

M.Com./M.Com WITH COMPUTER APPLICATION (CBCS) DEGREE

SPECIAL SUPPLEMENTARY EXAMINATION, APRIL 2020

SECOND SEMESTER

COMMERCE

QUANTITATIVE TECHNIQUES FOR DECISION MAKING

(For those who joined in July 2016 and afterwards)

Time Three hours

Maximum: 75 marks

Part-A (10x1=10 Marks)

Answer all Questions Choose the Correct answer

1. Decision Variable in an O.R Model are:
 - a. Controllable b. uncontrollable c. Parameters d. Constants
2. A constraint in an LPP is expressed as
 - a. an equation with = sign. b. inequality with \geq sign. c. inequality with \leq sign.
 - d. any of the above.
3. While solving a transportation problem the occurrence of degeneracy means that
 - a. total supply equals total demand b. the solution so obtained is not feasible
 - c. the few allocations become negative d. None of the above
4. The dummy source or destination in a T.P is introduced to
 - a. Prevent solution to become degenerate b. to satisfy rim conditions
 - c. ensure that total cost does not exceed a limit d. Solve the balanced transportation problem
5. In marking assignment, which of the following should be preferred;
 - a. only that row which have single zero b. only that column which have single zero
 - c. only a row / column that have single zero d. only column having more than one zero
6. An assignment problem can be
 - a. designed and solved as a transportation problem b. of maximization type
 - c. Solved only if number of rows equal the number of columns d. all of the above
7. The activity which can be delayed without affecting the execution of the immediate succeeding activity is determined by
 - a. total float b. free float c. independent float d. interfering float

8. When there are more than one servers, customer behavior in which he moves from one queue to another is known as
- a. balking b. jockeying c. reneging d. alternating
9. Staff replacement policy;
- a. arises due to resignation, retirement or death of a staff member from time to time
- b. is like replacement policy for items whose value deteriorate gradually
- c. can be easily formulated because people retire at known times
- d. does not yield the optimum replacement interval
10. As simulation is not an analytical model, therefore, result of simulation must be reviewed as
- a. approximation b. exact c. unrealistic d. simplified

Part-B (5x5=25 Marks)

Answer all question, choosing either (a) or (b)

11. a. What are the Uses of Operations Research
(or)

- b. Use graphical Method to Solve the LPP

$$\text{Maximize } Z = 3x_1 + 2x_2$$

$$\text{Subject to } 5x_1 + x_2 \geq 10$$

$$x_1 + x_2 \geq 6$$

$$x_1 + 4x_2 \geq 12$$

$$x_1 + x_2 \geq 0$$

12. a. Obtain the initial basic feasible solution of a transport action problem whose cost and rim Requirement table is given below:

Origin/Destination	D1	D2	D3	Supply
01	2	7	4	5
02	3	3	1	8
03	5	4	7	7
04	1	6	2	14
Demand	7	9	18	34

(or)

- b. Find the initial solution to the following T.P Using VAM

		Destination				Supply
		D1	D2	D3	D4	
Factory	F1	3	3	4	1	100
	F2	4	2	4	2	125
	F3	1	5	3	2	75
	Demand	120	80	75	25	300

13. a. A salesman is planning to tour cities B,C,D and E Starting from his home city A. The inter-city distances are shown in the following table.

City	A	B	C	D	E
A	∞	103	188	136	38
B	103	∞	262	176	52
C	188	262	∞	85	275
D	136	176	85	∞	162
E	38	52	275	162	∞

How should he plan his tour so that (i) he visits each city only once, and (ii) travels the Minimum distance

(or)

- b. There are four jobs to be assigned to five machines only one job can be assigned to one machine. The amount of time in hours required for the jobs per machine are given in the following matrix.

Job.	Machine.				
	A	B	C	D	E
1	4	3	6	2	7
2	10	12	11	14	16
3	4	3	2	1	5
4	8	7	6	9	6

Find an optimum assignment of jobs to the machine to minimize the total processing time and also find for which machine no job is assigned what is the total processing time to complete all the jobs?

14. a. Explain the distinction between PERT and CPM

(or)

- b. A T.V. repairman finds that the time spent on his job has an exponential distribution with mean 30 minutes. If the repairs sets in the order in which they come in, and if the arrival of sets is approximately poisson with an average rate of 10 per 8 hours day, What is the repairmen's expected idle time each day. How many jobs are ahead of the average set just brought in?

