

Kasim-Ur-Rahman

14524

BS (SE) 4th Semester
Section (A)

Operations Research

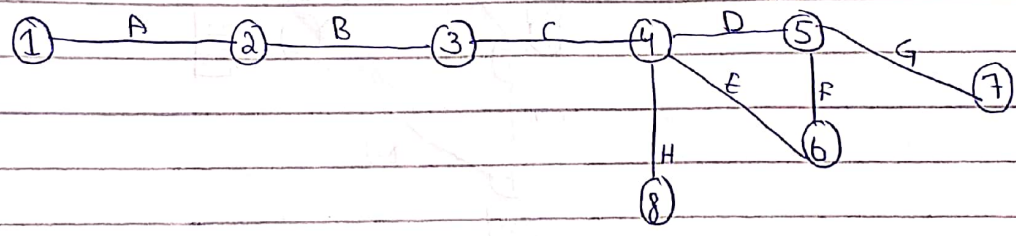
Final exam

Question 2

(1)

Activity	predecessor	(O)	(M)	(P)
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) project network



(B) mean = $\frac{t_a + 4t_m + t_b}{6}$

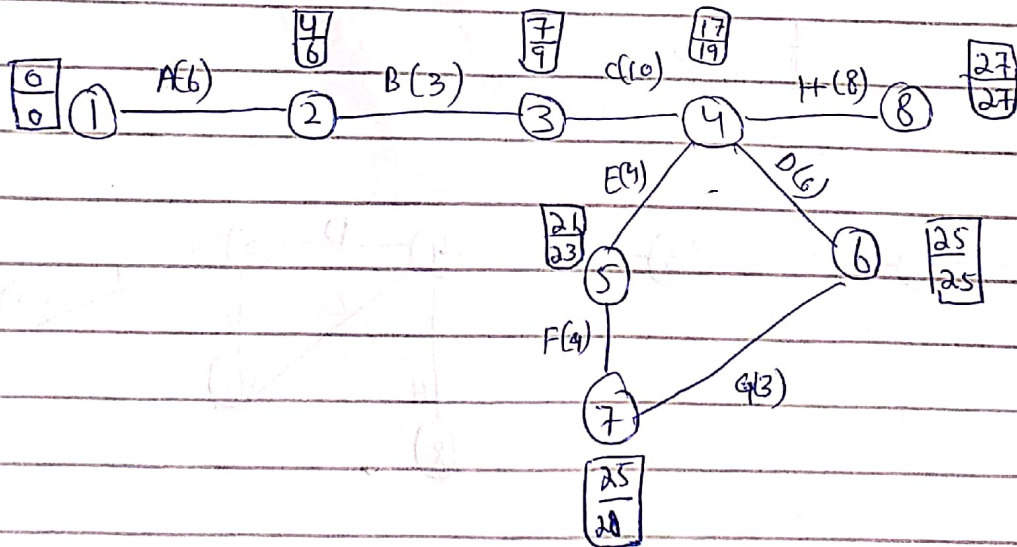
variance = $\left(\frac{t_b - t_a}{6}\right)^2$

deviation = $\sqrt{6^2}$

(2).

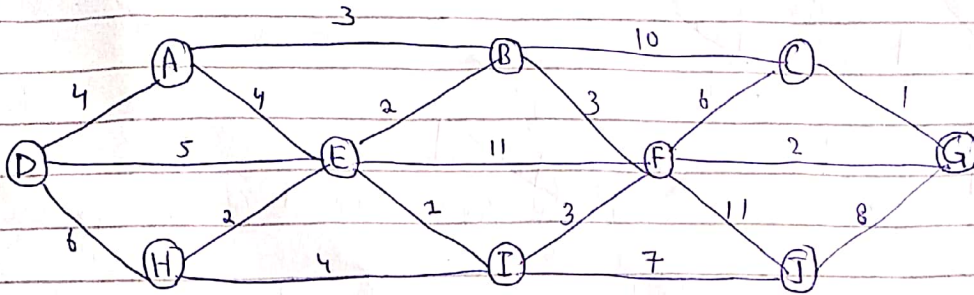
Activity	predecessor	O	M	P	mean	variance
A	-	4	5	12	6	1.77
B	A	2	3	4	3	0.11
C	B	6	8	22	10	7.11
D	C	4	6	8	6	0.44
E	C	3	4	5	4	0.11
F	E	2	4	6	4	0.44
G	D, F	2	3	4	3	0.11
H	C	5	7	15	8	2.77

(C) Critical path



(3)

