

Reg. No

Name

19P2056

M. COM DEGREE END SEMESTER EXAMINATION - MARCH/APRIL 2019

SEMESTER 2 : COMMERCE

COURSE : 16P2COMT10 : OPERATIONS RESEARCH

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

Time : Three Hours

Max. Marks: 75

Section A

Answer any 10 (2 marks each)

1. What is operation research?
2. What do you mean by Management Optimisation Techniques?
3. What is a linear programming problem?
4. What are travelling salesmen problems?
5. What is pay off matrix?
6. What is zero sum game?
7. Find the value of the game for the following pay off matrix

	Y	
X	1	-2
	2	-1
8. What is waiting time in queuing theory?
9. Define an 'event' and 'activity'.
10. What is critical path method?
11. What is meant by critical path? Why should we know which activities are critical?
12. What is Interfering Float?

(2 x 10 = 20)

Section B

Answer any 5 (5 marks each)

13. Explain the use of O.R. in management?
14. Show that the solution to the following LPP is unbounded.
Max: $Z = 2X_1 + 3X_2$
St $X_1 - X_2 \leq 2$; $X_1 + X_2 \geq 4$; $X_1, X_2 \geq 0$
15. A farmer has 100 acre farm. He can sell all tomatoes, lettuce or radishes he can raise. The price he can obtain is Rs. 5 per Kg of tomatoes, Rs. 2 a head of lettuce and Rs. 8 per kg of radishes. The average yield per acre is 2000 kgs of tomatoes, 3000 heads of lettuce and 1000 kgs of radishes. Fertilizer is available at Rs. 5 per kg and the amount required per acre is 100 kgs each for tomatoes and lettuce and 50 kgs for radishes. Labour required for sowing, cultivating and harvesting per acre is 5 man days for tomatoes and radishes and 6 man days for lettuce. A total of 400 man days of labour are available at Rs. 100 per man day. Formulate the problem as a LPP which maximizes the total profit of the farmer.

16. What do you understand by degeneracy in transportation problems? How would you solve degeneracy?
17. The cost of manufacture of the product at different production shops are:

Shop	Variable cost	Fixed cost
A	14	7000
B	16	4000
C	15	5000

Find the optimum quantity to be supplied from each shop to different warehouses at minimum total cost.

18. Give the essential features of the queuing process.
19. A ticket window of a cinema theatre is manned by a single individual. Customers arrive to purchase tickets in a Poisson fashion with a mean rate of 30 per hour. The time required to serve a customer has an exponential distribution with a mean of 90 seconds. Find:

- i. Expected queue length
- ii. Expected waiting time

20. Draw a network diagram to the following set of activities

Activities	Preceding activities
A	nil
B	nil
C	A
D	A
E	B and C
F	B and C
G	B and C
H	D and E
I	F
J	F
K	G
L	H and I
M	H and I
N	J,K and L

(5 x 5 = 25)

Section C

Answer any 3 (10 marks each)

21. "O.R. is an aid for the executive in making his decisions by providing him with the needed quantitative information based on the scientific method of analysis." Discuss the statement and how OR. Techniques are helpful in decision – making.

22. Solve the following Linear Programming Problems by Simplex Method.

$$\begin{aligned} \text{Max. } & Z = 3X_1 + 5X_2 \\ \text{S.t. } & 3X_1 + 2X_2 \leq 18 \\ & X_1 \leq 4 \\ & X_2 \leq 6 \\ & X_1, X_2 \geq 0 \end{aligned}$$

23. Apply VAM to the transportation problem whose matrix is given below. Find out the optimum solution.

	stores					
warehouse	1	2	3	4	5	availability
A	9	12	9	6	0	5
B	7	3	7	5	5	7
C	6	8	11	2	10	6
required	4	6	4	2	2	

24. A newspaper boy has the following probability of selling a magazine:

No. of copies sold	Probability
10	0.1
11	0.15
12	0.2
13	0.25
14	0.3

The cost of a copy is 30 paise and sale price is 50 paise. He cannot return unsold copies. How many copies should he order?

25. For the following data draw a network. Find the slack time of activities after calculating earliest expected time and the allowable time of all events. Find the critical path.

Activity	Duration	Activity	Duration
1-2	5	5-9	3
1-3	8	6-10	5
2-4	6	7-10	4
2-5	4	8-11	9
2-6	4	9-12	2
3-7	5	10-12	4
3-8	3	11-13	1
4-9	1	12-13	7

(10 x 3 = 30)