

14728

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Class	BS (SE) 4th Sem
Section	B

Q1 The given table shows the detail of a project

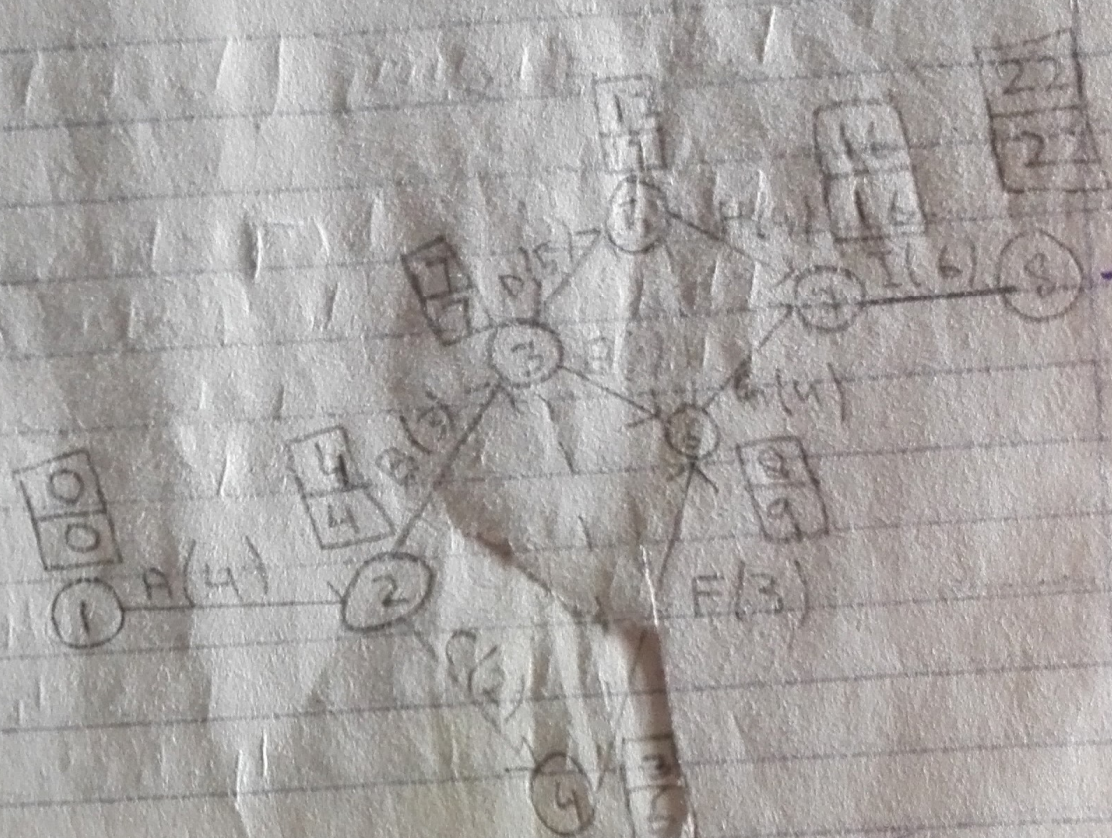
Activity	Predecessor	Time
A	-	4
B	A	3
C	A	2
D	B	5
E	B, C	1
F	C	3
G	E, F	4
H	D, E	4
I	H, G	6

- Calculate The CPM Network
- Determine the critical path
- Compute total floats and free float for non critical activity.

Solution:-

Solving the Following problem
Using CPM

(a) Calculate the CPM Network:-



(b) Determine the critical path and project completion time.
Determination of Earliest start (E)

