

$$h(x) = x \bmod 7$$

A = 0, 2, 8, 16, 12, 9

①

key

location

0	$0 \% 7 = 0$
2	$2 \% 7 = 2$
8	$8 \% 7 = 1$
16	$16 \% 7 = 2$
12	$12 \% 7 = 5$
9	$9 \% 7 = 2$

0	0
1	8
2	2
3	
4	
5	12
6	

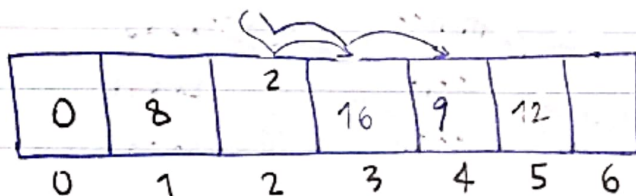


$$h(x) = x \% 7$$

A = 0, 2, 8, 16, 12, 9

list (Array)

②



this is an example of a huffman tree

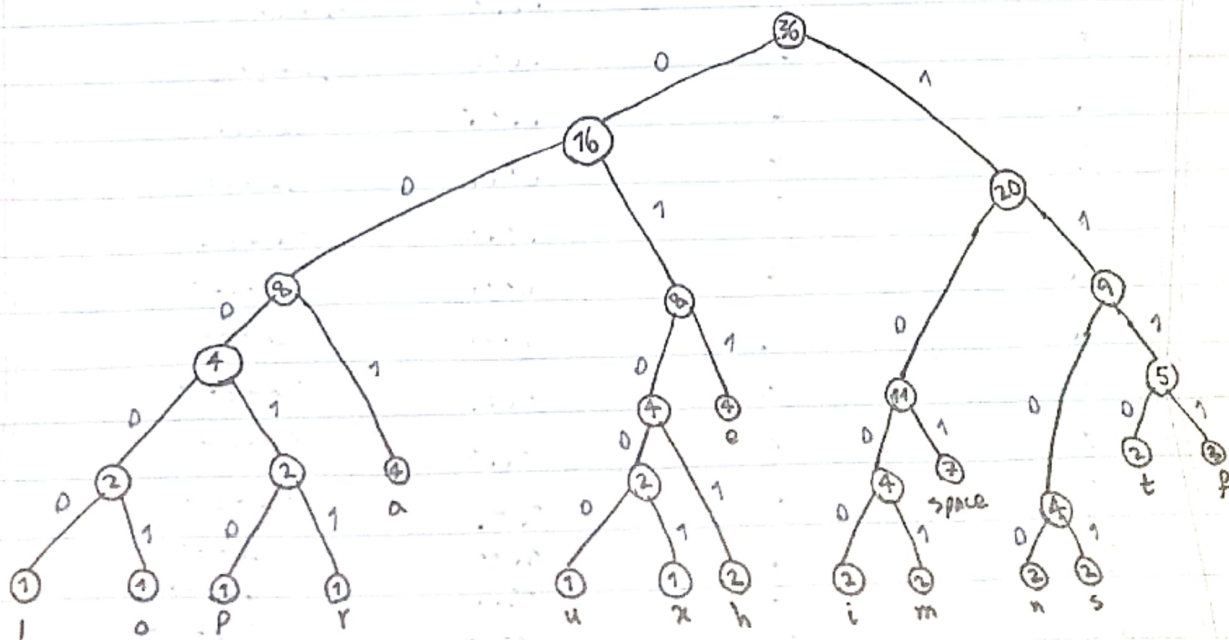
③

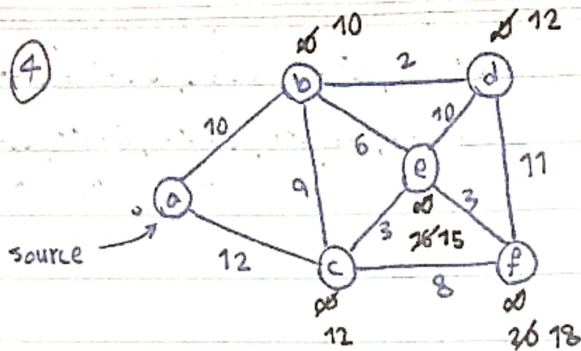
character	frequency	code	sum 144 bit
a	4	0000	$4 \times 4 = 16$
e	4	0001	$4 \times 4 = 16$
f	3	0010	$3 \times 4 = 12$
h	2	0011	$2 \times 4 = 8$
i	2	0100	$2 \times 4 = 8$
l	1	0101	$1 \times 4 = 4$
m	2	0110	$2 \times 4 = 8$
n	2	0111	$2 \times 4 = 8$
o	1	1000	$1 \times 4 = 4$
p	1	1001	$1 \times 4 = 4$
r	1	1010	$1 \times 4 = 4$
s	2	1011	$2 \times 4 = 8$
t	2	1100	$2 \times 4 = 8$
u	1	1101	$1 \times 4 = 4$
x	1	1110	$1 \times 4 = 4$
[space]	7	1111	$7 \times 4 = 28$