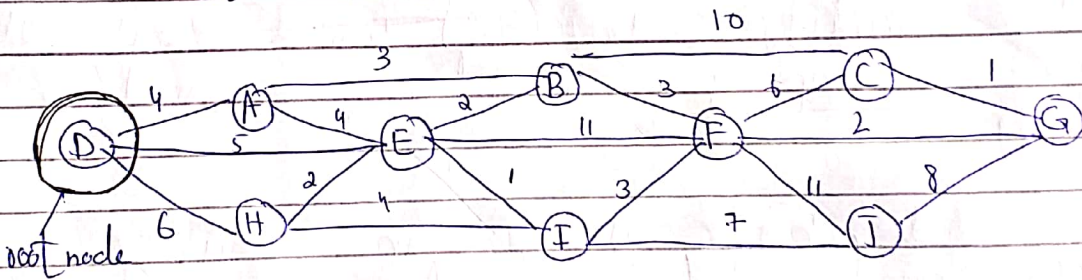
Question 3 :-



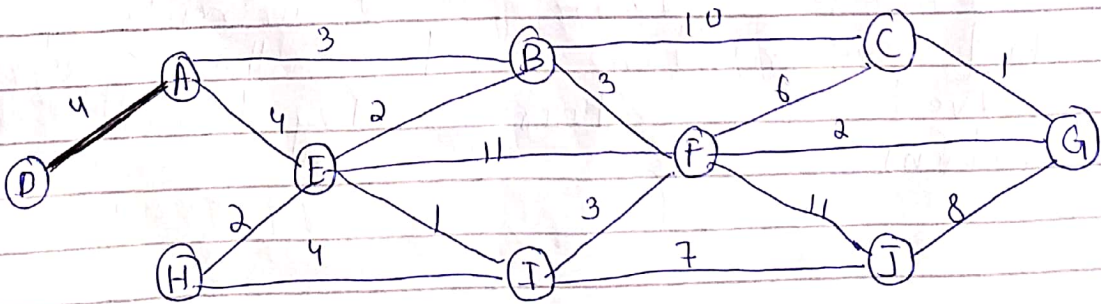
step 1 :-

Removing all loops and parallel edges -

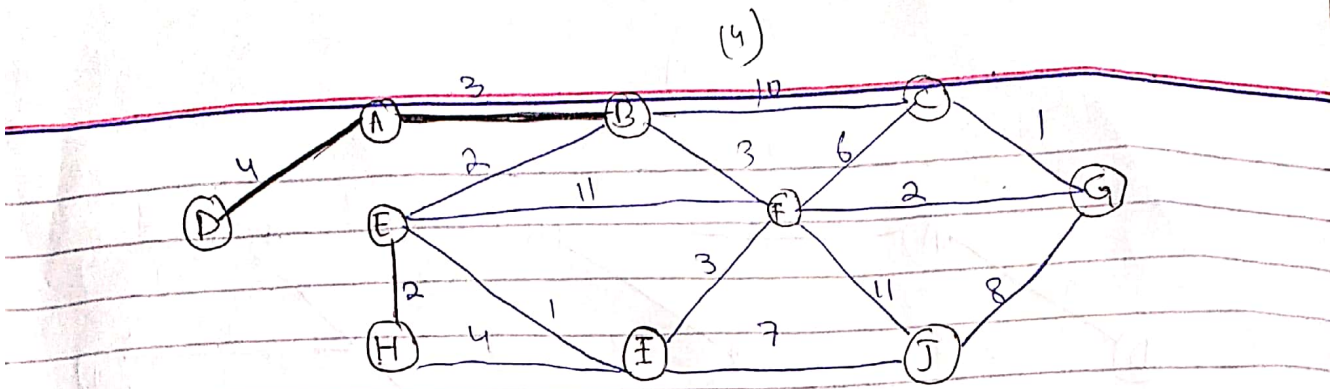
step 2 :- choosing arbitrary node as root node -



