20P2056

Reg. No ..... Name .....

M. COM DEGREE END SEMESTER EXAMINATION - MARCH 2020

SEMESTER 2 : COMMERCE

COURSE : **16P2COMT10 : OPERATIONS RESEARCH**

(For Regular - 2019 Admission & Supplementary 2018/2017/2016 Admissions)

Time : Three Hours Max. Marks: 75

Section A
Answer any 10 (2 marks each)

1. What is iconic model?
2. What is meant by modelling in O.R?
3. What is a linear programming problem?
4. What are travelling salesmen problems?
5. What do you mean by service pattern in queuing theory?
6. At a tool service centre, the arrival rate is 2 per hour and the service potential is 3 per hour. The hourly wage paid to the attendant at the service centre is Rs 50 per hour and the hourly cost of a mechanist away from his work is 120 Rs. a) Calculate the tool cost of operating the system for an 8-hour day. b) Calculate the cost of the system if there were two attendants working together as a team, each paid Rs 50 per hour and each able to serve as an average two customers per hour.
7. What is a mixed strategy?
8. What is principle of dominance?
9. What is network analysis? When is it used?
10. What is meant by critical path? Why should we know which activities are critical?
11. What are activity variance and project variance?
12. What is forward pass in CPM?

(2 x 10 = 20)

Section B
Answer any 5 (5 marks each)

13. How is O.R. useful in the field of engineering?

14. A marketing manager wishes to allocate his annual advertising budget of Rs. 20,000 in two media A and B. The unit cost of a message in media A is Rs. 1,000 and that of B is Rs. 1,500. Media A is a monthly magazine and not more than one insertion is desired in one issue. Atleast 5 message should appear in the media B. The expected effective audience for unit message in media A is 40,000 and for media B is 55,000. Develop a mathematical model.

15. A company produces two types of cow boy hats. Each hat of the first type requires twice as much labour time as the second type. If all hats are of the second type only, the company can produce a total of 500 hats a day. The market limits daily sales of the first and second types to 150 and 250 hats. Assuming that the profit per hat are Rs. 8 and for type I and Rs 5 for type 2, formulate the problem as a linear programming model in order to determine the number of hats to be produced of each type so as to maximize the profit.

16. A company has three factories A,B and C which supply to four ware houses situated at P,Q,R and S.The monthly production capacity(tons) of A,B and C are 120,80 and 200 respectively. The monthly requirements (tons)for the warehouses P,Q,R and S are 60,50,140 and 50 respectively. The transportation cost matrix is given below. Determine the optimum transportation distribution of products to warehouses to minimise the total transportation cost.

	factories		
warehouses	A	B	C
P	4	3	7
Q	5	8	4
R	2	4	7
s	5	8	4

17. A project work consists of three major jobs for which three contractors have submitted tenders. The tender amounts in lakhs are given below. Find the assignment which minimises total cost of project assuming that each contractor has to be assigned one job.

	job		
contractors	A	B	c
1	17	25	31
2	10	25	16
3	12	14	11

18. For the following pay off matrix of firm A, determine the optimal strategies for both the firms and the value of the game (using minimax principle)

		Firm B				
Firm A	3	-1	4	6	7
	-1	8	2	4	12
	16	8	6	14	12
	1	11	-4	2	1

19. Solve graphically the game whose pay off matrix is given below:

		Player B	
		B1	B2
Player A	A1	-6	7
	A2	4	-5
	A3	1	-2
	A4	2	5
	A5	7	6

20. Construct the network diagram.
    a) A is the first operation
    b) B and C can be performed in parallel and are immediate successor to A
    c) D,E,F follow B
    d) G follows E
    e) H follows D, but it cannot start until E is complete
    f) I and J succeed G
    g) F and J precede K
    h) H and I precede L
    i) M succeeds L and K
    j) The last operation N succeeds M and C

(5 x 5 = 25)

Section C
Answer any 3 (10 marks each)

21. Give any three definitions of O.R. and explain. Give three reasons why most definitions of O.R. are not satisfactory.

22. Solve: Minimize $Z = 3X_1 + 8X_2$
Subject to $X_1 + X_2 = 200$
$X_1 \leq 80$
$X_2 \geq 60$
$X_1 , X_2 \geq 0$

23. Solve the assignment problem.

		job			
machine	1	2	3	4	5
A	5	11	10	12	4
B	2	4	6	3	5
C	3	12	5	14	6
D	6	14	4	11	7
E	7	9	8	12	5

24. From the following pay-off table, transform the zero sum game into an equivalent liner programming problem and solve it by simplex method.

		Player B		
		B1	**B2**	**B3**
Player A	**A1**	9	1	4
	A2	0	6	3
	A3	5	2	8

25. Draw the network diagram from the following activities and find the critical path and total slack of activities. What is the project duration?

Job	A	B	C	D	E	F	G	H	I	J	K
Job (days) time	13	8	10	9	11	10	8	6	7	14	18
immediate predecessor	NONE	A	B	C	B	E	D&F	E	H	G&I	J

(10 x 3 = 30)