

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

END SEMESTER EXAMINATION-2015

B.Tech VIIIth Semester

COURSE CODE: 11B1WMA832

MAX. MARKS: 45

COURSE NAME: Linear Programming and Applications

COURSE CREDITS: 03

MAX. TIME: 3 HRS

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

Section A(1X10=10 Marks)

- Q1 Solution of linear programming problem $Max Z = 6x_1 + 8x_2$ s/t $x_1 + 4x_2 \leq 16$ and $4x_1 + x_2 \leq 8$ is unique or not.
- Q2. Write the dual of linear programming problem given in above question.
- Q3. If dual of the problem has unbounded solution then primal has which type of solution.
- Q4. Define artificial variable with example.
- Q5. For a salesman who has to visit n cities, in how many ways he can plan the tour.
- Q6. Which two methods are used for solving all integer programming problem.
- Q7. Prove that dual of the dual is primal itself using linear programming problem given in question 1.
- Q8. Which four methods are used for finding basic feasible solution in transportation problem.
- Q9. What are the number of non-occupied cells in a non degenerate basic feasible solution of 5 X 5 transportation problem.
- Q10 If there are less than 14 allocations in a 6 X 6 transportation problem, then it is a case of degeneracy or not.

Section B(5 X 3=15 marks)

- Q11. The standard weight of a special purpose brick is 5 kg and it contains two brick ingredients B1 and B2. B1 costs Rs 5 per kg and B2 costs Rs 8 per Kg. Strength considerations state that the brick contains not more than 4 kg of B1 and minimum of 2 Kg of B2. Since the demand for the product is likely to be related to the price of the brick, find out graphically minimum cost of the brick satisfying the above conditions.
- Q12. Solve the linear programming problem by Big M method.

$$Max z = 4x_1 + x_2$$

$$s/t \ 3x_1 + x_2 = 3, 4x_1 + 3x_2 \geq 6, x_1 + 2x_2 \leq 4 \text{ and } x_1, x_2 \geq 0$$

- Q13. (a) Write the mathematical form of assignment problem.

(b) Solve the assignment problem

Job/Operators	A	B	C	D	E
1	16	13	17	19	20
2	14	12	13	16	17
3	14	11	12	17	18
4	5	5	8	8	11
5	5	3	8	8	10

Section C(5 X 4=20 marks)

Q14.Solve the transportation problem

Plant/Wholesalers	1	2	3	Capacity
A	4	8	8	76
B	16	24	16	82
C	8	16	24	77
Supply	72	102	41	

Q15.Solve the Integer programming problem by Branch and Bound method.

$$\text{Max } Z = 5x_1 + 4x_2$$

s/t $x_1 + x_2 \leq 5$, $10x_1 + 6x_2 \leq 45$, $x_1, x_2 \geq 0$ and Integers

Q16 Solve the linear programming problem by dual simplex method.

$$\text{Min } Z = 3x_1 + 2x_2$$

s/t $3x_1 + x_2 \geq 3$, $4x_1 + 3x_2 \geq 6$, $x_1 + x_2 \leq 3$ and $x_1, x_2 \geq 0$

Q17.A book binder has one printing press, binding machine and finishing machine.The time required for printing,binding and finishing are known.Determine the order in which the books should be processed in order to minimize the total time required to process all the books.Also find the total elapsed time.

Book	1	2	3	4	5
Printing time	40	90	80	60	50
Binding time	50	60	20	30	40
Finishing time	80	100	60	70	110