PG – 563

IV Semester M.C.A. Examination, June/July 2018
(CBCS)
COMPUTER SCIENCE
MCA-404T : Quantitative Techniques

Time : 3 Hours Max. Marks : 70

Instructions : *Answer* ***any five*** *from Part –* ***A*** *and* ***any four*** *from Part –* ***B***.

PART – A

Answer **any five** of the following. **Each** question carries **six** marks. **(5x6=30)**

1. Define operations research. Explain its features.

2. A company produces 2 types of hats. Every hat A requires twice as much labour time as the second hat B. If the company produces only hat B, then it can produce a total of 500 hats a day. The market limits daily sales of hat A and B to 150 and 250 respectively. The profits on hat A and B are Rs. 8 and Rs. 5 respectively. Formulate and solve the LP problem graphically.

3. For the given transportation problem, use Vogel's approximation method to obtain basic feasible solution.

Destinations

		D_1	D_2	D_3	D_4	
Plants	P_1	6	3	5	4	22
	P_2	5	9	2	7	15
	P_3	5	7	8	6	8
Demand		7	12	17	9	

4. Write a short notes on :
   a) Degeneracy in transportation problem.
   b) CPM.

P.T.O.

5. Construct a network diagram for the following project, whose activities and precedence relationships are given below :

Activities	A	B	C	D	E	F	G	H	I
Immediate Predecessor	–	A	A	–	D	B, C, E	F	D	G, H

6. For the game with pay-off matrix.

Player B

Player A	B_1	B_2	B_3
A_1	– 1	2	– 2
A_2	6	4	– 6

Determine the best strategies for players A and B. Also determine the value of game. Is this game

i) Fair ?

ii) Strictly determinable ?

7. What is Dynamic programming ? Explain the different characteristics of dynamic programming.

8. Arrivals at a telephone booth are considered to be Poisson with an average time of 10 minutes between one arrival and the next. The length of the phone call is assumed to be distributed exponentially with mean 3 minutes.

a) What is the probability that a person arriving at the booth will have to wait ?

b) Find the average number of customers in the system.

PART – B

Answer **any four** of the following. **Each** question carries **ten** marks : **(4×10=40)**

9. Solve the LPP using Simplex method.

Maximise $Z = 4x_1 + 3x_2$

Subject to $2x_1 + x_2 \leq 1000$

$x_1 + x_2 \leq 800$

$x_1 \leq 400$

$x_2 \leq 700$

Where $x_1, x_2 \geq 0$.

10. Use Big-M method to solve

Maximise $Z = 2x_1 + 3x_2 + 4x_3$

Subject to $3x_1 + x_2 + 4x_3 \leq 600$

$2x_1 + 4x_2 + 2x_3 \geq 480$

$2x_1 + 3x_2 + 3x_3 = 540$

Where $x_1, x_2, x_3 \geq 0$.

11. Obtain an optimum solution for the given transportation problem using MODI method.

	D_1	D_2	D_3	D_4	Supply ↓
S_1	19	30	50	10	7
S_2	70	30	40	60	9
S_3	40	8	70	20	18
Demand →	5	8	7	14	

12. A travelling salesman has to visit 5 cities. He wishes to start from a particular city, visit each city once and then return to his starting point. Cost of going from one city to another is shown below. Find the least cost route.

From city \ To city	A	B	C	D	E
A	∞	2	5	7	1
B	6	∞	3	8	2
C	8	7	∞	4	7
D	12	4	6	∞	5
E	1	3	2	8	∞

13. Using principle of dominance, solve the following game.

Player A \ Player B			
	3	−2	4
	−1	4	2
	2	2	6

14. The three estimates for the activities of a project are given below :

Activity	Estimate Duration (Days)		
	Optimistic	Most Likely	Pessimistic
1 – 2	5	6	7
1 – 3	1	1	7
1 – 4	2	4	12
2 – 5	3	6	15
3 – 5	1	1	1
4 – 6	2	2	8
5 – 6	1	4	7

a) Draw the project network.

b) Find out the critical path and duration of the project.

c) What is the probability that the project will be completed at least 5 days earlier than expected ?

d) What is the probability that the project will be completed by 22 days ?

