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

Question Paper Code : 70398

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Seventh Semester

Computer Science and Engineering

CS 6704 — RESOURCE MANAGEMENT TECHNIQUES

(Regulations 2013)

Time : Three hours Maximum : 100 marks

(Uses of Normal Table is permitted)

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Define feasible solution and optimal solution to the linear programming problem.

2. What do you mean by shadow pricing?

3. What do you understand by degeneracy in a transportation problem?

4. How do you convert an unbalanced transportation problem into a balanced?

5. List different types of integer programming problems.

6. Write the Gomory's constraint for the all integer programming problem whose simplex table (with non integer solution) given below :

	$C_j \rightarrow 2$	20	–10	0		
Basic variable	C_B	X_B	X_1	X_2	X_3	S_1
x_2	20	5/8	0	1	1/5	3/10
x_1	2	5/4	1	0	0	1/4
	$z = C_B X_B = 15$		0	0	–14	–1

7. List the uses of classical optimization theory.

8. Write the sufficient conditions for Hessian Matrix (H) evaluated at stationary point (X_0).

9. Bring out any four difference between CPM and PERT.

10. List out the advantages of PERT.

PART B — (5 × 13 = 65 marks)

11. (a) An automobile manufacturer makes auto-mobiles and trucks in a factory that is divided into two shops. Shop A, which performs the basic assembly operation must work 5 man-days on each truck but only 2 man-days on each automobile. Shop B, which performs finishing operation must work 3 man-days for each truck or automobile that it produces. Because of men and machine limitations shop A has 180 man-days per week available while shop B has 135 man-days per week. If the manufacturer makes a profit of Rs. 300 on each truck and Rs. 200 on each automobile, how many of each should he produce to maximize his profit?

Or

(b) Garden Ltd. has two product Rose and Lotus. To produce one unit of Rose, 2 units of material X and 4 units of material Y are required. To produce one unit of Lotus, 3 units of material X and 2 units of material Y are required. At least 16 units of each material must be used in order to meet the committed sales of Rose and Lotus Cost per unit of material X and material Y are Rs. 2.50 per unit and Rs. 0.25 per unit respectively.

Your are required

(i) To formulate mathematical model (6)

(ii) To solve it for the minimum cost (Graphically). (7)

12. (a) Using dual simplex method solve the LPP (13)

Minimize $z = 2x_1 + x_2$

Subject to

$3x_1 + x_2 \geq 3$

$4x_1 + 3x_2 \geq 6$

$x_1 + 2x_2 \geq 3$

and

$x_1, x_2 \geq 0$

Or

(b) Solve the transportation problem. (13)

	1	2	3	4	Supply
I	21	16	25	13	11
II	17	18	14	23	13
III	32	27	18	41	19
Demand	6	10	12	15	

13. (a) Solve the following IPP :

Minimize $Z = -2x_1 - 3x_2$

Subject to

$2x_1 + 2x_2 \leq 7$

$x_1 \leq 2$

$x_2 \leq 2$

and

$x_1, x_2 \geq 0$ and integers

Or

(b) A students has to take examinations in three courses A, B and C. He has three days available for study. He feels it would be best to devote a whole day to the study of the same course, so that he may study a course for one day, two days or three days or not at all. His estimates of grade he may get by study are as follows :

Course/study days	A	B	C
0	0	1	0
1	1	1	1
2	1	3	3
3	3	4	3

How should he plan to study so that he maximizes the sum of this grades?

14. (a) Illustrate the sensitivity analysis in the Jacobian method.

Or

(b) Describe Kuhn-Tucker conditions with suitable example.

15. (a) (i) What is critical path method and further bring out the usefulness of it? (5)

(ii) Draw the network diagram exactly with two dummies. (8)

Activity	Must be proceeded
A	–
B	–
C	B
D	A, C
E	A
F	E
G	E
H	G
I	D, F
J	G, I
K	G, I
L	H, K

Or

(b) A small project is composed of 7 activities whose time estimates are listed below. Activities are being identified by their beginning (i) and ending (j) node numbers (13)

Activities		Time in weeks		
i	j	t_0	t_1	t_p
1	2	1	1	7
1	3	1	4	7
1	4	2	2	8
2	5	1	1	1
3	5	2	5	14
4	6	2	5	8
5	6	3	6	15

(i) Draw the network.

(ii) Calculate the expected variances for each.

(iii) Find the expected project completed time.

(iv) Calculate the probability that the project will be completed at least 3 weeks than expected.

(v) If the project due date is 18 weeks, what is the probability.

PART C — (1 × 15 = 15 marks)

16. (a) Unit profit of five salesman in four places are given below : (15)

	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. (15)

Maximize $Z = 80x_1 + 45x_2$

Subject to

$x_1 + x_2 \leq 7$

$12x_1 + 5x_2 \leq 600$

and

$x_1, x_2 \geq 0$ and integer

———————