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SARDAR PATEL UNIVERSITY

M.Sc.(QPM) / M.Sc. (Applied Statistics)
SEMESTER III (CBCS) EXAMINATION
Wednesday, 24TH October 2018
OPERATIONS RESEARCH-II **(QP-303 / PS03CAST22)**

Time : 02:00 p.m. to 05:00 p.m. Total Marks: 70

Note: Figures to the right indicate marks.

Q1 (a) Tick the correct answer. [8]

(i) Network models such as PERT and CPM are used to
(a) plan large and complex projects.
(b) schedule large and complex projects.
(c) to control large and complex projects. (d) all of the above.

(ii) In a transportation problem where the demand is equal to the supply is known as
(a) balanced transportation problem. (b) regular transportation problem.
(c) resource allocation transportation problem.
(d) simple transportation model.

(iii) VAM stands for:
(a)value added method (b) value assessment method
(c)vogel Adam method (d) Vogel's approximation method.

(iv) The horizontal and vertical lines drawn to cover all zeros of total opportunity matrix in an assignment problem must be:
(a) equal to each other,
(b) must be equal to $m \times n$ (where m and n are number of rows and columns)
(c) $m + n$ (m and n are number of rows and columns)
(d) equal to number of rows or columns.

(v) In Hungarian method of solving assignment problem, the row opportunity cost matrix is obtained by:
(a) dividing each row by the elements of the row above it,
(b) by subtracting the elements of the row from the elements of the row above it.
(c) by subtracting the smallest element from all other elements of the row.
(d) by subtracting all the elements of the row from the highest element in the matrix.

(vi) The critical path is
(a) shortest path in the network. (b)longest path in the network
(c) path with smallest variance. (d)path with largest variance.

(vii) In a Monte Carlo simulation, a variable that we might want to simulate is
(a) lead time for inventory orders to arrive.
(b) times between arrivals at a service facility.
(c) number of employees absent from work each day. (d) all of the above.

(viii) One assumption necessary for the EOQ model is instantaneous replenishment. This means
(a) the lead time is zero. (b) the production time is assumed to be zero.
(c) the entire order is delivered at one time.
(d) replenishment cannot occur until the on-hand inventory is zero.

Q2 (a) Answer the following questions (any **SEVEN**). [14]

(i) What do you understand by unbalanced transportation problem?

(ii) What do you mean by merge and burst events in a project network?

(iii) Explain what are degeneracy in transportation problem. How do you solve degeneracy in transportation problem?

(iv) How will you convert a maximization type of transportation problem into minimization one?

(v) Can there be multiple optimal solutions to an assignment problem?

(vi) What is an activity? What is an event?

(vii) What are the major differences between PERT and CPM ?

(viii) What are different types of inventories?

(ix) What is simulation?

Q3 (a) Describe the transportation problem. How would you determine whether a given transportation solution is optimal or not? [6]

(b) Solve the following transportation problem by North West corner rule. [6]

	D	E	F	Supply
A	6	4	1	50
B	3	8	7	40
C	4	4	2	60
Demand	20	95	35	

OR

(b) Obtain initial basic feasible solution of the following transportation problem by Vogel's approximation method. [6]

	D	E	F	G	Supply
A	20	21	16	18	10
B	17	28	14	16	9
C	29	23	19	20	7
Demand	6	10	4	5	

Q4 (a) What is an assignment problem? State and discuss the Hungarian Method of solving an assignment problem. [6]

(b) Five men are available to do five different jobs. From past records the time (in hours) that each man takes to do each job is known and given in the following table. [6]

Jobs	**Employees**				
	I	II	III	IV	V
A	10	5	13	15	16
B	3	9	18	13	6
C	10	7	2	2	2
D	7	11	9	7	12
E	7	9	10	4	12

Find the assignment of men to jobs that will minimize the total time taken.

OR

(b) A marketing manager has five salesmen and five sales districts. Considering the capabilities of salesman and the nature of the districts, the marketing manager estimates that sales per month (in hundred of rupees) for each salesman in each district would be as follows. [6]

Salesmen	Districts				
	A	B	C	D	E
1	32	38	40	28	40
2	40	24	28	21	36
3	41	27	33	30	37
4	22	38	41	36	36
5	29	33	40	35	39

Find the assignment of salesmen to districts that will result in maximum sales.

Q5 (a) Explain the following terms [6]
(i)Earliest start time (ii)Earliest finish time (iii)Critical path.

(b) Information on the activities required for a project is as follows. [6]

Name	Activities Node	Duration (days)
A	1-2	2
B	1-3	7
C	1-4	8
D	2-5	3
E	3-5	6
F	3-6	10
G	3-7	4
H	4-6	6
I	5-7	2
J	6-8	5
K	7-8	6

Draw the network and find the critical path.

OR

(b) Draw a network corresponding to following information. Obtain the early and late start and completion times and determine the critical path. [6]

Activity	1-2	1-3	2-6	3-4	3-5	4-6	5-6	5-7	6-7
Duration	4	6	8	7	4	6	5	19	10

Q6 (a) State and prove EOQ Model. [6]

(b) A particular item has a demand of 250 units per month. The ordering cost is Rs 100 per order and the unit holding cost is Rs 2.40 per unit per year. Determine [6]
(i) the economic lot size. (ii) the total inventory cost.
(iii) the number of orders per year.

(PTO)

OR

(b) A bakery keeps stock of a popular brand of cakes. Previous experience shows the daily demand pattern for the item with associated probabilities, as given: [6]

Daily demand (No)	0	10	20	30	40	50
Probability	0.01	0.20	0.15	0.50	0.12	0.02

Use the following sequence of random numbers to simulate the demand for the next 10 days.

Random Numbers :

25	39	65	76	12	05	73	89	19	49

—X—

(4)