Total Pages : 8

5148

M. Sc. (Final) Examination, 2016

MATHEMATICS

Paper–VIII

(Optimization Techniques)

Time : Three Hours
Maximum Marks : 100

PART - A (खण्ड-अ) [Marks : 20

Answer all questions (50 words each).
All questions carry equal marks.
सभी प्रश्न अनिवार्य हैं। प्रत्येक प्रश्न का उत्तर पचास शब्दों से अधिक न हो।
सभी प्रश्नों के अंक समान हैं।

PART - B (खण्ड-ब) [Marks : 50

Answer *five* questions (250 words each).
Selecting *one* from each unit. All questions carry equal marks.
प्रत्येक इकाई से **एक-एक** प्रश्न चुनते हुए, कुल **पाँच** प्रश्न कीजिए।
प्रत्येक प्रश्न का उत्तर 250 शब्दों से अधिक न हो।
सभी प्रश्नों के अंक समान हैं।

PART - C (खण्ड-स) [Marks : 30

Answer any *two* questions (300 words each).
All questions carry equal marks.
कोई **दो** प्रश्न कीजिए। प्रत्येक प्रश्न का उत्तर 300 शब्दों से अधिक न हो।
सभी प्रश्नों के अंक समान हैं।

PART - A

UNIT - I

1. (i) Define parameteric linear programming.

(ii) Why a new variable is added in a linear programming?

UNIT - II

(iii) Define mixed integer programming problem.

(iv) Formulate travelling salesman problem.

UNIT - III

(v) Define event and classify it.

(vi) What is resource levelling ?

UNIT - IV

(vii) Define lagrangian fucntion.

(viii) What are Kuhn-Tucker necessary conditions ?

UNIT - V

(ix) Define dynamic programming problem.

(x) Define shortest route problem.

PART - B

UNIT - I

2. Discuss the change in C_j which is the price of the basic variable on the value of the objective function and the optimal solution.

3. Given the following L.P.P.

Max $Z = -x_1 + 2x_2 - x_3$

s.t. $3x_1 + x_2 - x_3 \leq 10$

$-x_1 + 4x_2 + x_3 \geq 6$

$x_2 + x_3 \leq 4$

and $x_1, x_2, x_3 \geq 0$

Find the range of b_1 i.e 10 consistent with the optimal solution.

UNIT - II

4. Explain Gomory's cutting plane method for mind I.P.P.

5. Solve the following L.P.P. by Gomory's technique :

Max $Z = 3x_2$

s.t. $3x_1 + 2x_2 \leq 7$

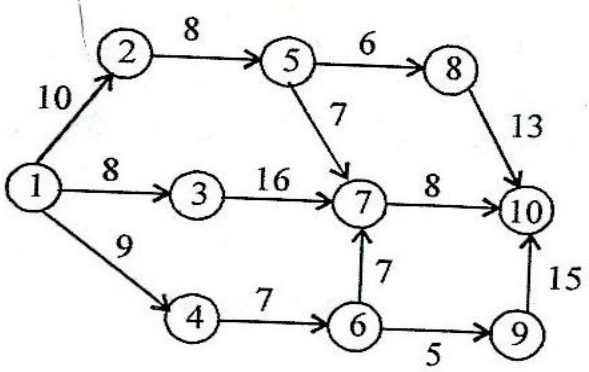
$x_1 - x_2 \geq -2$

and $x_1, x_2 \geq 0$ and are integers.

UNIT - III

6. Discuss the base steps in CPM/PERT tecnnique.

7. Determine early start (T_E) and late start (T_2) in respect of all node poitns and find critical path in respect of the following network :



UNIT - IV

8. Determine x_1, x_2, x_3 so as to

Maximise $Z = -x_1^2 - x_2^2 - x_2^3 + 4x_1 + 6x_2$

s.t. $x_1 + x_2 \leq 2$

$2x_1 + 3x_2 \leq 12$

and $x_1, x_2 \geq 0$

9. Apply Wolfe's method for solving the QPP :

Max. $Z = 4x_1 + 6x_2 - 2x_1^2 - 2x_1x_2 - 2x_2^2$

s.t. $x_1 + 2x_2 \leq 2$

and $x_1, x_2 \geq 0$

UNIT - V

10. State Bellman's principle of optimality and use it to solve :

Max. $(y_1\ y_2\ y_3)$

s.t. $y_1 + y_2 + y_3 = 5$

$y_1, y_2, y_3 \geq 0$

11. Use dynamic programming to solve :

Min. $Z = y_1^2 + y_2^2 + y_3^2$

s.t. $y_1 + y_2 + y_3 \geq 15$

and $y_1, y_2, y_3 \geq 0$

PART - C

UNIT - I

12. Solve the following L.P.P. by by the simple algorithm :

Min. $Z = 3x_1 + 2x_2 + x_3 + 4x_4$

s.t. $2x_1 + 4x_2 + 5x_3 + x_4 \geq 10$

$3x_1 - x_2 + 7x_3 - 2x_4 \geq 2$

$5x_1 + 2x_2 + x_3 + 6x_4 \geq 15$

and $x_1, x_2, x_3, x_4 \geq 0$

UNIT - II

13. Use branch and Bound technique to solve the following problem :

Max. $Z = 7x_1 + 9x_2$

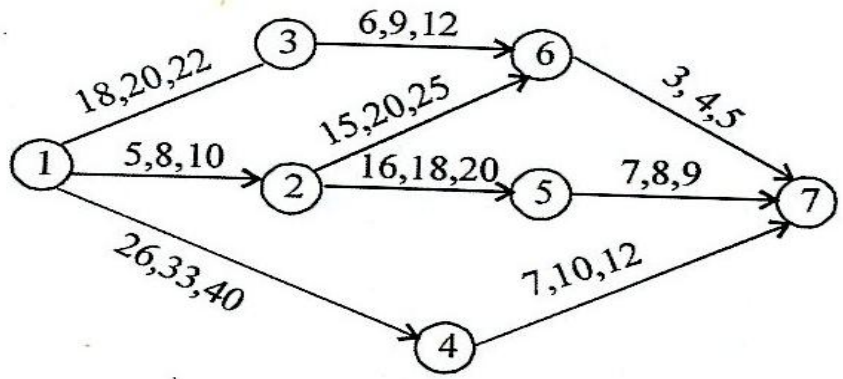
s.t. $-x_1 + 3x_2 \leq 6$

$7x_1 + x_2 \leq 35$

$0 \leq x_1, x_2 \leq 7$ and x_1, x_2 are integers.

UNIT - III

14. Consider the network shown in the figure given below. The estimates of to, tm and tp are shown in this order for each of the activities on the top of the arch denotting the respective activities :



Determine :

(i) Expected task time and their variance

(ii) The earliest and latest expected times to reach each node

(iii) The critical path.

UNIT - IV

15. Apply Beale's method to solve the QPP :

Max $Z = 2x_1 + x_2 - x_{12}$

s.t. $2x_1 + 3x_2 \leq 6$

$2x_1 + x_2 \leq 4$

and $x_1, x_2 \geq 0$

UNIT - V

16. Determine the maximal flow in the network given below :