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

Question Paper Code : 20378

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

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 do you mean by optimal solution of LPP?
3. Define duality problem in Operation Research.
4. Bring out the difference between assignment and transportation problem.
5. What is cutting plane method?
6. What do you understand by dynamic Programming?
7. What is Newton–Raphson method?
8. What is Tucker Condition? And bring out its application.
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) (i) Discuss the steps involved in the formulation of LP Problem.

(ii) Maximise $Z = 0.75a + 1b$

Subject to :

$1a + 1b \geq 0$

$-0.5a + 1b \leq 1$ and both a and b are ≥ 0.

Solve this using Graphical Method.

Or

(b) Solve using Simplex Method.

Maximize $z = 3x_1 + 2x_2$

Subject to :

$-x_1 + 2x_2 \leq 4$

$3x_1 + 2x_2 \leq 14$

$x_1 - x_2 \leq 14$

$x_1 - x_2 \leq 3$, where $x_1, x_2 \geq 0$.

12. (a) Solve the following linear programming problem using dual simplex method.

Min. $z = 2x_1 + x_2$

Subject to:

$3x_1 + x_2 \geq 3$

$4x_1 + 3x_2 \geq 6$

$x_1 + 2x_2 \leq 3$

$x_i \geq 0$.

Or

(b) Four captain pilots (CP1, CP2, CP3, CP4) has evaluated four flight officers (FO1, FO2, FO3, FO4) according to perfection, adaptation, morale motivation in a 1-20 scale (1: very good, 20: very bad). Evaluation grades are given in the table. Flight Company wants to assign each flight officer to a captain pilot according to these evaluations. Determine possible flight crews.

	FO1	FO2	FO3	FO4
CP1	2	4	6	10
CP2	2	12	6	5
CP3	7	8	3	9
CP4	14	5	8	7

13. (a) Using Branch and Bound Method.

Min. $f = 4x_1 + 5x_2$

Subject to

$x_1 + 4x_2 \geq 5$

$3x_1 + 2x_2 \geq 7$

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

Or

(b) (i) Bring out the characteristics of Dynamic Programming.

(ii) A vessel is to be loaded with stocks of 3 items. Each item 'j' has a weight of w_j and a value of v_j. The maximum cargo weight the vessel can take is 5 and the details of the three items are as follows:

j	w_j	v_j
1	1	30
2	3	80
3	2	65

Develop the recursive equation for the above case and find the most valuable cargo load without exceeding the maximum cargo weight by using dynamic programming.

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) (i) What is Critical Path Method and further bring out the usefulness of it?

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

Activity	Must be proceeded by
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

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) A factory manufactures two products A and B on three machines X, Y, and Z. Product A requires 10 hours of machine X and 5 hours of machine Y a one our of machine Z. The requirement of product B is 6 hours, 10 hours and 2 hours of machine X, Y and Z respectively. The profit contribution of products A and B are Rs. 23/- per unit and Rs. 32 /- per unit respectively. In the coming planning period the available capacity of machines X. Y and Z are 2500 hours, 2000 hours and 500 hours respectively. Find the optimal product mix for maximizing the profit.

Or

(b) Mr. Banerjee, a sales manager, has decided to travel from city 1 to city 10. He wants to plan for minimum distance programme and visit maximum number of branch offices as possible on the route. The route map of the various ways of reaching city 10 from city 1 is shown Fig. 16(b). The numbers on the arrow indicates the distance in km. (× 100). Suggest a feasible minimum path plan to Mr. Banerjee.

Stage 1	Stage 2	Stage 3	Stage 4

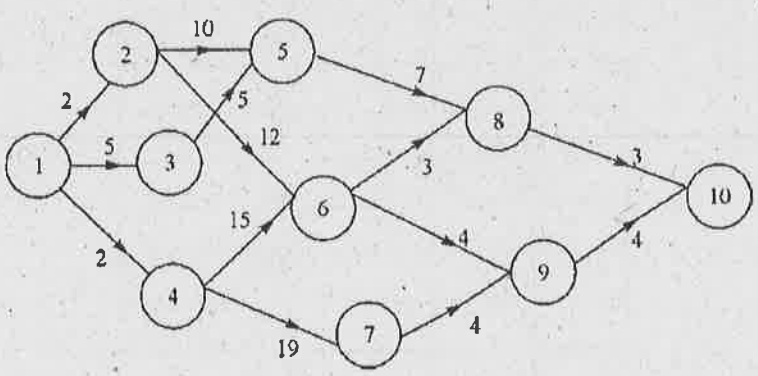

Fig. 16 (b)