

**M.B.A.-I (Sem.-II) Examination**  
**Management Science**  
**May-2017**

Time : 3 Hours]

[Max. Marks : 100

- Instructions: (1) This paper contains **FIVE** questions.  
 (2) All questions are compulsory.  
 (3) Question No.2, 3, 4 have internal options.  
 (4) Figures in the right side in parenthesis indicate marks.  
 (5) Use of Scientific Calculator is allowed.

- Q:1 (a)** Answer the following. (Any Four) (20)
1. Infeasibility & Unboundedness in graphical method of LPP
  2. Assignment Problem
  3. Methods of Transportation Problems
  4. Travelling salesman problem
  5. Transshipment Problem

- Q:2 (a)** A firm owns facilities at six places. It has manufacturing plants at places A, B and C with daily production of 50, 40 and 60 units respectively. At point D, E and F it has three warehouses with demands of 20, 95 and 35 units respectively. Per unit shipping costs are given in the following table. If the firm wants to minimize its total transportation cost, how should it route its products? Use any method of your choice to calculate IBFS. (10)

Source/Destinations	D	E	F
A	6	4	1
B	3	8	7
C	4	4	2

- Q:2 (b)** From the following time matrix (in minutes) Solve the assignment using HAM. (10)

Worker/Job	A	B	C
1	20	10	17
2	26	15	14
3	30	19	12

**OR**

- Q:2 (a)** Write a detailed note on Queuing. (10)
- Q:2 (b)** Write the dual of the following linear programming problems: (10)

- (b) Minimize  $Z = -4X_1 + 3X_2$   
 Subject to  
 $X_1 - 2X_2 \leq -4$   
 $2X_1 + 3X_2 \geq 13$   
 $-X_1 + X_2 \leq -4$   
 $X_1, X_2 \geq 0$

(P.T.O)

**Q:3 (a)**

Worker/Job	A	B	C
1	20	10	17
2	26	15	14
3	30	19	12

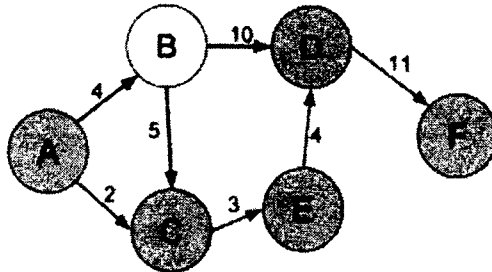
**(10)**

Formulate above assignment as zero one IPP.

**Q:3 (b)** Network Techniques **(10)**

**OR**

**Q:3 (a)** **(10)**



Calculate Shortest distance from A to F.

**Q:3 (b)** A company manufactures 29 units per day. The sale of these items depends upon demand which has the following distribution. **(10)**

Sales (units)	Probability
27	0.10
28	0.15
29	0.20
30	0.35
31	0.15
32	0.05

The production cost and sale price of each unit are Rs 40 and Rs 50, resp. Any unsold product is to be disposed off at a loss of Rs 15 per unit. There is a penalty of Rs 5 per unit if the demand is not met. Using the following random numbers, estimate the total profit/loss for the next ten days.

10, 99, 65, 99, 95, 01, 79, 11, 16, 20

**Q:4 (a)** A new shopping mall is considering setting up an information desk manned by one employee. Based on information obtained from similar information desks, it is believed that people will arrive at the desk at the rate of 20 per hour. It takes an average of 2 minutes to answer a question. **(10)**

It is assumed that arrivals are Poisson and answer times are exponentially distributed.

- (a) Find the probability that the employee is idle.
- (b) Find the proportion of the time that the employee is busy.
- (c) Find the average number of people receiving and waiting to receive information.
- (d) Find the average number of people waiting in line to get information.

E450-3

- (e) Find the average time person seeking information spends at the desk.  
(f) Find the expected time a person spends just waiting in line to have a question answered.

- Q:4 (b)** A manufacture of purse makes four styles of purse: a three-compartment bag which takes 45 min to assemble; a shoulder-strap bag, taking one hour to assemble; a tote bag, needing 45 min for assembly, and pocket purse requiring 30 min to assemble. There are 32 hrs of assembly time available per day. The profit contribution on the sale of a three- compartment bag is Rs 16, Rs 25 on a shoulder-strap bag, and Rs 12 each on tote bag and pocket purse. Special kind of fancy pins are used in decorating pocket purse and they are available for only 30 pieces. Different types of pins are used in other three types of bags of which only 70 are in stock. Enough raw materials is available for total of 60 pocket purse and tote bags which need same quantity of raw material. The manufacturer estimates a min demand of 6 pocket purses and 10 shoulder strap bags every day. Formulate a liner programming problem to optimize daily production. (10)

- Q:4 (a)** [OR] 

A's Strategy	B's Strategy	
	B1	B2
A1	8	-7
A2	-6	4

 (10)

Calculate value of the game and various probabilities associated with game modeling.

- Q:4 (b)**

Dairy	Starting Customers	Loss			End Customers
		A	B	C	
A	800	0	250	100	700
B	400	150	0	50	475
C	500	100	25	0	525

 (10)
- a. Prepare Transition Matrix  
b. Calculate Market share for 2 months from now.

- Q:5 (a)** The Electrocomp Corporation manufacturers' two electrical products: air conditioners and large fans. The assembly process for each is similar in that both require a certain amount of wiring and drilling. Each air conditioner takes 3 hours of wiring and 2 hours of drilling. Each fan must go through 2 hours of wiring and 1 hour of drilling. During the next production period, 240 hours of wiring time are available and up to 140 hours of drilling time may be used. Each air conditioner sold yields a profit of Rs. 25. Each fan assembled may be sold for Rs. 15 profit. Formulate and solve this LP production mix situation to find the best combination of air conditioners and fans that yields the highest profit. Solve the problem by using graphical method. (Graph paper not required). (20)