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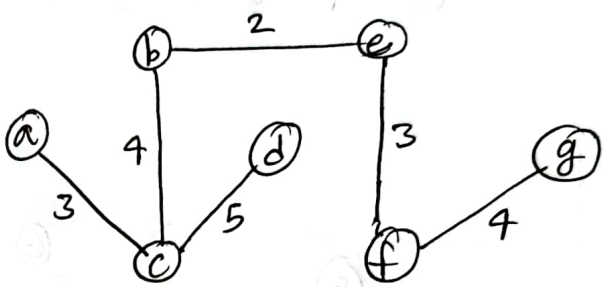
Section: 22

ASSIGNMENT-3

(1) I will use Kruskal's algorithm here.

Sorted Edged (Based on weight)				cycle
b	e	2	→	X
a	c	3	→	X
e	f	3	→	X
b	c	4	→	X
f	g	4	→	X
e	g	5	→	✓
c	d	5	→	✓
a	b	5	→	✓
d	e	6	→	✓
d	f	6	→	✓
c	f	6	→	✓



Total cost = 3+4+2+5+3+4

= 21

(2) (a) by using the codes given in the table,

decoded message:

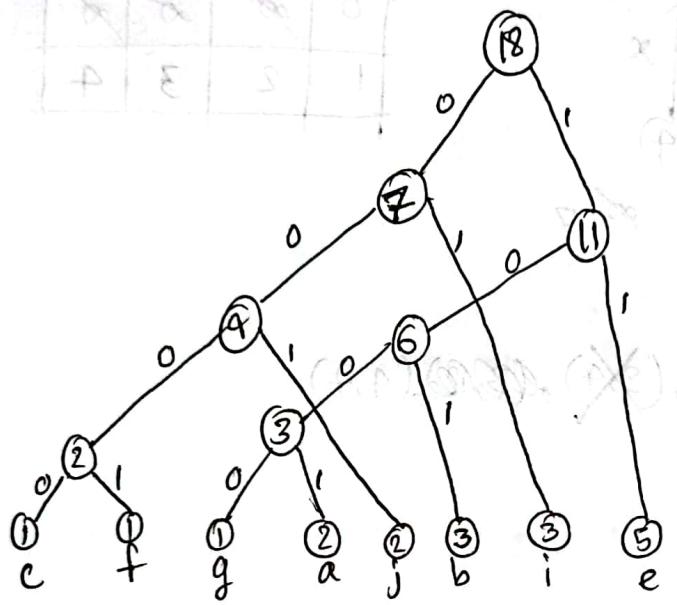
0000	0100	0100	1000	0100	1000	0100	1000	0001	0101	0001	0001
a	e	e	i	e	i	e	i	b	f	b	b

0110	0000	0100	1001	0010	1001
g	a	e	j	c	j

a → 2
b → 3
c → 1
d → 0
e → 5
f → 1
g → 1

h → 0
i → 3
j → 2

(b)



charac.	freq.	
a	2	
b	3	
c	1	
d	0	x
e	5	
f	1	
g	1	
h	0	x
i	3	
j	2	

left ⇒ 0
right ⇒ 1

a	b	c	d	e	f	g	h	i	j
1001	101	0000		11	0001	1000		01	001
2	3	1		5	1	1		3	2

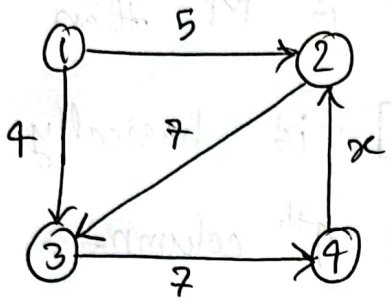
(c) Number of bits required = $(4\times2)+(3\times2)+(1\times4)+(2\times5)+(4\times1)$
$+(4\times1)+(2\times3)+(3\times2)$

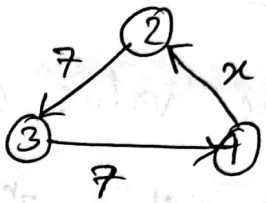
$= 8+6+4+10+4+4+6+6$

$= 48$ bits

(Ans)

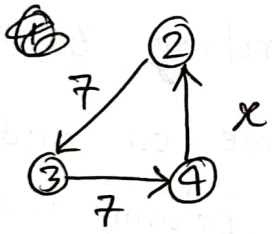
(3) (a)





if x is in the range of (-1 to -14), dijkstra algorithm will still work as $7+7-1 = 14-1 = 13$ and $7+7-14 = 0$. So, if x is in that range than it will run correctly.

