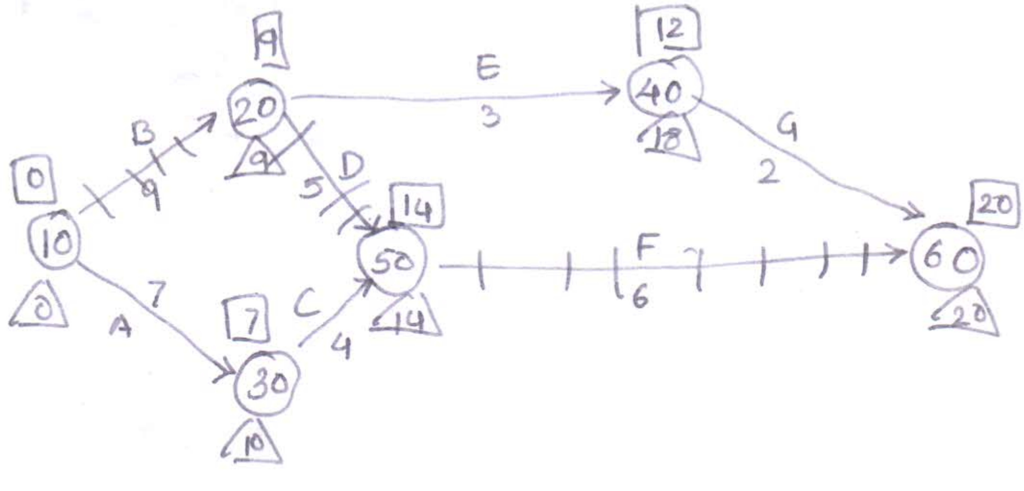
Comp: P218-131 (T2)   Answers T2.   SY MTECH Civil: P218-111 (T2) (Structure)
E&TC: P218-141 (T2)   Civil (WREE): P218-121 (T2)
Mech: P218-151 (T2)

19. Frame a CPM network for the data given in table below:
Also find:

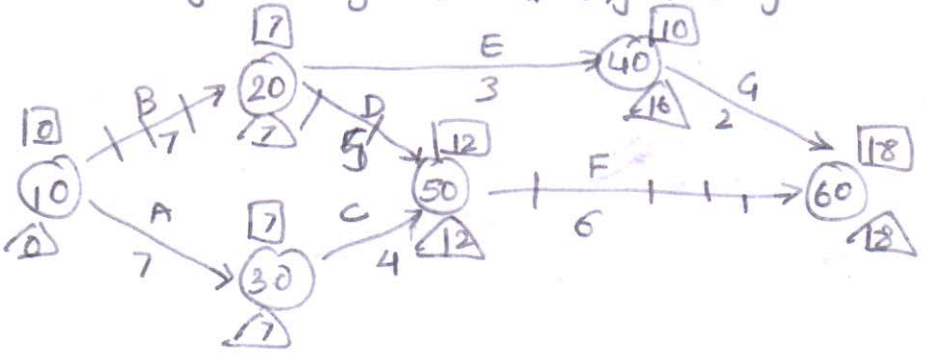
1. Critical path & normal duration of project.
2. Calculate normal cost & optimum cost. Assume the total cost of the project ₹11,000 and Indirect cost ₹300/day. Calculate optimum duration.

Activity	Events		Duration (Days)		C/S ₹/day
	Preceding	Succeeding	Normal	Crash	
A	10	30	7	3	100
B	10	20	9	7	60
C	30	50	4	1	150
D	20	50	5	3	250
E	20	40	3	1	20
F	50	60	6	4	332
G	40	60	2	1	1000



D.C = 11,000 , I.C = 20 × 300 = 6000   T.C = 17000/-

Crash B by 2 days ~~and D by 1 day~~.