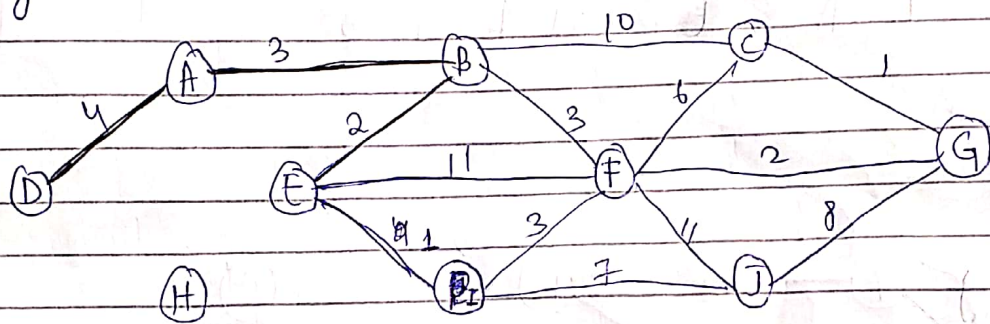
step 3 :-



Now the tree D-4-A is treated as one node and we are checking for all edges -

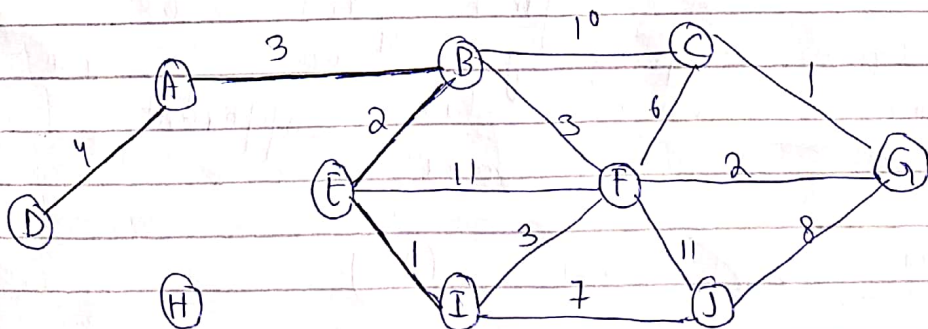


after this step $D-A-B$ tree is formed. Now we will again traverse it as a node and will check the edges again.



after adding Node E, the path is $D-A-B-E$.

Now

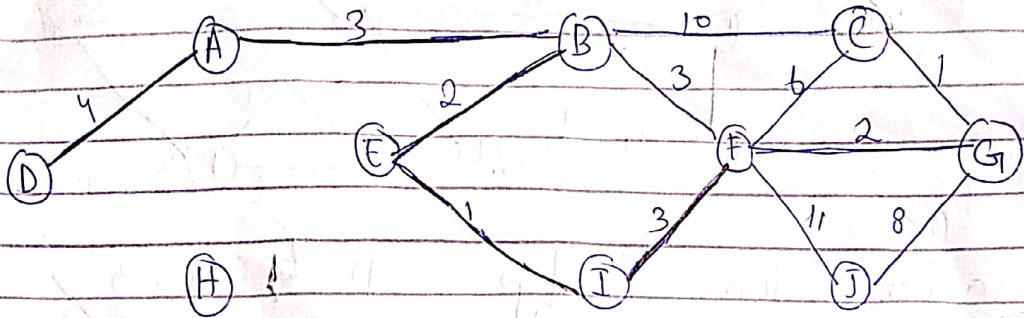


after adding root (I), the path is $D-A-B-E-I$.

$D-A-B-E-I$

Now

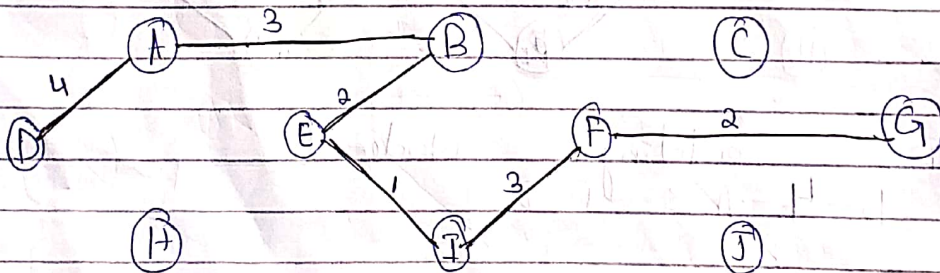
(5)



Now after adding root (F)