(b)



if x is ~~more~~ less than (-14) than dijkstra won't work as the total = $7+7-15 = -1$ [$x=-15$] becomes negative and a negative sum cycle forms. Bellman Ford algorithm will be able to detect cycle here but not actually solve it. So, any value which is ~~less~~ than (-14) is the answer.

(c) For x in the range of (-1 to -14) both dijkstra and bellman ford algorithm will work. Because if wouldn't create negative sum cycle.

4 (a)

POLYNOMIAL

EXPONENTIAL

PONIAL

	O	P	O	L	Y	N	O	M	I	A	L
O	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0
X	0	0	0	0	0	0	0	0	0	0	0
P	0	↖1	←1	←1	←1	←1	←1	←1	←1	←1	←1
O	0	↑1	↖2	←2	←2	←2	↖2	←2	←2	←2	←2
N	0	↑1	↑2	↑2	↑2	↖3	←3	←3	←3	←3	←3
E	0	↑1	↑2	↑2	↑2	↑3	↑3	↑3	↑3	↑3	↑3
N	0	↑1	↑2	↑2	↑2	↖3	↑3	↑3	↑3	↑3	↑3
T	0	↑1	↑2	↑2	↑2	↑3	↑3	↑3	↑3	↑3	↑3
I	0	↑1	↑2	↑2	↑2	↑3	↑3	↑3	↖4	←4	←4
A	0	↑1	↑2	↑2	↑2	↑3	↑3	↑3	↑4	↖5	←5
L	0	↑1	↑2	↖3	←3	↑3	↑3	↑3	↑4	↑5	↖6

4] (b) If the LCS table is M then the value of M[3][4] is basically what is in the 3rd row and 4th column.

M[P][Y] = 1 this is what I get from my table.

(c) LCS string → PONIAL

I am going row ~~and~~ wise searching column wise^. (col+1)
If it doesn't match then move on and make (row+1) and then again search column wise (col+1) and repeat the process untill it matches.
If it matches then increment the diagonal value by 1 (diag+1). Throughout the table I used signs so that ~~for~~ backtracking it's easy to follow. After ~~each~~ incrementing diagonal's value by 1, I took the max value among diagonal, left, up.
max(↘, →, ↑).

Ans. to the Q.No.5

(a) I will use 0/1 knapsack here to get the max. profit. Sorted based on weight.

objects	Diamond	Jewelry	~~Sculpture~~	Painting	Gold crest	Sculpture
Profit (v)	3	4		9	12	12
Weight (w)	1	2		4	5	8

v	i \ w	0	1	2	3	4	5	6	7	
	0	0	0	0	0	0	0	0	0	
3	Diamond	0	(3)	3	3	3	3	3	3	✓
4	Jewelry	0	3	4	(7)	7	7	7	7	✓
9	Painting	0	3	4	7	9	12	13	(16)	✓
12	Gold crest	0	3	4	7	9	12	15	(16)	×
12	Sculpture	0	3	4	7	9	12	15	(16)	×

max = 7 kg

(b) Selected items/objects = (Painting, Jewelry, Diamond)

(c) I will apply fractional knapsack here ~~as it is a matter of robert~~ (Greedy Method) max = 7kg

Objects	weight(w)	Profit(v)	(v/w)	taken
Diamond	1	3	3	✓ 7-1=6
Jewelry	2	4	2	
Painting	4	9	2.25	✓ 1
Gold crest	5	12	2.4	✓ 6-5=1
Sculpture	8	12	1.5	

∴ Maximum profit = 12 + 3 + 2.25

= 17.25

She made 17.25 which is more than 16.

∴ So, yes her belief is valid.

Ans