PG – 392

IV Semester M.C.A. Examination, June 2017
(CBCS)
COMPUTER SCIENCE
MCA-404T : Quantitative Techniques

Time : 3 Hours Max. Marks : 70

Instructions : *Answer **any five** questions from Part – **A** and **four** questions from Part – **B**.*

PART – A

Answer **any five** of the following. **Each** question carries **6** marks. **(5×6=30)**

1. What is operations research ? Explain three types of models used in operations research, giving suitable example.

2. A company sells two different products A and B. The company makes a profit of Rs. 40 and Rs. 30 per unit on products A and B respectively. The two products are produced in a common production process and are sold in two different markets. The production process had a capacity of 30,000 man hours. It takes 3 hours to produce a unit of A and one hour to produce one unit of B. The market has been surveyed and company officials feel that maximum number of units of A that can be sold is 8,000 and the maximum of B is 12,000 units. Subject to these limitations the products can be sold in any convex combinations. Formulate the problem as a LPP and solve it by graphical method.

3. Obtain initial basic feasible solution for the given transportation problem using VAM (Vogel's Approximation Method).

Origin/Destination	A	B	C	D	Capacity
X	19	30	50	10	07
Y	70	30	40	60	09
Z	40	08	70	20	18
Demand	05	08	07	14	34 / 34

P.T.O.

4. Write a note on following :
   a) PERT and CPM.
   b) Fundamental theorem of duality.
   c) Degeneracy in transportation problem.
5. Solve the following game using dominance principle.

	Player B				
Player A	3	5	4	9	6
	5	6	3	7	8
	8	7	9	8	7
	4	2	8	5	3

6. Draw the network diagram and find the critical path.

Activities	Immediate preceding activities	Time (months)
A	None	3
B	None	5
C	None	7
D	A	9
E	C	3
F	B, D	5
G	B, D	10
H	E, F	5
I	A	6
J	G, H	12
K	E, F	8

7. What is dynamic programming ? What are the characteristics of dynamic programming problem ?
8. Arrivals at a telephone booth are considered to be Poisson, with an average time of 10 minutes between one arrival and the next. The length of a phone call is assumed to be distributed exponentially with mean three minutes.
   i) What is the probability that a person arriving at the booth will have to wait ?
   ii) What is the average length of the queue that forms from time to time ?
   iii) The telephone department will install a second booth when convinced that an arrival would have to wait at least three minutes for the phone. By how much must the flow of arrival be increased in order to justify a second booth ?

PART – B

Answer **any four** of the following. **Each** question carries **10** marks. **(4×10=40)**

9. Solve the LPP by Simplex Method

   Maximize $Z = X_1 - X_2 + 3X_3$

   Subject to $X_1 + X_2 + X_3 \leq 10$

   $2X_1 - X_3 \leq 2$

   $2X_1 - 2X_2 + 3X_3 \leq 0$

   $X_1, X_2, X_3 \geq 0$

10. Solve the following using Penalty method.

    Minimize $Z = 4X_1 + 2X_2$

    Subject to $3X_1 + X_2 \geq 27$

    $X_1 + X_2 \geq 21$

    $X_1, X_2 \geq 0$

11. Obtain the optimal (Minimization) value for the Transportation Problem.

Origin/Destination	A	B	C	Capacity
X	6	8	4	14
Y	4	9	3	12
Z	1	2	6	5
Demand	6	10	15	31 / 31

12. A marketing manager has 4 salesman and 4 sales districts. Considering the capabilities of the salesman and the nature of districts, the marketing manager estimates that sales per month (in hundred rupees) for each salesman in each district would be as follows :

	D1	D2	D3	D4
S1	92	78	64	50
S2	68	58	48	38
S3	68	58	48	38
S4	56	48	40	32

Find the assignment of salesman to districts that will results in maximum sale.

13. A salesman has to visit five cities A, B, C D and E. The distance (in hundred miles) between the five cities are as follows :

	A	B	C	D	E
A	–	7	6	8	4
B	7	–	8	5	6
C	6	8	–	9	7
D	8	5	9	–	8
E	4	6	7	8	–

If the salesman starts his journey from city A and has to visit all the cities and come back to city A, which route he should select so that the total distance travelled is minimized.

14. For the given network activities
    a) Draw the network
    b) Critical path, project duration, all types of float values
    c) Variance of the critical path
    d) Find the probability of completing the project within 70 days.

