optimal transportation solution with transportation cost, demand and supply as given below:

Factory	Warehouse				
	A	B	C	D	E
F	19	30	50	10	7
G	70	30	40	60	9
H	40	8	70	20	18
Demand	5	8	7	14	34

4. Attempt any two parts of the following:- **[10x2=20]**

(a) In a small town there are only two stores ABC and XYZ that handle sundry goods. Both plans to run pre-Diwali sales. Sales are advertised through a local newspaper, radio and television media. With the aid of an advertising firm the game matrix is constructed. Determine optimal strategies and worth of such strategies for both ABC and XYZ. Also find value of the game.

Strategy of ABC	Strategy of XYZ		
	Newspaper	Radio	Television
Newspaper	30	40	-80
Radio	0	15	-20
Television	90	20	50

(b) Define:- (i) Pure and mixed strategies (ii) Two person zero sum game (iii) Saddle point (iv) Payoff matrix

(c) Find the sequence that minimises the total time in hours required to complete the following tasks:

M/C	Tasks						
	A	B	C	D	E	F	G
X	3	8	7	4	9	8	7
Y	4	3	2	5	1	4	3
Z	6	7	5	11	5	6	12

5. Attempt any two parts of the following:- **[10x2=20]**

(a) The following mortality rates have been observed for a certain type of light bulb:

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

There are 1000 bulbs in use and it costs Rs. 1.00 to replace an individual bulb which has burnt out. If all bulbs are replaced simultaneously it would cost Rs. 0.25 per bulb. It is proposed to replace all bulbs at fixed intervals, and to replace individually as they fail. At what interval should all bulbs be replaced? Which replacement policy is preferred (individual or group)?

(b) A project schedule has the following characteristics:

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

Draw network diagram. Find Critical path, Project length and Variance of Project.

(c) Write the characteristics of M/M/1 queue model. Define the terms :-

(i) Queue discipline (ii) Balking (iii) Reneging and (iv) Jockeying.