Bachelor of Computer Application (B.C.A.) 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, labelled diagrams wherever necessary.

EITHER

1. (A) Define the following terms with example :

    (i)   Saddle point

    (ii) Two-person zero sum game

    (iii) Value of the game.   5

   (B) Reduce the following game by dominance property and solve it :

Player B

		I	II	III	IV	V
	1	1	3	2	7	4
Player A	2	3	4	1	5	6
	3	6	5	7	6	5
	4	2	0	6	3	1

5

OR

   (C) Solve the following 2 × n game graphically :

Player B

$$\text{Player A} \quad \begin{array}{c} A_1 \\ A_2 \end{array} \begin{bmatrix} 2 & 1 & 0 & -2 \\ 1 & 0 & 3 & 2 \end{bmatrix}$$

with columns $B_1 \ B_2 \ B_3 \ B_4$

5

   (D) Explain decision tree with suitable example.   5

EITHER

2. (A) Define Activity. Explain different types of activities giving suitable example.   5

   (B) Following table gives the activities in a construction project and time duration :

Activity	Preceding Activity	Normal Time (days)
1—2	—	20
1—3	—	25
2—3	1—2	10
2—4	1—2	12
3—4	1—3, 2—3	5
4—5	2—4, 3—4	10

   (a) Draw the activity network of the project.

   (b) Determine the project path and the project duration.   5

OR

(C) Explain time-cost trade-off aspects in network technique with example. 5

(D) A project consists of a series of tasks labelled A, B,......,H, I with the following relationship.

(W< X, Y means X and Y can not start until W is completed ; X, Y < W means W cannot start until both X and Y are completed.) With this notation construct the network diagram having following constraints :

A < D, E ; B, D < F ; C < G ; B < H ; F, G < I. 5

EITHER

3. (A) An automobile factory manufactures a particular type of gear within the factory. This gear is used in final assembly. The particulars of these gears are demand rate r = 14000 units/year, production rate K = 35000 units/year. Set up and carrying cast Cc = Rs. 15/unit/year. Find the Economic Batch Quantity (EBQ). 5

(B) Explain inventory review system in detail. 5

OR

(C) Find the optimum order quantity for a product for which the price breaks are as follows :

Quantity	Purchasing Cost per unit (Rs.)
$0 < Q_1 < 100$	20
$100 < Q_2 < 200$	18
$200 < Q_3$	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

(D) What is meant by Inventory Control ? Explain the factors affecting inventory control. 5

EITHER

4. (A) Explain service mechanism of Queuing System. 5

(B) A supermarket has 2 girls serving at the counters. The customers arrive in a Poisson fashion at the rate of 12 per/hr. The service time for each customer is exponential with mean 6 minutes. Find :

(i) The probability that an arriving customer has to wait for service.

(ii) The average number of customers in the system. 5

OR

(C) Assume that the goods trains are coming in a yard at the rate of 30 trains per day and suppose that inter arrival time follows an exponential distribution. The service time for each train is assumed to be exponential with an average of 36 minutes. If the yard can admit 9 trains at a time, calculate the probability that the yard is empty and find the average queue length. 5

(D) Discuss multi-channel queuing theory model with properties. 5

5. Attempt *all* :

(A) Explain Laplace criteria with an example. 2½

(B) Write down the rules for network construction. 2½

(C) Define the following terms :

(i) Set-up Cost

(ii) Purchase Cost

(iii) Ordering Cost. 2½

(D) Write a note on Queue disciplines. 2½