(i) Assuming an interest of 10% determine the present worth of future cost of the proposed machine.

(ii) Compare the new machine with presently owned machine that has an annual operating cost of Rs. 25,000 and cost of repair Rs. 7,500 in the second year with an annual increase of Rs. 2,500 in the subsequent years in life.

Or

(b) Discuss the advantages and limitations of Simulation.

Code No. : 8949   Sub. Code : KKCM 23/ KKAM 23/PKCM 22

M.Com./M.Com. with Computer Applications (CBCS) DEGREE EXAMINATION, APRIL 2019.

Second Semester

Commerce – Core

QUANTITATIVE TECHNIQUES FOR DECISION MAKING

(For those who joined in July 2016 and afterwards)

Time : Three hours   Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer:

1. A model in Operations Research is

   (a) an approximation

   (b) an idealization

   (c) an essence of reality

   (d) all of the above

2. Decision variable in the Operations Research model are

(a) Controllable (b) Uncontrollable

(c) Parameters (d) Constants

3. A constrain in an LPP restricts

(a) Value of objective function

(b) Value of the decision variable

(c) Use of available resources

(d) Uncertainty of optimum value

4. In a maximization LPP, if at least one artificial variable is in the basis, but not at zero level and the Coefficient of M in each of the net evaluation $(z_j - c_j)$ is non-negative, then we have

(a) a feasible solution

(b) non feasible solution

(c) an unbounded solution

(d) an optimum solution

5. The solution to the transportation problem with m-source and n-destination is feasible, if the numbers of allocation are

(a) $m + n - 1$ (b) $m + n + 1$

(c) $m + n$ (d) $m \times n$

6. The Vogel's approximation method

(a) The cost difference indicate the penalties for not using the respective least cost routes

(b) Initial solution to transportation problems not applicable, if some routes are prohibited

(c) Degeneracy never occurs

(d) None of the above

7. In an assignment problem involving four workers and three jobs, total number of assignment possible are

(a) 4 (b) 3

(c) 7 (d) 12

8. Maximization assignment problem is transform into a minimization problem by

(a) subtracting each element of profit matrix from the highest element of the matrix

(b) subtracting all the elements in column from the highest element of that column

(c) subtracting all the elements in row from the highest element of that row

(d) any of the above

9. PERT network each activity time assumes a β - distribution, because

   (a) it need not be symmetrical about model value

   (b) it is a uni-model distribution that provide information regarding the uncertainty of time estimates of activities

   (c) it has got finite non-negative error

   (d) all of the above

10. Priority queue discipline may be classified as

   (a) finite or infinite

   (b) limited or un limited

   (c) pre-emptive or non-pre emptive

   (d) all of the above

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Explain the various types of OR models.

   Or

   (b) State the limitations of Linear programming.

12. (a) The company has three factories at Amethi, Baghpat and Gwalior; and four distribution centers at Allahabad, Mumbai, Kolkata and New Delhi with identical cost of production at the three factories the only variable cost involved in transportation cost. The production at the three factories is 5,000 tones; 6,000 tones; and 2,500 tones respectively. The demand at the four distribution centers is 6,000 tones, 4,000 tones, 2,000 tones and 1,500 tones respectively. The transportation costs per tone from different factories to different centers are given below:

Factory	Allahabad	Mumbai	Kolkata	New Delhi
Amethi	3	2	7	6
Baghpat	7	5	2	3
Gwalior	2	5	4	5

Suggest the optimum transportation schedule and find the minimum cost of transportation.

Or

(b) A manufacturer wants to ship 8 loads of his product as shown below, The matrix gives the mileage from origin O to the destination D

Original	Destination A	Destination B	Destination C	Availability
X	50	30	220	1
Y	90	45	170	3
Z	30	200	50	4
Requirement	3	3	2	

Shipping cost are Rs. 10 per load per mile. What shipping schedule should be used?

recommendation with regard to quantity for raw materials to be blended, which will meet the quality requirements with minimum cost

Quality characteristics	Contribution to quality A	Contribution to quality B	Contribution to quality C	Minimum quality requirement
1	3	0	1	10
2	5	1	2	15
3	1	2	0	8
Cost of raw materials per unit	2	5	3	

17. (a) A particular product is manufacture in factories A, B, C, and D; and is sold at centers 1, 2, and 3. The cost (in rupees) of product per unit and capacity(in Kg) per unit time of each plant is given below:

Factory	Cost (Rs.) per unit	Capacity (kg) per unit
A	12	100
B	15	20
C	11	60
D	18	80

The sales price in rupees per unit and the demand in Kg per unit time are as follows:

Sales center	Sales price (Rs.) per unit	Demand (kg) per unit
1	15	120
2	14	140
3	16	60

Find the optimum sales distribution

Or

(b) A manufacturer must produce a certain product in sufficient quantity to meet contracted sales in next four months, The production facilities available for this product are limited But by the different amounts in respective month, The unit cost of production also varies in each month.

The product may be produced one month and then held for sale in a later month, but at an estimated storage cost of Rs 1 per unit per month, No storage cost is incurred for goods sold in the same month in which they are produced. There is no initial inventory and none is desired at the end of 4 months. Given the following table, show how much to produce in each of four months in order to minimize the total cost.

Month	Contracted sales (units)	Maximum production (units)	Unit cost of production (Rs.)
1	20	40	14
2	30	50	16
3	50	30	15
4	40	50	17

Formulate and solve the above problem as a transportation problem.

18. (a) An automobile dealer wishes to put four repairmen to four different jobs. The repairmen have somewhat different kind of skills and they exhibit different levels of

efficiency from one job to another. The dealers have estimated the number of man hours that would be require for each job-man combination.

Job Man	A	B	C	D
1	5	3	2	8
2	7	9	2	6
3	6	4	5	7
4	5	7	7	8

Find the optimum assignment that will result in minimum man hours needed.

Or

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

	JOB I	JOB II	JOB III	JOB IV	JOB V
Man A	2	9	2	7	1
Man B	6	8	7	6	1
Man C	4	6	5	3	1
Man D	4	2	7	3	1
Man E	5	3	9	5	1

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

19. (a) A project is represented by the network shown below and has the following data.

Task:	A	B	C	D	E	F	G	H	I
Optimistic time:	3	2	6	2	5	3	3	1	2
Pessimistic time:	15	14	30	8	17	15	27	7	8
Most likely time:	6	5	12	5	11	6	9	4	5

Determine the following:

(i) Expected task time and their variance.

(ii) The earliest and latest expected time to reach each event.

(iii) The critical path.

(iv) The probability of an event occurring at the proposed completion date if the original contract time of completing the project is 27 days.

Or

(b) What are the advantages and Limitations of PERT and CPM?

20. (a) AQ company is considering the purchase of new equipment of purchase price Rs. 75,000. The economic life of the equipment is expected to be 10 years. The salvage value of the machine at the end of the life will be Rs. 15,000. The annual running costs are estimated to be Rs. 35,000.