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C 24232 (Pages : 4) Name.....

Reg. No.....

SECOND SEMESTER M.B.A. DEGREE EXAMINATION, JUNE 2017

(CUCSS)

BUS 2C 14—MANAGEMENT SCIENCE

(Regular FT—2016 Admissions)

Time : Three Hours Maximum : 36 Weightage

Part A

Answer **all** *questions.*

Each question carries 1 *weightage.*

1. Distinguish between a slack variable and an artificial variable in linear programming.
2. Explain the term resource smoothing and resource levelling.
3. What are the common methods of obtaining initial feasible solution in transportation problem ?
4. What is simulation ?
5. What is Expected Opportunity Loss (EOL) ?
6. Define crashing.

(6 × 1 = 6 weightage)

Part B

Answer any **four** *questions.*

Each question carries 3 *weightage.*

7. A company manufactures two products namely A and B. Product B is of superior quality and product A is of lower quality the profit on two types of products are Rs. 30 and Rs. 40 respectively for product A and B. The data on resources required and availability of resources are given below :

	Product A	Product B	Capacity available per month
Raw Material (kg)	60	120	12,000
Machining (hours per piece)	8	5	630
Assembly (man hours)	3	4	500

Using the Graphical approach of Linear Programming Problem, calculate the maximum profit.

8. Solve the following transportation problem using the North West Corner rule method.

Origin	Destination				
	E	F	G	H	
A	6	4	1	5	14
B	8	9	2	7	16
C	4	3	6	2	5
	6	10	15	4	

Turn over

9. Find the optimal solution for the assignment problem with the following cost matrix :

Mechanist	Jobs			
	N	E	W	S
A	14	20	11	19
B	12	10	15	09
C	16	19	18	15
D	17	13	15	14

10. Draw an arrow diagram showing the following relationship :

Activity	Immediate predecessor
A	-
B	A
C	A
D	B, C
E	C
F	D
G	E
H	F, G

11. What are the characteristics of a queuing model?

12. A small - scale industry has decided to establish a separate workshop for one of its products. The list of various operations is as follows :

A = Workshop building

B = Machine foundation

C = Installation of machines,

D = Electric fitting

E = Whitewash

F = Floor repairing

G = Clean up

Construct the network diagram and number the events according to Fulkerson's rule.

(4 × 3 = 12 weightage)

Part C

Answer any **three** *questions.*

Each question carries 4 weightage.

13. Solve the following Linear programming problem using graphical method :

Maximise $Z = 27x_1 + 29x_2 + 25x_3$

subject to $27x_1 + 12x_2 + 12x_3 \leq 162$

$27x_1 + 12x_2 + 25x_3 \leq 189$

$3x_1 \leq 5$

and $x_1, x_2, x_3 \geq 0$.

14. A Company has 3 plants and 3 warehouses. The total cost of sending a unit from different plants to the warehouses, production at different plants and demand at different warehouses are shown in the following cost matrix table :

Plants	Warehouses			Production
	A	B	C	
X	8	16	16	152
Y	32	48	32	164
Z	16	32	48	154
Demand	144	204	82	

Determine the transportation schedule, so that the cost is minimised .Assume that the cost matrix is given in thousands of rupees.

15. With a view to improve the quality of customer service ,a bank is interested in making an assessment of the waiting time of its customer coming to one of its branches located in residential area. This branch has only one teller counter. The arrival rate of the customers and the service rate of the teller are given below :

Time between two consecutive arrivals of customers (in minutes)	Probability	Service time by the teller (in minutes)	Probability
3	0.17	3	0.10
4	0.25	4	0.30
7	0.25	5	0.40
6	0.20	6	0.15
7	0.13	7	0.05

You are required to simulate 10 arrivals of customers in the system starting from 11 a.m and show the waiting time of the customers and idle time of the teller.

Use the following random numbers taking the first two random numbers in two digits each for first trial and so on :

11, 56, 23, 72, 94, 83, 83, 02, 97, 99, 83,10, 93, 34, 33, 53, 49, 94, 37 and 97

16. Explain 'PERT' and 'CPM'.

17. A Company produces two types of leather belts say type A and B. Belt A is a superior quality and Belt B is of a lower quality. Profits on the two types of belts are 40 and 30 Rs. per belt respectively. Each belt of type A requires twice as much time as required belt of type B. If all belts were of type B, the company could produce 1,000 belts per day. But supply of leather is sufficient only for 800 belts per day. Belt A requires fancy buckle and only 400 fancy buckles are available for this per day. For belt of type B, only 700 buckles are available per day. How should the company manufacture two types of belts in order to have a maximum overall profits?

(3 × 4 = 12 weightage)

Part D

(Compulsory question)

The question carries 6 weightage.

18. A project consists of the following activities and different time estimates :

Activity	Least time (days)	Greatest time (days)	Most Likely time (days)
1-2	3	15	6
1-3	2	14	5
1-4	6	30	12
2-5	2	8	5
2-6	5	17	11
3-6	3	15	6
4-7	3	27	9
5-7	1	7	4
6-7	2	8	5

(a) Draw the network.

(b) Determine the expected task times and their variances.

(c) Find the earliest and latest expected times to reach each node.

(d) Find the critical path.

(e) What is the probability that the project will be completed by 27 days?

(1 × 6 = 6 weightage)