character	frequency	code	ادامہ یا غ سوال
a	4	001	$4 \times 3 = 12$
e	4	011	$4 \times 3 = 12$
f	3	1111	$3 \times 4 = 12$
h	2	0101	$2 \times 4 = 8$
i	2	1000	$2 \times 4 = 8$
l	1	00000	$1 \times 5 = 5$
m	2	1001	$2 \times 4 = 8$
n	2	1100	$2 \times 4 = 8$
o	1	00001	$1 \times 5 = 5$
p	1	00010	$1 \times 5 = 5$
r	1	00011	$1 \times 5 = 5$
s	2	1101	$2 \times 4 = 8$
t	2	1110	$2 \times 4 = 8$
u	1	01000	$1 \times 5 = 5$
x	1	01001	$1 \times 5 = 5$
[space]	7	101	$7 \times 3 = 21$ Sum 99 bits

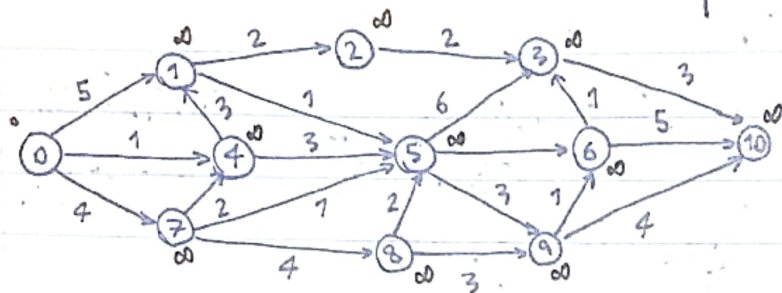
with Huffman tree and compression 99 bits

without " " " " " 144 bits



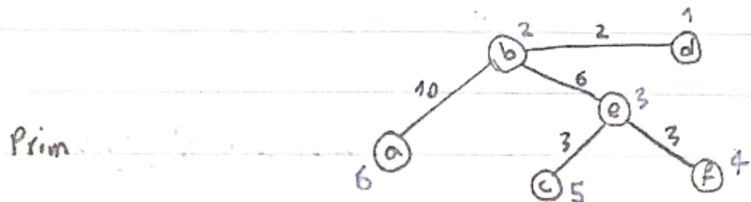


Source	V_a	V_b	V_c	V_d	V_e	V_f
V_a	0	∞	∞	∞	∞	∞
V_b		10	∞	12		
V_c			12	12	16	
V_d				12	15	20
V_e					15	20
V_f						18

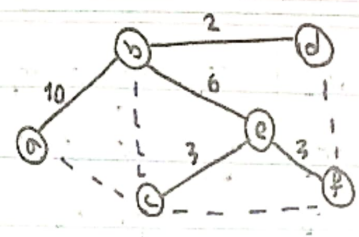


Source	V_0	V_1	V_2	V_3	V_4	V_5	V_6	V_7	V_8	V_9	V_{10}
V_0	0	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞
V_2		∞	1					4			
V_1		4					4				
V_5			6		4						
V_7			6	10			9	4		7	
V_2			6	10			9		8	7	
V_9				8			9		8	7	
V_3				8			8		8		11
V_6							8		8		11
V_8									8		11
V_{10}											11

(5) Prim's Algorithm Kruskal's Algorithm Brúvka's Algorithm

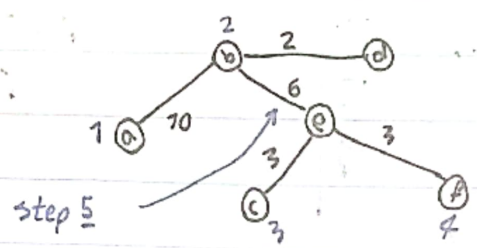


Kruskal

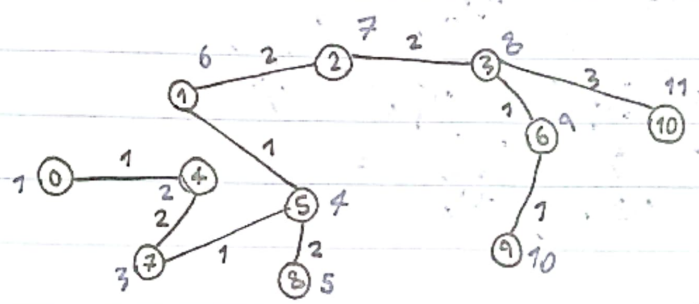


$bd = 2, ef = 3, ec = 3, be = 6, cf = 3$
 $bc = 9, ab = 10, ed = 10, df = 11, ac = 12$

