

D 42901

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Name.....

Reg. No.....

**SECOND SEMESTER M.B.A. DEGREE EXAMINATION, JUNE 2018**

(CUCSS)

M.B.A.

**BUS 2C 14—MANAGEMENT SCIENCE**

(2016 Admissions)

Time : Three Hours

Maximum : 36 Weightage

**Part A**

*Answer all questions.  
Each question carries 1 weightage.*

1. Enumerate the industrial application of linear programming.
2. Explain the stages in assignment algorithm.
3. Define the optimal solution to Transportation problem.
4. How can simulation be applied in practical situations ?
5. Distinguish between PERT and CPM.
6. Define decision tree.

(6 × 1 = 6 weightage)

**Part B**

*Answer any four questions.  
Each question carries 3 weightage.*

- 7 Minimise  $Z = 20x + 40y$

subject to

$$36x + 6y \leq 108$$

$$3x + 12y \leq 36$$

$$20x + 10y \leq 36$$

$$\text{and } X, Y \geq 0$$

8. Solve the following transportation problem using the least cost method.

Origin	Destination					Requirement
	M1	M2	M3	M4	M5	
O <sub>1</sub>	8	7	10	8	4	60
O <sub>2</sub>	7	9	6	3	5	20
O <sub>3</sub>	10	11	12	9	6	20
O <sub>4</sub>	4	6	10	7	13	50
Availability	30	40	20	30	30	

Turn over

- 9 Find the assignment, which minimises the total cost. Each division has to be assigned one marketing executive :

Marketing executive	DIVISIONS			
	N	E	W	S
A	120	100	80	90
B	80	90	110	70
C	110	140	120	100
D	90	90	80	90

10. The time schedule for different activities of project is given below :

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

Construct the PERT network and compute :

- Critical Path and its duration.
- Total float for each activity.

11. Solve the following Linear programming problem using simplex method

$$\text{Maximise } Z = -2x_1 - x_2$$

subject to

$$3x_1 + x_2 = 3$$

$$4x_1 + 3x_2 \geq 6$$

$$x_1 + 2x_2 \leq 4$$

$$\text{and } x_1, x_2 \geq 0$$

12. A refreshment centre in a railway station has two counters :

- (i) Self-service (opted by 60% of the customers) and
- (ii) Attended service (opted by 40% of the customers).

Both counters can serve one person at a time. The arrival rate of customers is given by the following probability distribution :

No. of arrivals	:	1	3	4	0	2
Probability	:	0.10	0.30	0.05	0.20	.035

Formulate the associated interval of 2 digit random numbers for generating :

- (i) The type of service.
- (ii) The arrival rate.

(4 × 3 = 12 weightage)

### Part C

*Answer any three questions.  
Each question carries 4 weightage.*

13. What is the purpose of Linear Programming?

14. A company desires to devote the excess capacity of the three machines namely lathe, shaping machine and milling machine to make three products A, B and C. The available time per month in these machines are tabulated below :

Machine	Available Time/Month
Lathe	200 hours
Shaping	100 hours
Milling	180 hours

The time taken to produce each unit of the products A, B and C on the machines is displayed in the table below :

	Lathe	Shaping	Milling
Product A (hours)	6	2	4
Product B (hours)	2	2	—
Product C (hours)	3	—	3

**Turn over**

The profit per product would be Rs. 20, Rs. 16 and Rs. 12 respectively on products A, B and C. Formulate a linear programming problem to find the optimum product mix.

15. Explain with examples the significance of management science in management studies.
16. Determine optimum solution by applying MODI to the following transportation problem :

Origin / Destination	A	B	C	E	supply
1	21	16	25	13	11
2	17	18	14	23	13
3	32	27	18	41	19
Demand	6	10	12	15	

17. A firm makes two products X and Y, and has a total production capacity of 9 tonnes per day, X and Y requiring same production capacity. The firm has a permanent contract to supply atleast 2 tonnes of X and atleast 3 tonnes of Y per day to another company. Each tonne of X requires 20 machine hours production time and tonne of Y requires 50 machine hours production time, the daily maximum number of possible machine hours is 360. All the first output can be sold and the profit made is Rs. 80 per tonne of X and Rs. 120 per tonne of Y. You are required to determine schedule for maximum profit and calculate this profit.

(3 × 4 = 12 weightage)

#### Part D

##### Compulsory questions.

The question carries 6 weightage.

18. Tasks : A, B, C.....H, I constitute a project. The notation A < B means that the tasks A must be finished before B can begin. With this notation

$$A < D, A < E, B < F, C < G, D < F, C < H, F < I, G < I$$

Draw a graph to represent the sequence of tasks and find the minimum time of completion of the project, when the time (in days) of completion of each task is as follows and minimum time for the completion of the project.

Task :	A	B	C	D	E	F	G	H	I
Time :	8	10	8	10	16	17	18	14	9

Find the critical path and minimum time for the completion of the project.

(1 × 6 = 6 weightage)