S.No. 340 BATCH: 2009 – 2013 Reg.No. 8

END OF SEMESTER EXAMINATIONS, NOVEMBER – 2017
COMPUTER ORIENTED OPTIMIZATION TECHNIQUES
SUBJECT CODE: 09UBCA06

MAJOR: B.C.A
TIME : 3 HOURS

SEMESTER : II
MAX.MARKS: 75

SECTION-A (5 x 2 = 10)

Answer ALL questions:

1. Define Slack Variable.
2. Write the general mathematical formulation of the Transportation problem.
3. What do you mean by a saddle point?
4. Write the formula for finding average annual total cost.
5. Define Total float.

SECTION-B (5 x 4 = 20)

Answer ALL questions:

6. a) Obtain all the basic solutions to the following system of linear equation:

$$x_1 + 2x_2 + x_3 = 4$$
$$2x_1 + x_2 + 5x_3 = 5$$

(OR)

b) A manufacture produces two types of models M_1 and M_2. Each M_1 model requires 4 hours of grinding and 2 hours of polishing; whereas each M_2 model requires 2 hours of grinding and 5 hours of polishing. The manufacturer has 2 grinders and 3 polishers. Each grinder works for 40 hours a week and each polisher works for 60 hours a week. Profit on an M_1 Model is Rs. 3.00 and on an M_2 model is Rs.4.00. Whatever is produced in a week is sold in the market. How should the manufacturer allocate his production capacity to the two types of models so that he may make the maximum profit in a week.

7. a) Determine an initial basic feasible solution to the following transportation problem using the north-west corner rule:

	D_1	D_2	D_3	D_4	
O_1	6	4	1	5	14
O_2	1	9	8	7	16
O_3	4	3	6	2	5
	6	10	15	4	35

Availability

Where O_i and D_j represent i^{th} the origin and j^{th} destination respectively.

(OR)

b) Consider the problem of assigning five jobs to five persons. The assignment costs are given as follows:

	Job				
Persons	1	2	3	4	5
A	8	4	2	6	1
B	0	9	5	5	4
C	3	8	9	2	6
D	4	3	1	0	3
E	9	5	8	9	5

Determine the optimum assignment schedule.

8. a) Player A can choose his strategies from (A_1, A_2, A_3) only, while player B can choose from the set (B_1, B_2) only. The rules of the game state that the payments should be made in accordance with the selection of strategies.

Strategy Pair Selected	Payments to be made
A_1, B_1	Player A Pays Re.1 to Player B
A_1, B_2	Player B Pays Rs. 6 to Player A
A_2, B_1	Player B Pays Rs. 2 to Player A
A_2, B_2	Player B Pays Rs 4 to player A
A_3, B_1	Player A Pays Rs. 2 to Player B
A_3, B_2	Player A Pays Rs. 6 to Player B

What strategies should A and B play in order to get the Optimum benefit of the play?

(OR)

b) Consider a modified form of "matching biased coins" game problem. The matching player is paid Rs.8.00 if the two coins turn both heads and Re. 1.00 if the coins turn both tails. The non-matching player is paid Rs. 3.00 when the two coins do not match. Given the choice of being the matching or non-matching player, which one would you choose and what be your strategy?

9. a) A truck owner finds from his past records that the maintenance costs per year, of a truck whose purchase price is Rs. 8,000 are as given below:

Year:	1	2	3	4	5	6	7	8
Maintenance costs:	1000	1300	1700	2200	2900	3800	4800	6000
Resale Price:	4000	2000	1200	600	500	400	400	400

Determine at which time it is profitable to replace the truck?

..2..

(OR)

b) A company is considering the purchase of a new machine for Rs.15, 000. The economic life of the machine is expected to be 8 years. The salvage value of the machine at the end of the life will be Rs.3,000. The annual running cost is estimated to be Rs.7,000. Assuming the interest rate of 5% , determine the present worth of future costs of the proposed machine.

10. a) Construct the network diagram, an assembly is to be made from two parts X and Y. Both parts must be turned on a lathe. Y must be polished whereas X need not be polished. The sequence of activities, together with their predeccessors is given below.

Activity	Description	Predecessor Activity
A	Open with order	-
B	Get material for X	A
C	Get material for Y	A
D	Turn X on the lathe	B
E	Turn Y on lathe	B,C
F	Polish Y	E
G	Assemble X and Y	D,F
H	Pack	G

(OR)

b) (i) Define Activity (ii) Define free float.

SECTION-C (3 x 15 = 45)

Answer any **THREE questions:**

11. Use Simplex method to solve the following L.P.P

Maximize $Z = 7x_1 + 5x_2$

Subject to the constraints:

$x_1 + 2x_2 \leq 6$

$4x_1 + 3x_2 \leq 12$

$x_1, x_2 \geq 0$

12. Obtain an initial basic feasible solution to the following T.P using the vogel's approximation method.

Warehouses	Stores					Availability
		I	II	III	IV	
	A	5	1	3	3	34
	B	3	3	5	4	15
	C	6	4	4	3	12
	D	4	-1	4	2	19
Requirement		21	25	17	17	80

13. Solve the following 5 X 2 game graphically.

	Player B	
	B_1	B_2
A_1	-2	5
A_2	-5	3
A_3	0	-2
A_4	-3	0
A_5	1	-4

Player A

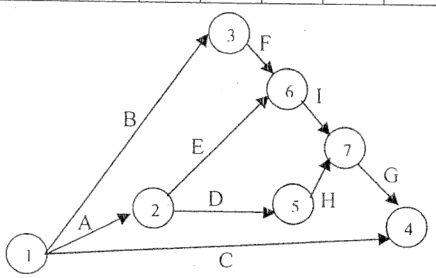
14. The following rates have been observed for a certain type of light bulb.

End of week:	1	2	3	4	5	6	7	8
Probability of failure to date:	0.05	0.13	0.25	0.43	0.68	0.88	0.96	1.00

The cost of replacing an individual failed bulb is Rs. 1.25. The decision is made to replace all bulbs simultaneously at fixed intervals, and also to replace individual bulbs as they fall in service. If the cost of group replacement is 30 paise per bulb, what is the best interval between group replacements? At what group replacement price per bulb would a policy of strictly individual replacement become preferable to the adopted policy?

15. A project is represented by the network in the figure and has the following data:

Task:	A	B	C	D	E	F	G	H	I
Least time:	5	18	26	16	15	6	7	7	3
Greatest time:	10	22	40	20	25	12	12	9	5
Most likely Time:	8	20	33	18	20	9	10	8	4



Determine the following:

a) Expected task times and their variance.

b) The earlist and latest expected times to reach each node.

c) The critical path and

d) The probability of a node occurring at the proposed completion date if the original contract time of completing the project is 41.5 weeks.

****