Code No. 12073

FACULTY OF MANAGEMENT
MBA (CBCS) III – Semester Examination, February 2021

Subject: Operations Research
Paper: MB 303

Time:2Hours **Max.Marks: 80**

PART – A

Note: Answer any four questions. **(4x5 = 20 Marks)**

1 Explain the dynamic programming problem.
2 Explain the implications of sensitivity analysis.
3 What is degeneracy in transportation problem?
4 Differentiate the slack and surplus variables.
5 Explain the M/M/1 model of queuing theory.

PART – B

Note: Answer any four questions. **(4x15 =60 Marks)**

6 Define operations research and discuss its nature and scope?
7 (i) What is goal programming? State clearly its assumptions.
(ii) State some problem areas in management where goal programming might be applicable.
8 What is duality in LPP? What are the rules to form a dual problem from primal problem?
9 Use the Big M Method to solve the following problem:
Minimize $z=2x1 + x2 + 3x3$
Subject to the constraints: $x1 - 2x2 + x3 \geq 4$
$2x1 + x2 + x3 \leq 8$
$x1 - x3 \geq 0$
Where $x1 \geq 0; x2 \geq 0; x3 \geq 0.$
10 (i) Distinguish between transportation model and assignment model.
(ii) Explain the managerial applications of Assignment problem and travelling salesman problem.
11 Solve the following assignment problem.

	I	II	III	IV	V
A	11	17	8	16	20
B	9	7	12	6	15
C	13	16	15	12	16
D	21	24	17	28	26
E	14	10	12	11	13

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12 A construction company has to undertake the construction of a fly-over bridge. The work involves a number of activities which are indicated by A, B, C etc. Their time estimates and precedence relationship are given below:

ACITIVITY	PRECEDING ACTIVITY	Time Estimates (in months)		
		Optimistic	Most Likely	Pessimistic
A	---	1.5	2	2.5
B	A	1.5	2	2.5
C	---	1	2	3
D	C	1.5	2	2.5
E	B.D	0.5	1	1.5
F	E	1	2	3
G	B,D	3	3.5	7
H	G	3	4	5
I	F,H	1.5	2	2.5

(i) Draw the PERT network for the project.

(ii) What is the expected time for the completion of project?

13 For the data given in the table below, draw the network. Crash systematically the activities and determine the optimal project duration and cost.

ACTIVITY (i-j)	Time Estimates (weeks)		Direct Cost Estimates (in Rs)	
	Normal	Crash	Normal	Crash
1-2	8	100	6	200
1-3	4	150	2	350
2-4	2	50	1	90
2-5	10	100	5	400
3-4	5	100	1	200
4-5	3	80	1	100

14 Explain the applications of simulation to different management problems with suitable examples?

15 In a railway station only one train is handled at a time. The railway yard is sufficient for two trains to wait while others is given signal to leave the station Trains arrive a station at a average of 6 per hour and the railway station can handle them at an average rate of 12 per hour. Assuming Poisson arrival and exponential service distribution, find the steady state probabilities of the various number of trains in the system. Also find the average number of trains in the system.

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