15. a. A firm is considering replacement of a machine, whose, cost price is Rs.12,200 and the Scrap value, Rs.200. The running (maintenance and operating) cost in rupees are found from experience to be as follows:

Year	1	2	3	4	5	6	7	8
Running cost	200	500	800	1200	1800	2500	3200	4000

When should the machine be replaced?

(or)

- b. State the classification of simulation models.

Part-C (5x8=40 Marks)

Answer all questions, either (a) or (b)

16. a. How can operations Research Models be classified ? What are the best classification in Terms of learning and understanding the fundamentals of O.R.?

(or)

- b. Use simplex method to

$$\begin{aligned} \text{Minimize } Z: & x_2 - 3x_3 + 2x_5 && \text{subject to the constraints;} \\ & 3x_2 - x_3 + 2x_5 \leq 7; && -2x_2 + 4x_3 \leq 12 \\ & -4x_2 + 3x_3 + 8x_5 \leq 10; && x_2 \geq 0; x_3 \geq 0 \text{ and} \\ & && x_5 \geq 0. \end{aligned}$$

17. a. Find the initial basic feasible solution to the following transportation problem Using VAM, given the cost matrix.

	D1	D2	D3	D4	Supply
S1	20	25	28	31	200
S2	32	28	32	41	180
S3	18	35	24	32	110
Demand	150	40	180	170	

(or)

- b. A Product is manufactured at four factories A,B,C and D. The unit production costs in them are Rs.2, Rs.3, Rs. 1 and Rs.5. respectively. Their production capacities are 50, 70,30 and 50 units respectively. These factories supply the products to four stores, demands of which as 25, 35, 105 and 20 units respectively. Unit transportation cost in rupees from each factory to each store is given in the table below:

		Stores.			
		I	II	III	IV
Factories	A	2	4	6	11
	B	10	8	7	5
	C	13	3	9	12
	D	4	6	8	3

Determine the extent of deliveries from each of the factories to each of stores so that the total production and transportation cost is minimum.

18. a. A Pharmaceutical Company is Producing a Single Product and is selling it through five agencies located in different cities. All of a sudden, there is a demand for the product in another five cities not having any agency of the company. The company is faced with the problem of decoding on how to assign the existing agencies to dispatch the product to ready cities in such a way that the travelling distance is minimized. The distance between the surplus and deficit cities (in k.m) is given in the following table.

		Deficit Cities.				
		a	b	c	d	e
Surplus Cities.	A	85	75	65	125	75
	B	90	78	66	132	78
	C	75	66	57	114	69
	D	80	72	60	120	72
	E	76	64	56	112	68

Determine the optimum assignment schedule

(or)

b. What are the different methods of solving the assignment problem? Explain the steps for solving the problem.

19. a. A Project consist of a series of tasks labelled A,B,.....H, I with the following relationships (W<X,Y means X and Y cannot start until W is completed; X,Y < W means W cannot start until both X and Y are completed) with this notation construct the net work diagram having the following constraints;

A<D, E; B ,D < F; C<G; B, G < H; F, G < I, find also the minimum time of completion of the project, when the time (in days) of completion of each table is an follows :

Task .	A	B	C	D	E	F	G	H	I
Time.	23	8	20	16	24	18	19	4	10

(or)

- b. The rate of arrival of customers at a public telephone booth follows position distribution with an average time of 10 minutes between one customer and the next. The duration of a phone call is assumed to follow exponential distribution, with mean time of 3 minutes.
- What is the probability that of person arriving at the booth will have to wait
 - What is the average length of the non – empty queues that form from time to time.
 - The BSNL will install a second booth when it is convinced that the customers would expected waiting for at least 3 minutes for their turn to make a call. By how much time should the flow of customers increase in order to justify a second booth?
 - Estimate the fraction of a day that the phone will be in use.
 - What is the probability that it will take him more than 10 minutes altogether to wait for phone and complete his call?

20. a. The following failure rates have been observed for a certain type of transistors in a digital computer:

End of the Week	1	2	3	4	5	6	7	8
Probability of Failure rate.	0.05	0.13	0.25	0.43	0.68	0.88	0.96	1.00

The cost of replacing an individual failed transistor is Rs.1.25. The decision in made to replace all these transistors simultaneously at fixed intervals, and to replace the individual transistors as they fail in service. If the cost of group replacement is 30 praise per transistor, what is the best interval between group replacement? At what group replacement price per transistor would a policy of strictly individual replacement become preferable to the adopted policy?

(or)

- b. Explain Monte – Carlo Simulation.