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QP CODE: 19002513 56

Reg No : ....

Name : ....

M.Com. DEGREE (C.S.S) EXAMINATION, NOVEMBER 2019

First Semester

Faculty of Commerce

Core - CM010104 - MANAGEMENT OPTIMISATION TECHNIQUES

2019 Admission Onwards

4FFBCA96

Time: 3 Hours

Maximum Weight :30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. Write a short note on simulation and heuristic models.
2. List the steps involved in the research phase of operations research.
3. Write a short note on surplus variable.
4. Write the standard form of the following LPP.

Maximize $Z = x_1 + 2x_2 + 3x_3 - x_4$

Subject to,

$x_1 + 2x_2 + 3x_3 \geq 15$

$2x_1 + x_2 + 5x_3 \leq 20$

$x_1 + 2x_2 + x_3 + x_4 = 10$

$x_1, x_2, x_3, x_4 \geq 0$

5. Explain any four application of transportation problem.
6. Give a brief note on assignment problem. Mention two applications of assignment problem.
7. What do you mean by individual repalcement?
8. The cost of a machine is Rs 6000. The salvage value (resale value) and the running costs are given as under. Find the most economical replacement age of the machine.

Year	1	2	3	4	5	6	7
Running cost	1200	1400	1600	1800	2000	2400	3000
Resale Value	4000	2666	2000	1500	1000	600	600

9. Write a short note on slack.

Turn Over

10. The sequence of activities, together with their predecessors, is given below. Develop an associated networ[k] for the project.

Activity	A	B	C	D	E	F	G	H
Preceding Activity	-	A	A	B	B,C	E	D,F	G

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. "Operations research is no more than a quantitative analysis of the problem." Comment.

12. Explain the procedure for solving minimisation problem of LP using simplex method.

13. Solve graphically

Maximize Z = 9x1 + 3x2

Subject to,

2x1 + 3x2 $\leq$ 13

2x1 + x2 $\leq$ 5

x1 , x2 $\geq$ 0

14. Solve the following Transportation problem using Least Cost Entry Method

From	*To*			*Available*
	A	*B*	*C*	
1	*50*	*30*	*220*	*1*
2	*90*	*45*	*170*	*3*
3	*250*	*200*	*50*	*4*
Requirement	*4*	*2*	*2*	

15. Find the initial basic feasible solution for the transportation problem using VAM.

Factories	Warehouses				Availability
	I	II	III	IV	
A	10	30	50	10	7
B	70	30	40	60	9
C	40	8	70	20	18
Demand	5	8	7	14	

16. RM Limited has recently installed a new machinery but has not yet decided on the appropriate number of a certain spare part required for repairs. Spare parts cost Rs 2000 each but are only avaliable if ordered now. If the plant failed and there was no spare part avaliable, the cost to the business of mending the plant rises to 15000. The plant ha an estimated life of 10 years and the probability distribution of failure during this time based on the experience with similar plant is as follows;

No. of failure over 10 years period	Probability
0	0.1
1	0.4
2	0.3
3	0.1
4	0.1
5 and over	Nil

You are required to calculate:

(a) The expected number of failures in the 10 year periods

(b) The optimal number of spares that should be purchased now.

(c) The cost now of the odering policy chosen

(d) EVPI of the number of failures in the 10 year life.

17. Compare and contrast EMV and EOL Criterion.

18. Develop a network for the project based on the following information and number the events following Fulkerson's logic:

Activity	A	B	C	D	E	F	G	H	J	K	L
Immediate Predecessors	-	A	B	B	D	B	E	E	D,F,H	C,J	K

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

*Weight **5** each.*

19. A manufacturing company produces two types of product: the super and the regular. Resource requirements for production are given below in the table. There are 1,600 hours of assembly worker hours available per week, 700 hours of paint time and 300 hours of inspection time. Regular customers will demand at least 1,500 units of the regular type and 90 of the super type.

Product Type	Profit Contribution (Rs.)	Assembly Time (hr.)	Paint Time (hr.)	Inspection Time (hr.)
Regular	50	1.2	0.8	0.2
Super	75	1.6	0.9	0.2

Formulate and solve the given linear programming problem to determine the product mix on a weekly basis.

20. Obtain an optimum optimum solution for the following transportation problem

From	To			Supply
	D_1	D_2	D_3	
S_1	7	3	4	2
S_2	2	1	3	3
S_3	3	4	6	5
Demand	4	1	5	

21. I) A milkman buys milk at Rs 12 per litre and sells for Rs 15 per litre. Unsold milk has to be thrown away. The daily demand in litres has the following probabilistic distribution

Litres	46	48	50	52	54	56	58	60	62	64
Prob.	.01	.03	.06	.1	0.2	0.25	0.15	0.1	0.05	0.05

If the day's demand is independent of previous day's demand, how many litres should he order every year.

II) Machine A cost Rs 9000 .Annual operating costs are Rs 200 for the first year and then increase by Rs 2000 every year. Determine the best age at which to replace the machine. If the optimum replacement policy is followed, what wi be the average yearly cost of owning and operating the machine? (Assume that the machine has no resale value when replaced and future cost are not discounted)

(b) Machine B cost Rs. 10,000. Annual operating costs are Rs.400 for the first year and then increases by Rs 800 every year. You have now a machine of Type A which is one year old. Should you replace it with B and if so when?

(c) Suppose you are just ready to replace Machine A with another machine of the same type when you hear that the machine B will become available in a year. What should you do?

22. A small project consists of seven activities for which the relevant data are given below:

Activity	A	B	C	D	E	F	G
Preceding Activities	-	-	-	A,B	A,B	C,D,E	C,D,E
Activity Duration(Days)	4	7	6	5	7	6	5

Draw a network and indicate the critical path on it.

1. Determine scheduling of activities and compute various floats.
2. Earliest expected and latest expected time for each event.

(2×5=10 weightage)