$$ES_j = \max(\sum ES_i + D_{ij})$$

$$\text{For Node 1} = ES_1 = 0$$

$$\text{Node 2} = 0 + 4 = 4$$

$$\text{Node 3} = 4 + 3 = 7$$

$$\text{Node 4} = 4 + 2 = 6$$

$$\text{Node 5} = 7 + 5 = 12$$

$$\text{Node 6} = 6 + 3 = 9$$

Node 7 = 12 + 4 = 16

Node 8 = 16 + 6 = 22

Determination of Latest Completion time (Lci) -

$Lci = \min_j (Lcj - D_{ij})$

Node 8 = $L(7) - D_{87} = 22 - 6 = 16$

Node 7 = $L(7) - D_{57} = 16 - 4 = 12$

Node 6 = $9 - 1 = 8$

Node 5 = $12 - 5 = 7$

Node 4 = $6 - 3 = 3$

Node 3 = $7 - 3 = 4$

Node 2 = $7 - 3 = 4$

Node 1 = $4 - 4 = 0$

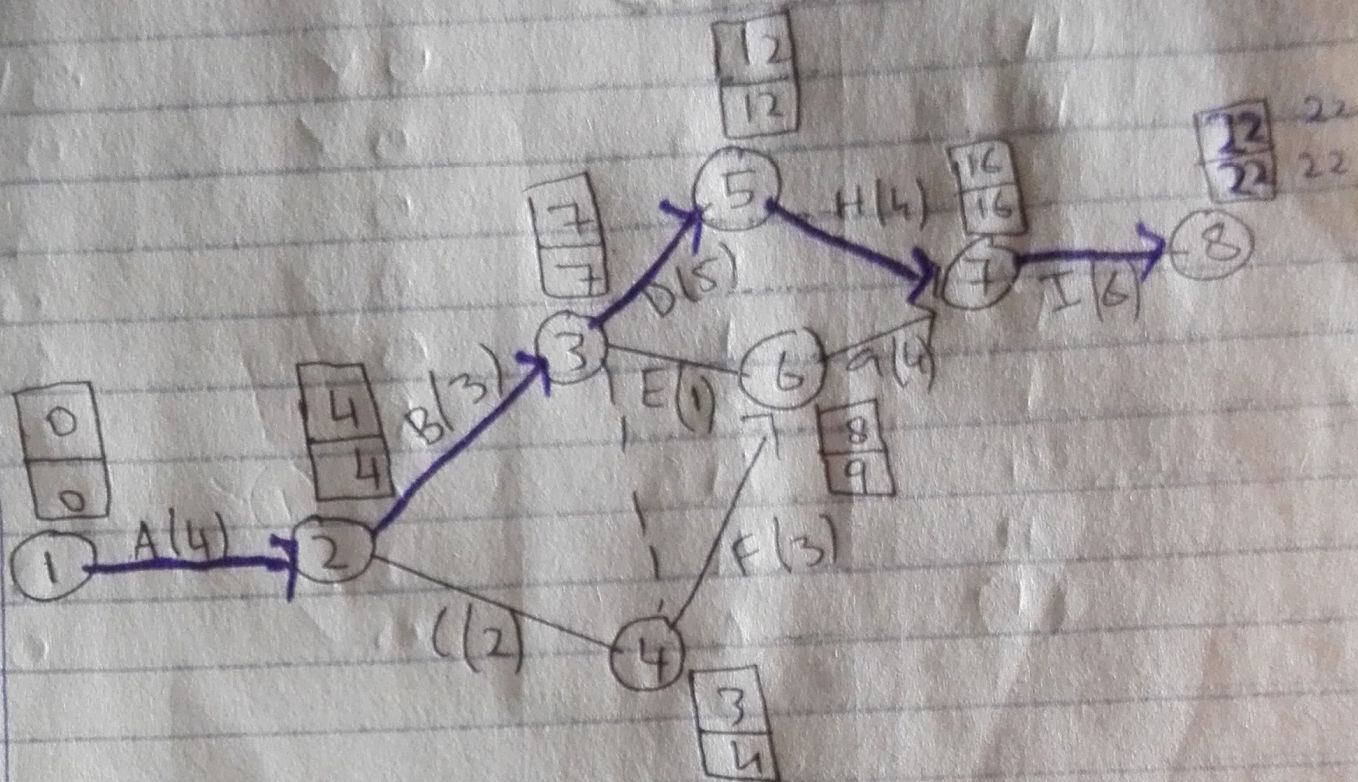
Critical path -

Condition -

(1) $ESi = LCi$

(2) $ESj = LCj$

(3) $ESj - ESi = LCi - LSi = \text{float}$



1-2-3-5-7-8

A-B-D-H-I

$$\Rightarrow 4 + 3 + 5 + 4 + 6 = 22$$

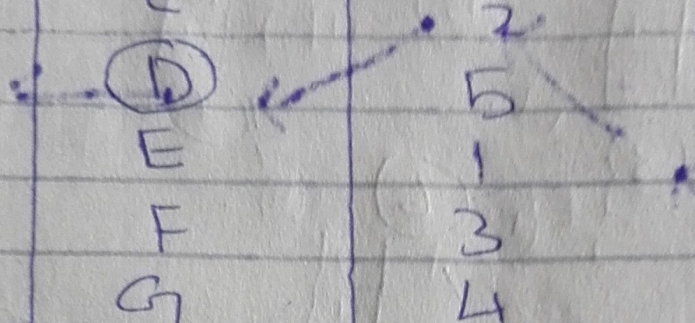
C Compute Total float and Free float :-

It is the amount of time to the completion time of an activity can be delayed without the project completion time

$$TF_{ij} = LC_j - ES_i - D_{ij}$$

Free floats :-

Activity (i,j)	Duration (D _{ij})	Total float (TFL _{ij})	Free float (FFL _{ij})
(A)	4	0 ✓	0 ✓
(B)	3	0 ✓	1 ✓
(C)	2	0	2
(D)	5	0 ✓	0 ✓
(E)	1	0	1
(F)	3	1	2
(G)	4	0	3
(H)	4	2	0
(I)	6	0 ✓	0 ✓



