Reg. No. | | | | | | | | | |

MCA 305

III Semester M.C.A. Degree Examination, December 2018
OPERATION RESEARCH (Repeaters)

Time : 3 Hours Max. Marks : 75

***Note** : Answer **any five** questions. **Each** question carries **equal** marks.*

1. a) Describe origin of OR with its application. **5**

   b) A company has 3 operational departments weaving, processing and packing with the capacity to produce 2 different types of clothes that are suiting and shirting with the profit of Rs. 2 and Rs. 4 per meter respectively. 1 meter suiting requires 3 mins of weaving, 2 mins of processing and 1 min of packing time. Similarly 1 meter of shirting requires 4 mins of weaving 1 min of processing and 3 mins of packing time. In a week total run time of each department is 60, 40 and 80 hours for weaving, processing and packing department respectively. Formulate a LPP to find the product to maximize the profit. Solve the same using graphical method. **10**

2. a) Explain special cases of Simplex method. **7**

   b) Solve by Simplex method. **8**

   Max $Z = 5x_1 + 4x_2$

   Subject to

   $6x_1 + 4x_2 < = 24$

   $x_1 + 2x_2 < = 6$

   $-x_1 + x_2 < = 1$

   $x_1, x_2 > = 0$

3. Obtain the initial basic feasible solution by North West Corner's rule and hence obtain the optimal solution, where the unit transportation costs, Cij, are given in the transportation model given below. Given A, B, C, D are mills and X, Y, Z are retail shops. **15**

	A	B	C	D	SUPPLY
X	10	2	20	11	15
Y	12	7	9	20	25
Z	4	14	16	18	10
Demand	5	15	15	15	

4. a) A company has 5 jobs to be done. The following matrix shows the return in terms of rupees on assigning ith (i = 1, 2, 3, 4, 5) machine to the j^{th} job (j = A, B, C, D, E). Assign the five jobs to the five machines so as to maximize the total expected profit. **9**

	Jobs					
Machines		**A**	**B**	**C**	**D**	**E**
	1	5	11	10	12	4
	2	2	4	6	3	5
	3	3	12	5	14	6
	4	6	14	4	11	7
	5	7	9	8	12	5

b) Explain the solution of TSP using Hungarian method for assignment problem. **6**

5. a) Explain the basic characteristics of the queuing model with the example. **6**

b) Consider a box office ticket window being manned by a single server. Customer arrives to purchase ticket according to Poisson input process with a mean rate of 30/hr. The time required to serve a customer has an ED with a mean of 90 seconds. Determine :

i) Mean queue length.

ii) Mean waiting time in the system.

iii) The probability of the customer waiting in the queue for more than 10 min.

iv) The fraction of the time for which the server is busy. **9**

6. a) What do you mean by Monte Carlo simulation ? Give an example. How do you ensure randomness of generated random numbers ? **9**

b) Discuss simulation and its application in decision making. **6**

7. a) Given the details of activities in a project, their predecessors and durations, find the least time required to complete the project. Identify the critical path and activities. Calculate the floats in each activity. **10**

Activity	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
Immediate predecessors	–	–	–	–	A, B	E	F	D	G, H	C, I
Duration (In weeks)	3	2	4	3	2	4	2	1	2	4

b) Differentiate PERT and CPM. **5**

8. a) Differentiate and illustrate pure and mixed strategies game. **5**

b) Briefly explain with examples minmax and maxmin criterion for the Game theory. **5**

c) Describe very briefly the terms bulk arrival, jockeying, balking, reneging in the context of queues. **5**