Answer Key (S. Y. B. A. Sem-III) Paper-III, UAST302 Set-I

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Q.1(a) $i. \to b), ii. \to c), iii. \to a), iv. \to a), v. \to c), vi. \to d)$ *and* $vii. \to b)$

Q.2(a) (i) *Maximize* $Z = 25x_1 + 35x_2$ subject to constraints: $2x_1 + 5x_2 \leq 400, 3x_1 + 2x_2 \leq 600, x_1, x_2 \geq 0$

Q.2(a) (ii)

Vertex	Co-ordinates	Value of $Z = 10x_1 + 8x_2$
O	$(x_1 = 0, x_2 = 0)$	$Z = 0$
A	$(x_1 = 0, x_2 = 100)$	$Z = 800$
B	$\mathbf{(x_1 = 80, x_2 = 60)}$	$\mathbf{Z = 1280}$ **(Maximum)**
C	$(x_1 = 120, x_2 = 0)$	$Z = 1200$

Q.2(b) Since all $(z_j - c_j) \geq 0$ an optimum basic feasible solution to the auxiliary LPP is obtained. But *Maximum* $Z^* < 0$ and an artificial variable is present in the basis at a positive level. Therefore the original LPP does not possess any solution.

Q.2(c) (i) *Minimize* $Z = 100w_1 + 20w_2$ subject to constraints: $6w_1 + 2w_2 \geq 2000$, $9w_1 + w_2 \geq 3000$, $w_1, w_2 \geq 0$

Q.3 (a) (i) VAM: $x_{11} = 5, x_{14} = 2, x_{23} = 7, x_{24} = 3, x_{32} = 8$ *and* $x_{34} = 10$ and $Z = 1718$

Q.3 (b) (ii) LCM: $x_{14} = 7, x_{21} = 3,\ x_{23} = 7, x_{31} = 2, x_{32} = 8$ *and* $x_{34} = 8$ and $Z = 1788$, $Z_{VAM} < Z_{LCM}$

Q.4 (a) (i) $x_{14} = 11, x_{21} = 6, x_{22} = 3, x_{24} = 4, x_{32} = 7$ *and* $x_{33} = 12$ and $Z = 1592$

Q.4 (a) (ii) $3 \to 1 \to 5 \to 6 \to 2 \to 4$, *Minimum total time* $= 42$ *hrs*

Q.4 (b) $S_1 \to T_1, S_2 \to T_4, S_3 \to T_3, S_4 \to T_2$ and *Total Profit Rs.* 139

Q.5 (a) (ii) $A \to E \to B \to D \to C \to A$ and *Total Distance* $= 539$

Q.5 (b) (i) *Maximize* $Z = 400x_1 + 200x_2$ subject to constraints: $9x_1 + 5x_2 \leq 900, 5x_1 + 3x_2 \leq 750, x_1, x_2 \geq 0$

$x_{11} = 144, x_{12} = 8, x_{22} = 164, x_{32} = 32$ *and* $x_{33} = 82, x_{34} = 40$ and $Z = 21744$