B.Com(Hons) DEGREE EXAMINATION,APRIL 2020
I Year II Semester
Operations Research

Time : 3 Hours   **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer **ALL** the questions

1. What are the scopes of O.R.?

2. Name the models used in O.R.

3. What is unbalanced transportation problem?

4. Define Assignment problem.

5. What are the three main phases of a project?

6. Activities A, B and C are the immediate predecessors for Y activity. If the earliest finish times for the three activities are 12, 15 and 10, then find the earliest start time for Y?

7. The mean arrival rate to a service centre is 3 per hour. The mean service time is found to be 10 minutes per service. Assuming Poisson arrival and exponential service time, find the utilization factor for the service facility.

8. Write down the formula to find the average length of queue?

9. Solve the game whose payoff matrix is given by

Player B

Player A $\begin{bmatrix} 9 & 3 & 1 & 8 & 0 \\ 6 & 5 & 4 & 6 & 7 \\ 2 & 4 & 3 & 3 & 8 \\ 5 & 6 & 2 & 2 & 1 \end{bmatrix}$

10. Define zero sum game.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

11. Explain the different phases of O.R.

12. A firm engaged in producing two models A and B performs three operations – painting, Assembly and testing. The relevant data are as follows

Model	Unit sale Price	Hours required for each unit		
		Assembly	Painting	Testing
A	Rs.50	1.0	0.2	0.0
B	Rs.80	1.5	0.2	0.1

Total numbers of hours available are: Assembly 600, Painting 100, testing 30. Determine weekly production schedule to maximize the profit.

13. Find the initial basic feasible solution for the following transportation problem by North West corner rule.

	To				Supply
	1	2	1	4	30
From	3	3	2	1	50
	4	2	5	9	20
Demand	20	40	30	10	

14. Determine the Optimal assignment schedule.

		Job				
		1	2	3	4	5
	A	8	4	2	6	1
	B	0	9	5	5	4
Person	C	3	8	9	2	6
	D	4	3	1	0	3
	E	9	5	8	9	5

15. Find the critical path and project duration for the following project

Activity	1-2	1-3	1-4	2-5	3-6	3-7	4-6	5-8	6-9	7-8	8-9
Duration	2	2	1	4	8	5	3	1	5	4	3

16. In a railway marshalling yard, goods train arrives at a rate of 30 trains per day. Assuming that inter arrival time follows an exponential distribution and the service time distribution is also exponential, with an average of 36 minutes. Calculate (i) the mean Queue size (ii) the probability that queue size exceeds 10.

17. Solve the following game graphically

Player B

Player A $\begin{bmatrix} 2 & 2 & 3 \\ 4 & 3 & 2 \end{bmatrix}$

18. Use the dominance property and solve the game.

Player K

Player L $\begin{bmatrix} 18 & 4 & 6 & 4 \\ 6 & 2 & 13 & 7 \\ 11 & 5 & 17 & 3 \\ 7 & 6 & 12 & 2 \end{bmatrix}$

Section C $(2 \times 15 = 30)$ Marks

PART - A - Case Study - Compulsory Question

19. (i) Draw the Network for the given project.

(ii) Find the critical path and project duration for the following project

(iii) Calculate the total float

Activity	1-2	1-3	2-4	2-5	3-4	4-5
Duration	8	4	10	2	5	3

PART - B

Answer any **ONE** questions

20. Solve the following L.P.P by Simplex method

Max $Z = 3x + 2y$
Subject to $-2x + y \leq 1$
$x \leq 2$
$x + y \leq 3$
and $x, y \geq 0$

21. Solve the following transportation problem using MODI Method

	Destination				Supply
	6	1	9	3	70
Source	11	5	2	8	55
	10	12	4	1	70
Demand	85	35	50	45	