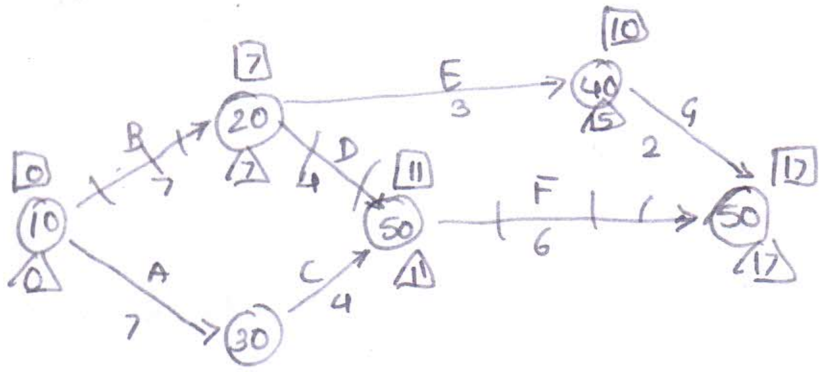


D.C = 11000 + 2 × 60 = 120 + 11,000
= 11,120

I.C = 18 × 300
= 5400

T.C = 16,520

② crash activity B by 2 days, D by 2 days ~~and A by 1 day~~

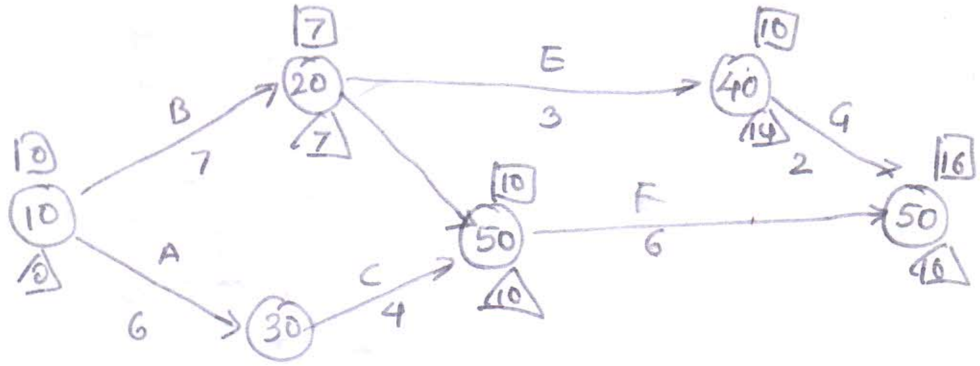


D·C = 2x60 + 2x250 ~~+ 1x100 = 720~~ + 11,000 = 11,370

I·C = 17x300 = 5100

T·C = 16,470

crash activity B by 2 days, D by 2 days & A by 1 day.

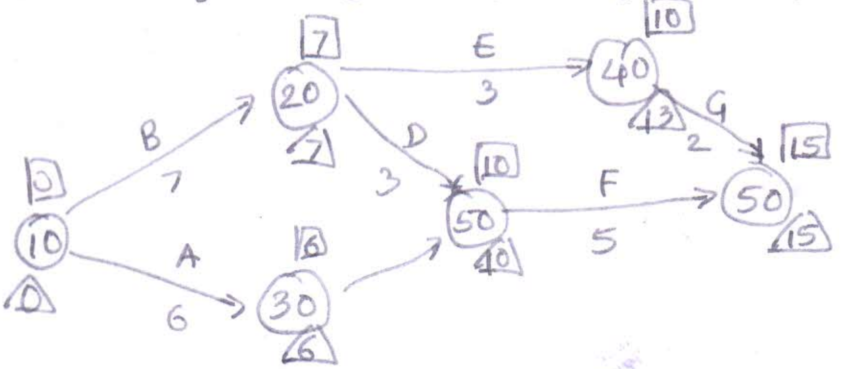


D·C = 2x60 + 2x250 + 1x100 = 720 + 11,000 = 11,720

I·C = 16x300 = 4800

T·C = 16,520.

crash B by 2 days, D by 2 days & F by 1 day & A by 1 day.



D·C = 2x60 + 2x250 + 1x1000 + 1x100 = 11,000 + 1720 = 12,720

I·C = 15x300 = 4500

D·C = 17,220

optimum cost = 16,520

Duration = 16.

