HARCOURT BUTLER TECHNICAL UNIVERSITY, KANPUR

ASSSIGNMENT-5 /OPERATIONS RESEARCH (BMA-341/342)

III -B.Tech. – ME/CS 2021-22

1. What is dynamic programming? State the Bellman's "principle of optimality" in dynamic programming and give mathematical formulation of D.P.

2. Define the following Dynamic programming terms:
- (i) Stage
- (ii) State variable
- (iii) Decision variable
- (iv) Return function
- (v) Recursive relationship

3. Use dynamic programming to solve:

Minimize Z = $y_1^2 + y_2^2 + y_3^2$

Subject to constraints: $y_1 + y_2 + y_3 = 10 \; and \; y_1, y_2, y_3 \geq 0$

4. Use dynamic programming to find the maximum value of

Maximize Z = $x_1 . x_2 \ldots \ldots x_n$

Subject to constraints: $x_1 + x_2 + \cdots + x_n = C \; and \; x_1, x_2, \ldots, x_n \geq 0$

5. Use dynamic programming to solve the following problem.

Minimize Z = $y_1^2 + y_2^2 + y_3^2$

Subject to constraints: $y_1 + y_2 + y_3 \geq 15 \; and \; y_1, y_2, y_3 \geq 0$

6. Use the principle of optimality to find the maximum value of

Z= $b_1x_1 + b_2x_2 + \cdots + b_nx_n$

When $x_1 + x_2 + \cdots + x_n = C, \; x_1, x_2, \ldots, x_n \geq 0$

7. Use dynamic programming to solve the following LPP:

$Max \; z = 3x_1 + 5x_2$

Subject to the constraints:

$$x_1 \leq 4 \, , \; x_2 \leq 6$$
$$3x_1 + 2x_2 \leq 18$$
$$x_1, x_2 \geq 0$$

8. Use dynamic programming to solve the following LPP:

$$Max \; z = x_1 + 9x_2$$

Subject to the constraints:

$$2x_1 + x_2 \leq 25$$
$$x_2 \leq 11$$
$$x_1, x_2 \geq 0$$

9. State the various steps involved for solving the multistage problem by dynamic programming.