Reg. No. : | | | | | | | | | | | | |

Question Paper Code : X 20411

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020
Seventh Semester
Computer Science and Engineering
CS 6704 – RESOURCE MANAGEMENT TECHNIQUES
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Std. Statistics table permitted
Answer ALL questions

PART – A **(10×2=20 Marks)**

1. What is linear programming ?
2. What is meant by optimal solution of LPP ?
3. Define primal and dual problem.
4. Write the difference between the transportation problem and the assignment problem.
5. Write the ILP algorithms based on exploiting the tremendous computational success of Linear Programming.
6. Define Dynamic Programming.
7. What is Newton Raphson method ?
8. Define Kuhn – Tucker conditions.
9. If there are five activities P, Q, R, S and T such that P, Q, R have no immediate predecessors but S and T have immediate predecessors P, Q and R respectively. Represent this situation by a network.
10. Define critical path.

PART – B **(5×13=65 Marks)**

11. a) Solve the LPP using graphical method.

Maximize $Z = 3x_1 + 4x_2$

Subject to the constraints

$2x_1 + 5x_2 \leq 120$

$4x_1 + 2x_2 \leq 80$

and $x_1, x_2 \geq 0$

(OR)

b) Solve the following LPP using Simplex method.

Max $Z = 2x_1 + x_2 + x_3$

Subject to

$4x_1 + 6x_2 + 3x_3 \leq 8$

$3x_1 - 6x_2 - 4x_3 \leq 1$

$2x_1 + 3x_2 - 5x_3 \geq 4$

and $x_1, x_2, x_3 \geq 0$

12. a) Use dual Simplex method to solve the LPP.

Maximize $Z = -3x_1 - 2x_2$

Subject to

$$x_1 + x_2 \geq 1$$
$$x_1 + x_2 \leq 7$$
$$x_1 + 2x_2 \geq 10$$
$$x_2 \leq 3$$

and $x_1, x_2 \geq 0$

(OR)

b) Consider the problem of assigning four sales persons to four different sales regions as shown in the following table such that the total sales is maximized.

		Sales region			
		1	**2**	**3**	**4**
	1	10	22	12	14
Salesman	**2**	16	18	22	10
	3	24	20	12	18
	4	16	14	24	20

The cell entries represent annual sales figures in lakhs of rupees. Find the optional allocation of the sales persons to different regions.

13. a) Find the optimum integer solution to the following linear programming problem :

Maximize $z = x_1 + 2x_2$

Subject to

$2x_2 \leq 7$

$x_1 + x_2 \leq 7$

$2x_1 = 11$

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

(OR)

b) Use Branch and Bound method to solve the following :

Maximize $z = 2x_1 + 2x_2$

Subject to

$5x_1 + 3x_2 \leq 8$

$x_1 + 2x_2 \leq 4$

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

14. a) Solve $2x^3 - 2.5x - 5 = 0$ for the root in [1, 2] by Newton Raphson method.

(OR)

b) Minimize $f = x_1^2 + 2x_2^2 + 3x_3^2$

Subject to the constraints :

$g_1 = x_1 - x_2 - 2x_3 \leq 12$

$g_2 = x_1 + 2x_2 - 3x_3 \leq 8$

Using Kuhn-Tucker conditions.

15. a) Draw the network from the following activity and find the critical path and total duration of project.

Activity	Immediate Predecessors	Duration (Weeks)
A	–	3
B	–	8
C	A	9
D	B	6
E	C	10
F	C	14
G	C, D	11
H	F, G	10
I	E	5
J	I	4
K	H	1

(OR)

b) A project has the following activities and other characteristics :

Time estimate (in weeks)

Activity	Preceding Activity	Most Optimistic	Most Likely	Most Pessimistic
A	–	4	7	16
B	–	1	5	15
C	A	6	12	30
D	A	2	5	8
E	C	5	11	17
F	D	3	6	15
G	B	3	9	27
H	E, F	1	4	7
I	G	4	19	28

Required :

i) Draw the PERT network diagram.

ii) Identify the critical path.

iii) Prepare the activity schedule for the project.

iv) Determine the mean project completion time.

v) Find the probability that the project is completed in 36 weeks.

PART – C **(1×15=15 Marks)**

16. a) Unit profit of five salesmen in four places are given below.

	S_1	S_2	S_3	S_4	S_5	Available
P_1	5	6	4	2	6	40
P_2	7	9	5	2	5	50
P_3	3	3	3	2	4	60
P_4	7	8	5	4	4	50
Demand	40	30	40	40	30	

Solve the problem to maximize the profit.

(OR)

b) Solve the integer programming problem.

Maximize $Z = 80x_1 + 45x_2$

Subject to

$x_1 + x_2 \leq 7$

$12x_1 + 5x_2 \leq 60$

and $x_1, x_2 \geq 0$ and integer.

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