Total Float = L_{ij} - E_{si} - D_{ij}

A = 4 - 0 - 4 = 0

B = 7 - 3 - 4 = 0

C = 6 - 4 - 2 = 0

D = 12 - 5 - 7 = 0

E = 8 - 7 - 1 = 0

F = 8 - 4 - 3 = 1

G = 16 - 4 - 12 = 0

I = 22 - 16 - 6 = 0

Free Floats: -

it is the amount of time the activity completion time can be delayed without affecting the earliest start time of immediate successor activities in the network

$$FF_{ij} = ES_j - ES_i - D_{ij}$$

$$(1) A \rightarrow 1-2 \Rightarrow 4 - 0 - 4 = 0$$

$$(2) B \rightarrow 2-3 \Rightarrow 7 - 4 - 4 = 0$$

$$(3) C \rightarrow 2-4 \Rightarrow 4 - 4 - 2 = 0$$

$$(4) D \rightarrow 3-5 \Rightarrow 12 - 7 - 5 = 0$$

$$(5) E \rightarrow 3-6 \Rightarrow 9 - 7 - 1 = 1$$

$$(6) F \rightarrow 4-6 \Rightarrow 9 - 4 - 3 = 2$$

$$(7) G \rightarrow 6-7 \Rightarrow 16 - 9 - 4 = 3$$

$$(8) H \rightarrow 5-7 \Rightarrow 16 - 12 - 4 = 0$$

$$(9) I \rightarrow 7-8 \Rightarrow 22 - 16 - 6 = 0$$

$$A - B - D - H - I = 4 + 0 + 5 + 6 + 6 = 22$$

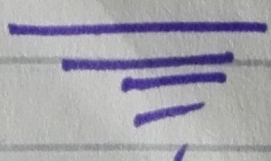
Q: 2

The given table shows the detail of a project

Activity	Preceder	O optimistic	M most likely	P pessimistic
A	-	4	5	12
B	A	2	3	4
C	B	6	8	22
D	C	4	6	8
E	C	3	4	5
F	E	2	4	6
G	D, F	2	3	4
H	C	5	7	15

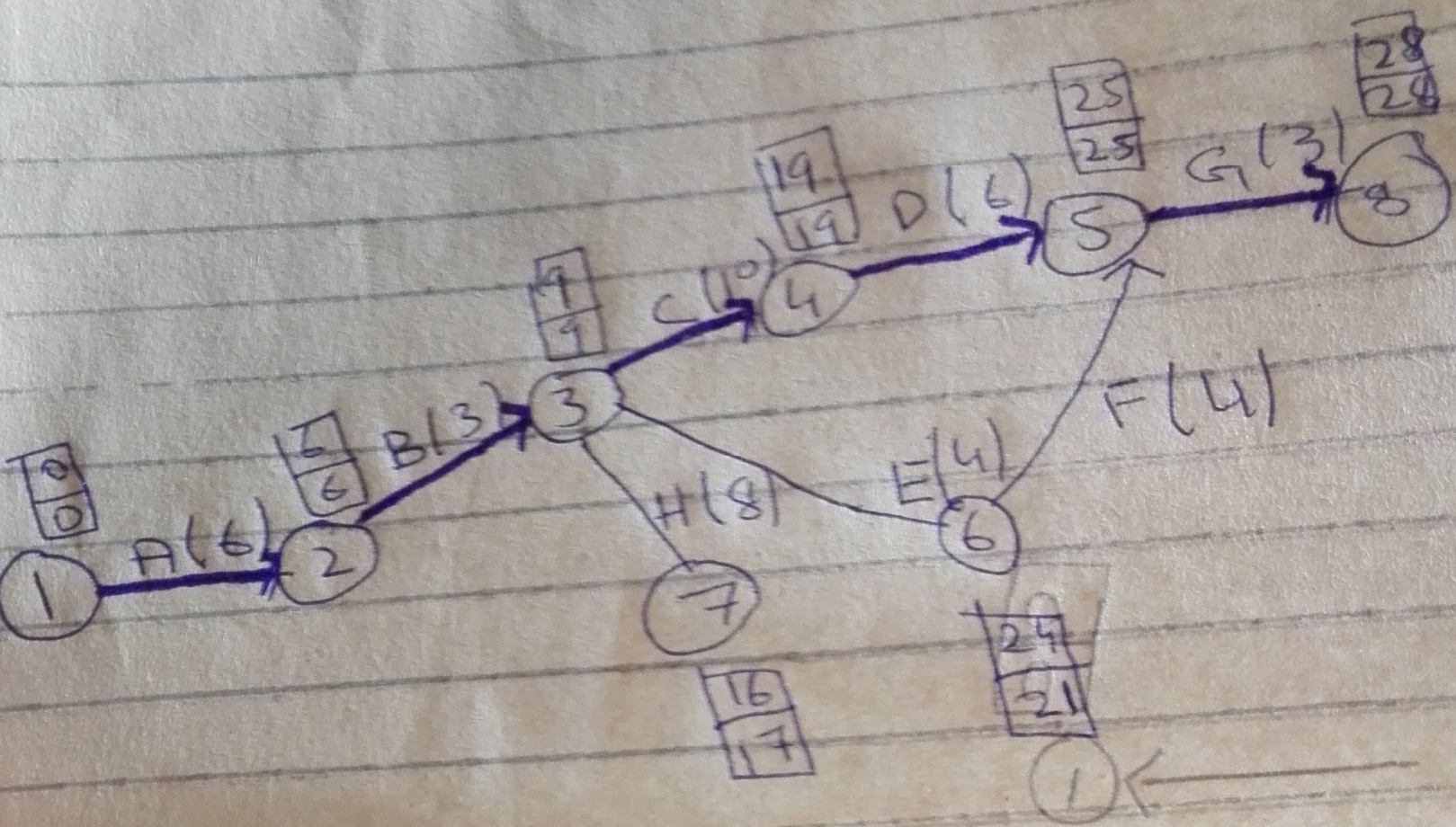
- (a) Construct the project network
- (b) Find the expected duration and variance of each activity
- (c) Find the critical path and expected project completion time