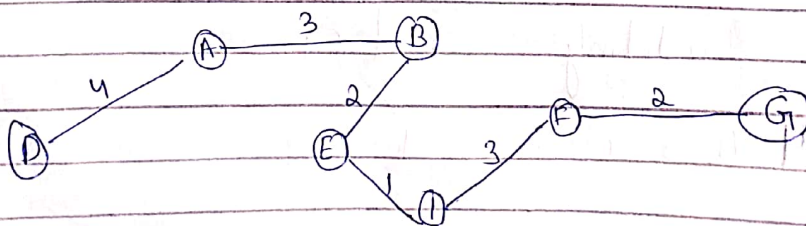
D-4-A-3-E-2-I-1-F-3

Now

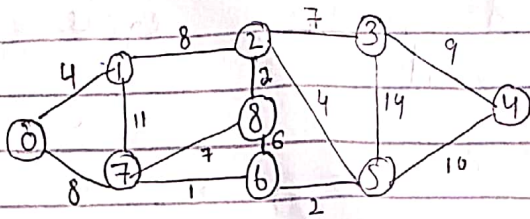


Now we find that the output spanning tree of the graph using two different algorithms is same

$$4 + 3 + 2 + 1 + 3 + 2 = 15$$



Question 4



Sol :-

* Here in the graph there are 9 vertices and 14 edges.

* Minimum Spanning tree formed will be having $(9-1) = 8$ edges.

Weight Source Destination.

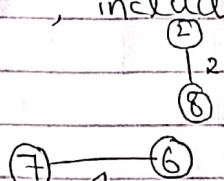
1	7	6
2	8	2
2	6	5
4	0	1
4	2	5
6	8	6
7	2	3
7	7	8
8	0	7
8	1	2
9	3	4
10	5	4
11	1	7

* Now picking all edges one by one from the list.

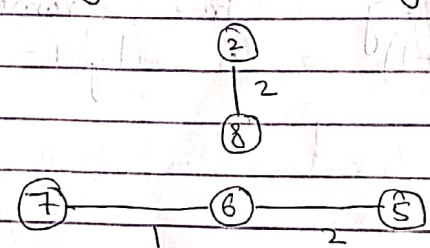
(1) pick edge 7-6 ; No cycle is

(1) is formed $\textcircled{7} \xrightarrow{1} \textcircled{6}$ include it -

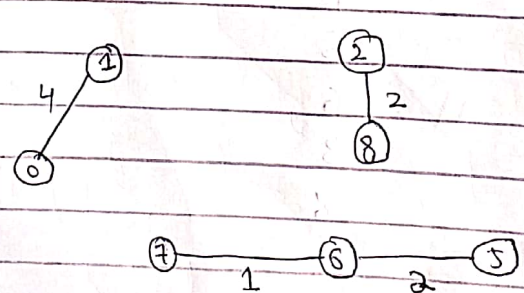
(2) picking edge $8-2$: No cycle is formed, include it -



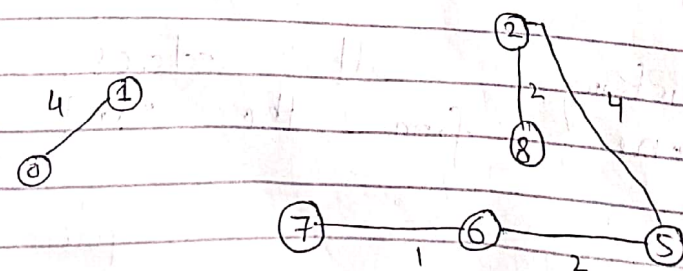
(3) picking edge $6-5$: again No cycle is formed including it -



(4) edge $0-1$



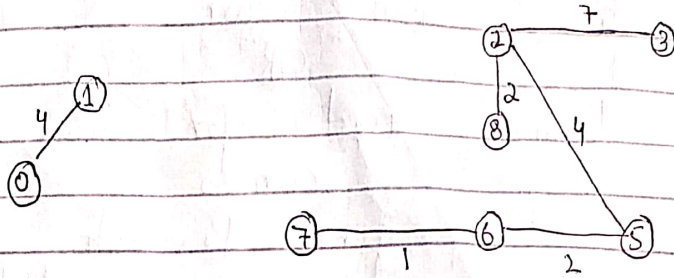
(5) picking edge $2-5$



(8)

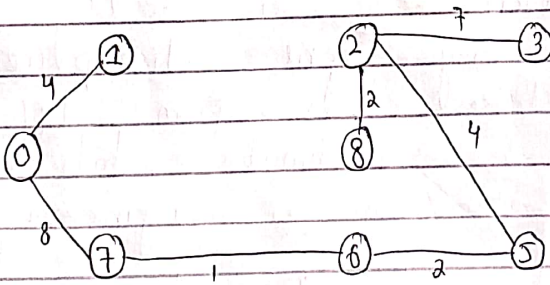
(6) edge 8-6, Including this stage
edge results into cycle -

(7) edge 2-3, No cycle -



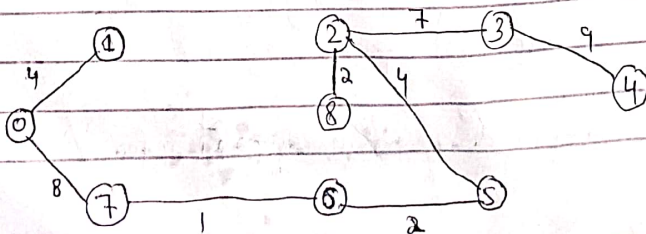
(8) edge 7-8, Including this
edge results into cycle -

(9) edge 0-7, No cycle forming -



(10) Picking edge 1-2, including this
edge results into cycle -

(11) Picking edge 3-4.