Activity	Precedence	Optimistic (days) to	Most likely tm	Pessimistic tp
A	–	2	4	6
B	A	8	12	16
C	A	14	16	30
D	B	4	10	16
E	C, B	6	12	18
F	E	6	8	22
G	D	18	18	30
H	F, G	8	14	32

PG – 505

IV Semester M.C.A. Examination, June 2016
(CBCS)
COMPUTER SCIENCE
MCA – 404 T : Quantitative Techniques

Time : 3 Hours Max. Marks : 70

PART – A

Answer **any five** of the following. **Each** question carries **6** marks. **(5×6=30)**

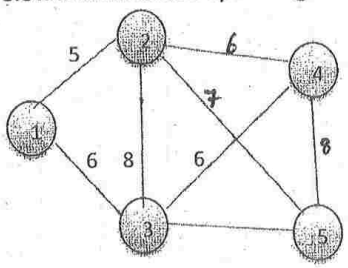
1. Define operations research. Explain the features and uses of OR.

2. Solve LPP using graphical method
   Maximize $Z = X_1 + X_2$
   Subject to $X_1 + X_2 <= 1$
   $-3X_1 + X_2 >= 3$
   $X_1, X_2 >= 0$

3. Using Least Cost Method obtain basic feasible solution

	D1	D2	D3	D4	
O1	1	2	1	4	30
O2	3	3	2	1	50
O3	4	2	5	9	20
	20	40	30	10	

4. For the Network shown below find minimum spanning tree using Kruskal's algorithm.



P.T.O.

5. For the game given whose payoff matrix is given below. Determine the best strategy for players A and B and also the value of the game. Is the game fair or strictly determinable ?

$$\begin{array}{c} \\ A \end{array}\begin{array}{c} \begin{array}{ccc} B & & \end{array} \\ \begin{bmatrix} -1 & 2 & -2 \\ 6 & 4 & -6 \end{bmatrix} \end{array}$$

6. In a public telephone booth the arrivals are on an average of 15 per hr. A call on an average takes 3 mins. If there is just one phone, find
   a) Expected number of callers in the booth at any time.
   b) The proportion of the time the booth is expected to be idle.

7. Using VAM method obtain basic feasible solution

	D	E	F	
A	1	2	6	7
B	0	4	2	12
C	3	1	5	11
	10	10	10	

8. Draw the Network Diagram for the table shown below :

a)

Activity	Predecessor
A	–
B	–
C	–
D	A
E	C
F	B, D
G	B, D
H	E, F
I	A
J	G
K	E, F

b)

Activity	Predecessor
A	–
B	–
C	A
D	A
E	I, J, K
F	B, D
G	B, D
H	F
I	A
J	G, H
K	F

PART – B

Answer **any four** of the following. **Each** question carries **10** marks. **(4×10=40)**

9. What is dynamic programming ? Explain the different characteristics of dynamic programming.

10. Solve the following using Big-M Method.

Maximize $Z = 3X_1 + 2X_2$

Subject to $2X_1 + X_2 <= 2$

$3X_1 + 4X_2 >= 12$

$X_1, X_2 >= 0$

11. Solve the following transportation problem to maximize the profit.

	D	E	F	G	
A	40	25	22	33	100
B	44	35	30	30	30
C	38	38	28	30	70
	40	20	60	30	

12. The owner of a small machine shop has 4 mechanics available to assign jobs for the day. Five jobs are offered with expected profit for each mechanic on each job as shown below. Find the assignment of mechanics to the job that result in maximizing profit which job should be declined.

JOBS ⟶

MACHINES ↓

	A	B	C	D	E
1	62	78	50	111	82
2	71	84	61	73	59
3	87	92	111	71	81
4	48	64	87	77	80

13. A travelling salesman has to visit 5 cities. He wishes to start from a particular city. Visit each city once and then return to his starting point. Cost of going from 1 city to other is shown below. Find the least cost route.

	A	B	C	D	E
A	–	4	10	14	2
B	12	–	6	10	4
C	16	14	–	8	14
D	24	8	12	–	10
E	2	6	4	16	–

14. A small maintenance project consist of the following jobs whose precedence relationship is given below :

a) Draw an arrow diagram representing the project.

b) Find the critical path and total project duration.

c) Find the total float for each activity.

Activity	1-2	1-3	2-3	2-5	3-4	3-6	4-5	4-6	5-6	6-7
Time	15	15	3	5	8	12	1	14	3	14

Chap III
Motivation skill
Goal setting
Personality development
Resume Building
Time management
self Confidence

Unit IV
1) Communication
Types of Communication

Unit V
1) Problem Solving and Decision making
2) Leadership process
3) Team player

Unit I
- Attitude
- +ve and -ve attitude
- Building self Confidence
- Etiquette and manners

Unit II
- Personality
- Levels of motivation
- public speaking
- Importance of listening and responding