TKN/KS/16/5978

Bachelor of Computer Application (B.C.A.) Part—II
Semester—IV (C.B.S.) Examination

OPERATIONS RESEARCH—II

Paper—IV

Time : Three Hours] [Maximum Marks : 50

Note :— (1) **ALL** questions are compulsory and carry equal marks.

(2) Draw neat and labelled diagrams wherever necessary.

EITHER

1. (a) Define :

(i) Two person zero sum game.

(ii) Value of the game. 5

(b) Use graphical method to solve the following game and find the value of game :

	Player B			
Player A	B_1	B_2	B_3	B_4
A_1	2	2	3	–2
A_2	4	3	2	6

5

(ii) Average number of passengers waiting to be served. 5

OR

(c) What are the transient and steady states of the queuing systems ? Also explain Kendall's notation for representing queuing models. 5

(d) A television repairman finds that the time spent on his jobs has an exponential distribution with a mean of 30 minutes. If he repairs the sets in the order in which they came in, and if the arrival of the sets follows a Poisson distribution with an approximate average rate of 10 per 8-hour day, what is the repairman's expected idle time each day ? How many jobs are ahead of the average set just brought in ? 5

5. (a) Explain the following terms concerned with game theory :

(i) Saddle point

(ii) Payoff matrix. 2½

(b) An assembly is to be made from two parts X and Y. Both parts must be turned on a lathe. Y must be polished whereas X need not be polished. The sequence of activities, together with their predecessors, is given below :

Task	Time (in days)
A	8
B	9
C	7
D	10
E	11
F	9
G	10
H	8
I	7

5

(b) Discuss the role of Network construction. 5

OR

(c) Explain the following terms concerned with network techniques :

(i) Numbering the events

(ii) Activity. 5

(d) A small project is composed of 9 activities whose time estimates are listed in the following table :

Activities	Estimated duration in weeks		
	Optimistic	Most likely	Pessimistic
1—2	5	10	8
1—3	18	22	20

Activities	Estimated duration in weeks		
	Optimistic	Most likely	Pessimistic
1—4	26	40	33
2—5	16	20	18
2—6	15	25	20
3—6	6	12	9
4—7	7	12	10
5—7	7	9	8
6—7	3	5	4

Determine the following :

(i) The critical path

(ii) The earliest and latest expected completion times of each event. 5

EITHER

3. (a) What is inventory problem ? Explain the necessity of maintaining Inventory. 5

(b) A stockiest has to supply 12,000 units of a product per year to his customer. The demand is fixed and known and the shortage cost is assumed to be infinite. The inventory holding cost is Rs. 0.20 per unit per month and the ordering cost per order is Rs. 350. Determine the optimal lot size, optimal scheduling period and minimum total variable yearly cost. 5

OR

(c) Explain the roles of different costs in modelling inventory problems. 5

(d) Find the optimal order quantity of a product for which the price breaks are as follows :

Quantity (Units)	Price per unit (Rs.)
$0 \leq Q_1 < 100$	20
$100 \leq Q_2 < 200$	18
$200 \leq Q_3$	16

The monthly demand for the product is 400 units. The storage cost is 20 % of the unit cost of the product and the cost of ordering is Rs. 25 per month. 5

EITHER

4. (a) Explain the following terms :

(i) Input process of queuing

(ii) Queue discipline. 5

(b) A railway booking office has 3 counters to receive request for reservation of tickets. On an average 48 persons arrive in an 8-hour day. Each reservation clerk spends 15 minutes on an average on an arrival. If the arrivals are Poissonally distributed and service times are according to exponential distribution, find :

(i) Average number of passengers in the system.

OR

(c) Solve the following game without saddle point and find strategies for Player A and Player B :

	Player B	
Player A	B_1	B_2
A_1	6	1
A_2	–3	2

5

(d) Obtain optimum strategies for player A and Player B. Also find the value of game for the following game by Dominance Principle :

	Player B			
Player A	B_1	B_2	B_3	B_4
A_1	1	2	3	–1
A_2	2	2	1	5
A_3	3	4	0	–2
A_4	4	3	2	6

5

EITHER

2. (a) Construct the network diagram and obtain the minimum time for completion of project for the following task :

A < B ; B, C < E ; D < E, F ; F < I ; G < H

Activity	Description	Predecessor Activity
A	Open work order	—
B	Get material for X	A
C	Get material for Y	A
D	Turn X on lathe	B
E	Turn Y on lathe	B, C
F	Polish Y	E
G	Assemble X and Y	D, F
H	Pack	G

Draw a network diagram of activities for the project. 2½

(c) Explain the following terms in Inventory :

(i) Lead time

(ii) Order cycle. 2½

(d) Draw and explain structure of a queuing system. 2½