Since the number of edges included equals $(V-1)$, the algorithm stops here -

Question (5) answer:-

Introduction:-

Operational Research or Operation research both are often shortened as "OR". Another term used for this field is management Sciences. Operation Research is a relatively new discipline. The contents and the boundaries of the Operation research are not yet fixed, therefore to give formal definition of the term Operations Research is difficult task. The Operation Research starts when when mathematical and quantitative techniques are used to substantiate the decision being taken. Operations Research tools are not from any one discipline. Operations Research takes tools from different discipline such as mathematics, statistics, economics, psychology, engineering etc.

Applications and Examples:-

- * Airline Industry (routing and flight plans, crew scheduling, revenue management) -
- * Telecommunications (network routing, queue control)
- * Manufacturing Industry
- * Health care (hospital management, facility design)

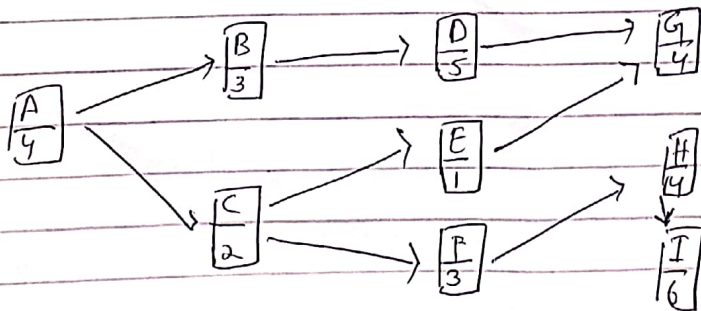
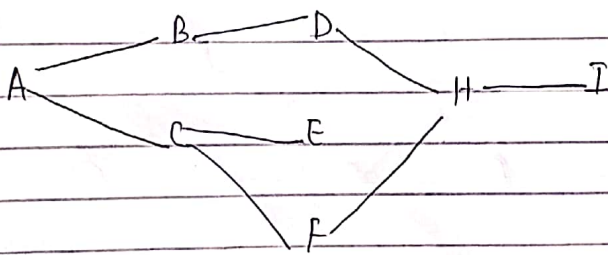
- * Transportation (traffic control, logistics, network flow) -
- * strategic planning -
- * Supply chain management -
- * pricing and revenue management
- * logistics and site locations
- * Optimization -
- * Marketing research -
- * Forecasting
- * Risk analysis -

* It will help us to ~~using~~ use our quantitative reasoning skills and ability to think critically, solve complex problems and provide solution

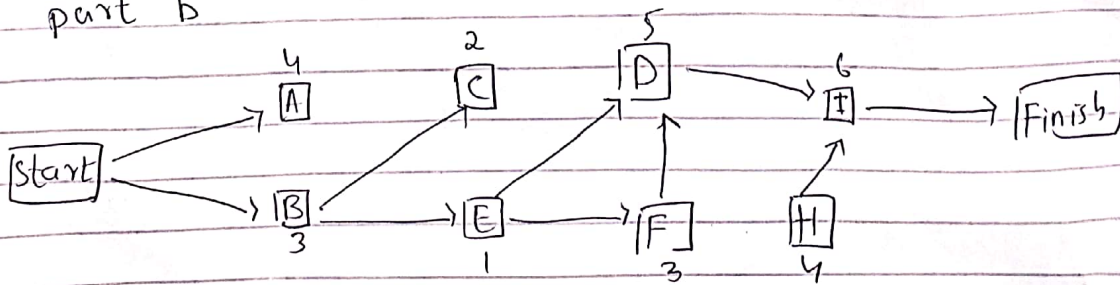
* It will help us in our professional life to improve businesses by studying cost-effectiveness, labor requirements, product distribution and other factors involved in their day-to-day operations -

Question (1)

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



part b



part (c)

total Float = TF

$$TF = LF - EF \quad \text{Finish}$$

$$TF = L_s - E_s \quad \text{start}$$