Solution: -

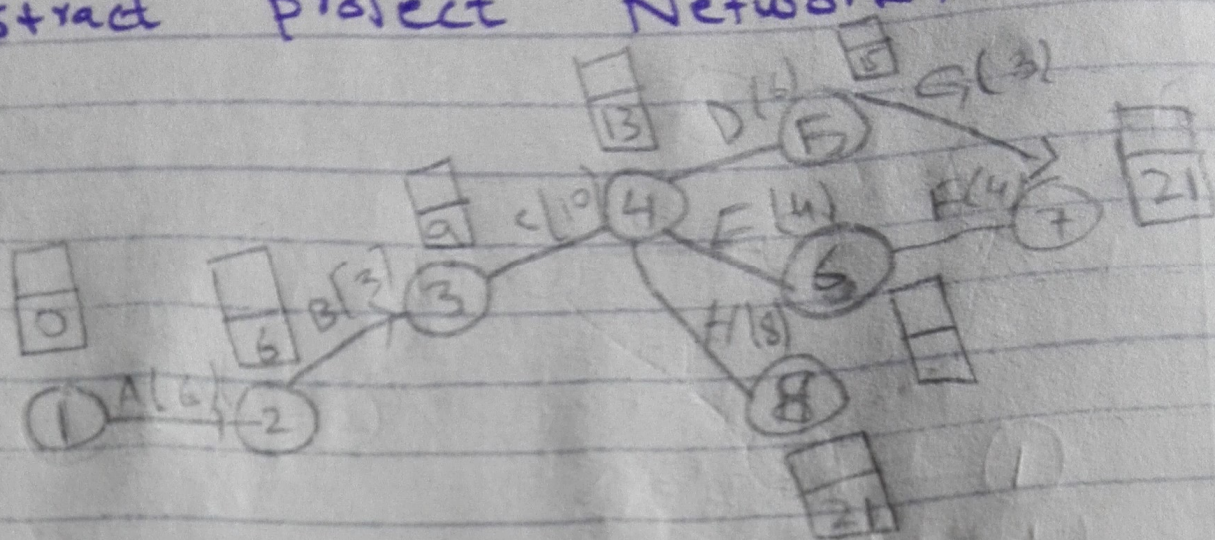


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a) Construct project Network:-



b) Find the expected duration and Variance of for Each activity

Activity	O	M	P	Mean (u)	Variance
A	4	5	12	$\frac{4+4+12}{3}$	0.222
B	2	3	4	3	0.0555
C	6	8	22	10	0.5
D	4	6	8	6	0.1111
E	3	4	5	4	0.5555
F	2	4	6	4	0.1111
G	2	3	4	3	0.5555
H	5	7	15	8	0.2777

$$\text{Mean} = t_e - \text{expected}$$

$$u = \frac{t_o + 4t_m + t_p}{6}$$

$$\sigma^2 = \left[\frac{t_p - t_o}{6} \right]^2$$

Q.3 write a detailed note on how this course (Research) will help you in your professional life.

Ans **Operation Research:-**

Operation Research is the scientific study of operation of the process of making a better decision with use operation research in our life. To make a good decisions in our life. Operation Research is an art and science. We can use Operation Research for solving a real world problem by using Operation Research techniques. Operation Research is a science in which deal with problem formulation solution and finally appropriate decision making - it is most often used to analyze complex real life problems typically with the goal improving or optimizing performance.