



25804663A

QP CODE: 25804663

Reg No : .....

Name : .....

**I.M.C.A DEGREE EXAMINATION,, OCTOBER 2025**

**Fifth Semester**

Integrated MCA

**Core - IMCA5C01 - OPERATIONS RESEARCH**

2020 Admission onwards

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Time: 3 Hours

Maximum: 75 Marks

**Part A**

Answer any **ten** questions

Each question carries **3** marks

1. Write the Limitations of OR.
2. What is an Artificial Variable?
3. Show that the solution to the following LPP has no feasible solution using Graphical Method.

$$\text{Max } Z = 6X_1 - 4X_2$$

$$\text{Sub to: } 2X_1 + 4X_2 \leq 4,$$

$$4X_1 + 8X_2 \geq 16$$

$$X_1 \geq 0, X_2 \geq 0$$

4. What do you mean by degeneracy in Transportation Problem?
5. What are assignment problems?
6. Explain Degeneracy in Transportation Problem.
7. State whether the following game matrix has a saddle point?

	Y	
X	1	-2
	2	-1

8. What is a network
9. Define the terms (a) Queue (b) server (c) system
10. What is the difference between the M/M/1 and M/M/S queuing models?





11. Write any two methods of generating random numbers.
12. Discuss the key steps involved in conducting a Monte Carlo simulation for risk assessment.

(10×3=30 marks)

**Part B**

*Answer all questions*

*Each question carries 9 marks*

13. a) A firm can produce three types of cloth A, B and C. Three kinds of wool is required for it, say red, green and blue wools. One unit length of type A cloth needs 2 yards of red wool, 5 yards of blue wools, one unit length of type B cloth needs 3 yards of red wool, 4 yards of green wool, and 2 yards of blue wool, and one unit length of type C cloth needs 6 yards of green and 5 yards of blue wools. The firm has only a stock of 10 yards of red wool, 12 yards of green wool, and 17 yards of blue wool. It is assumed that the income obtained from one unit length of type A, B and C are Rs 4.00, 5.00 and 6.00 respectively. Determine how the firm should use the available material, so as to maximize the income from the finished cloths  
Read more on Sarthaks.com - <https://www.sarthaks.com/3521988/firm-can-produce-three-types-cloth-and-three-kinds-wool-required-say-red-green-and-blue-wools>

OR

- b) *Solve the following using simplex Method*

$$\text{Min } Z = 3X_1 + 8X_2$$

$$\text{Sub to: } X_1 + X_2 = 200$$

$$X_1 \leq 80$$

$$X_2 \geq 60$$

$$X_1 \geq 0, X_2 \geq 0$$

14. a) *Find the optimum solution to the following assignment problem.*

Workers	Job			
		X	Y	Z
A	18	17	16	
B	15	13	14	
C	19	20	21	

OR





b) Solve the following Travelling Salesman Problem

	A	B	C	D	E
A	-	4	7	3	4
B	4	-	6	3	4
C	7	6	-	7	5
D	3	3	7	-	7
E	4	4	5	7	-

15. a) Solve the following game

		Player B	
		$B_1$	$B_2$
Player A	$A_1$	3	5
	$A_2$	4	1

OR

b) A project schedule has the following characteristics

Activity	1-2	1-3	2-4	3-4	3-5	4-9	5-6	5-7	6-8	7-8	8-10	9-10
Time	4	1	1	1	6	5	4	8	1	2	5	7

(1) Construct network diagram

(2) Find EST, LST, EFT and LFT values for all the activities

(3) Find critical path and project duration

16. a) A customer arrives at a one window drive in a bank according to Poisson distribution with mean 10 per hour. Service time per customer is exponential with mean 5 minutes. The space in front of the window, including that for the serviced car can accommodate a maximum of three cars. Other cars wait outside this space. (i) What is the probability that the arriving customer can drive directly to the space in front of the window? (ii) What is the probability that the arriving customer will have to wait outside the indicated space? (iii) How long is an arriving customer expected to wait before starting service.

OR

b) A bank has two tellers working on saving accounts. The first teller handles withdrawals only. The second teller handles deposits only. It has been found that the service time distributions for both deposits and withdrawals are exponential with mean service time 3 minutes per customer. Deposits are found to arrive in a Poisson fashion throughout the day with mean arrival rate 16 per hour. Withdrawals also arrive in a Poisson





fashion with mean arrival rate 14 per hour. What would be the effect on the average waiting time for depositors and withdrawers?

17. a) Explain the basic ideas of Monte Carlo simulation and its applications in solving OR problems.

OR

- b) *The demand for a tourist car during the last 200 days is as shown below*

<i>Demands per day</i>	5	10	15	20	25	30
<i>No of days</i>	2	40	30	100	24	4

*Simulate the demand for next 10 days and find the average demand per week*

*Use the random number 09,54,42,01,80,06,26,57,79,52*

(5×9=45 marks)