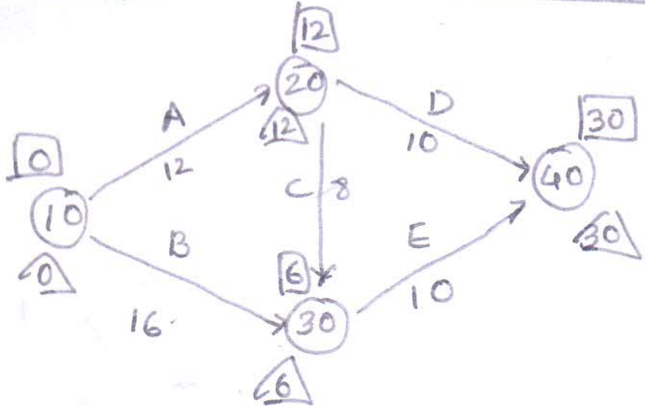
Q.1

b. ~~V~~ Various sources of risk. Any five → 5 marks.

Q.2

a. For the network shown in Fig. the data about cost is given in table.
(4) The indirect cost of project is ₹3000 per week. Determine optimum cost & duration.

	Normal Duration	Crash Duration	Normal cost	Crash Cost	C/S
10 - 20	12	6	14,000	29,000	2500
10 - 30	16	10	8000	17,000	1500
20 - 30	8	2	12000	18,000	1500
20 - 40	10	6	16 000	30,000	3500
30 - 40	10	6	10,000	22,000	2000



1] D.C = 6000 I.C = 90,000 T.C = 1,50,000.

2] D.C = 66,000 I.C = 78,000 T.C = 1,44,000

3] D.C = 72,000 I.C = 72,000 T.C = 1,44,000

4] D.C = 74,000 I.C = 66,000 T.C = 1,40,000

5] D.C = 83,000 I.C = 60,000 T.C = 1,43,000

6] D.C = 92,000 I.C = 54,000 T.C = 1,46,000

7] D.C = 1,03,000 I.C = 48,000 T.C = 1,51,000.

Q.2 b. Nine phases of risk. ~~Any 5~~ → 5 marks.

Q.3 b Key Decision → How much raw material of A, B, C be used.

Let x_1, x_2 & x_3 be the proportions (%.)

∴ Objective function

minimize $Z = 90x_1 + 280x_2 + 40x_3$.

subject to.

$0.92x_1 + 0.97x_2 + 1.043x_3 \leq 0.98$

$7x_1 + 13x_2 + 16x_3 \geq 8$

$440x_1 + 490x_2 + 480x_3 \geq 450$

$x_1 + x_2 + x_3 = 100$.

$x_1, x_2, x_3 > 0$.

Q.3 a Importance of risk Management → 8 marks.

Q.4 a Advantages → 4 marks
Limitations → 4 marks.

Q.4 b.

Formulation of LPP

A resourceful home decorator manufactures two types of lamps A and B. Both the lamps go through two technicians first a cutter and then a finisher. Lamp A requires 2 hours of cutter time and one hour of finisher's time. Lamp B requires one hour of cutter time and two hours of finisher's time. The cutter has 104 hours and finisher 76 hours available time. Profit on one lamp of A is Rs. 6.00 and one lamp of B is Rs. 11.00. Assuming that the decorator can sell all that he produces, how many of each type of lamps should he manufacture to obtain the best return?

Solution

It is typical LPP. Here the profit will depend or the output or Lamps A and B. SO we are to find the optimum combination of the outputs of A and B .Let the manufacturer produce X units of A and Y units of B. Then profit from X units of A will be 6X and profit from Y units of B will be 11Y and the total profit from X units of A and Y units of B will be

$Z = 6X + 11Y$

Now we want to find that combination of X, Y for which Z is maximum. Hence our objective function is

Maximize $Z = 6X + 11Y$

Again X units of A will require 2X hours of cutter time and Y hours of finisher time. Similarly Y units of B will require Y hours of cutter time and 2Y hours of finisher time.

Thus cutter time required for producing X units of A and Y units of

$B = 2X + Y$

And the corresponding finisher time will be $= X + 2Y$

But the total time available for cutter and finisher is respectively 104 hours and 76 hours. Hence we get the constraints as

$2X + Y \leq 104$ (Cutter time)

$X + 2Y \leq 76$ (Finisher Time)

And $X, Y \geq 0$ is the non- negativity restriction. Thus the mathematical model for the formulated LPP can be written as

Max. $Z = 6X + 11Y$ (Objective Function)

$2X + Y \leq 104$

$X + 2Y \leq 76$ (Constraints)

$X, Y \geq 0$ (non-negativity restriction)