Brutka

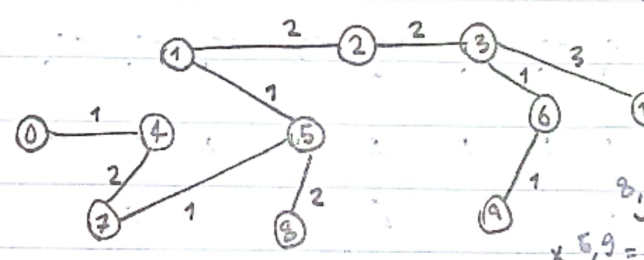


Prim



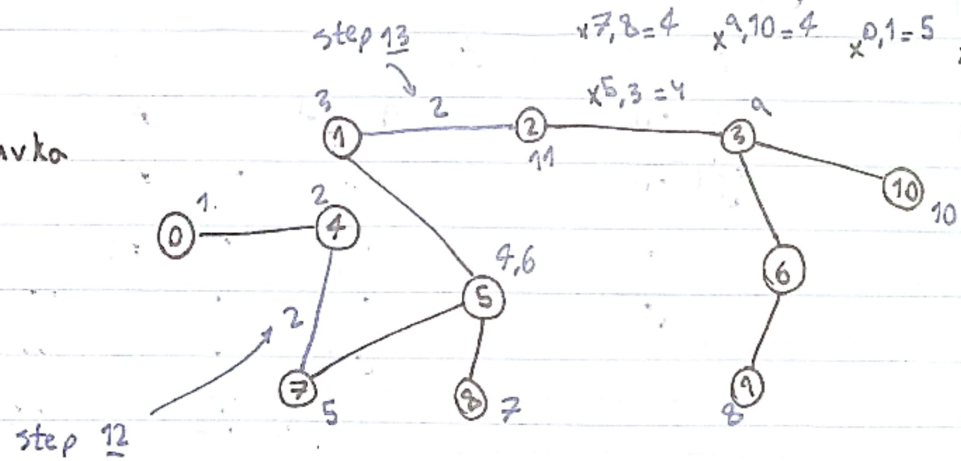
در قطری رسم نه تری
به طر نیست

Kruskal

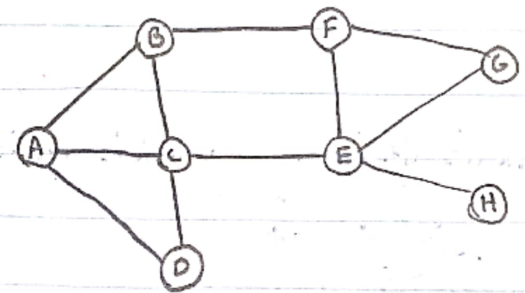


$0,2=1, 7,5=1, 9,6=1$
 $6,3=1, 1,5=1, 7,4=2$
 $1,2=2, 2,3=2$
 $8,5=2, 4,1=3, 4,5=3$
 $5,9=3, 3,10=3, 0,7=4$
 $7,8=4, 9,10=4, 0,1=5, 5,6=5, 6,10=5$
 $5,3=4$

Brutka



6

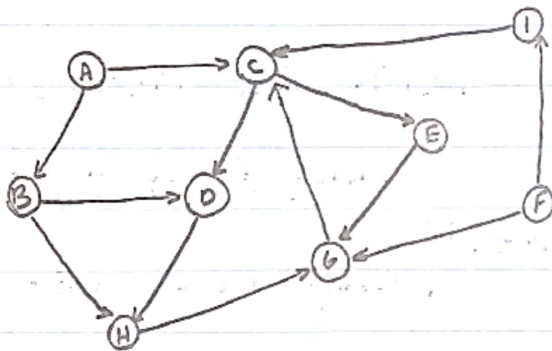
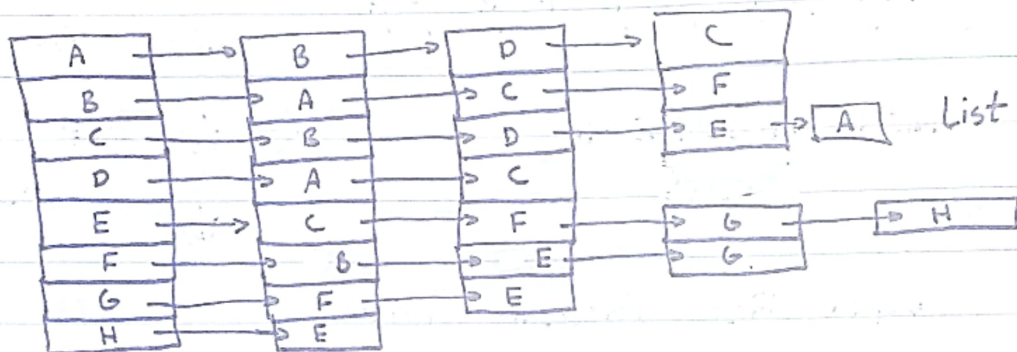


Adjacency Matrix
Adjacency List

ادامہ پانچ سوال ۶

	A	B	C	D	E	F	G	H
A	0	1	1	1	0	0	0	0
B	1	0	1	0	0	1	0	0
C	1	1	0	1	1	0	0	0
D	1	0	1	0	0	0	0	0
E	0	0	1	0	0	1	1	1
F	0	1	0	0	1	0	1	0
G	0	0	0	0	1	1	0	0
H	0	0	0	0	1	0	0	0

matrix

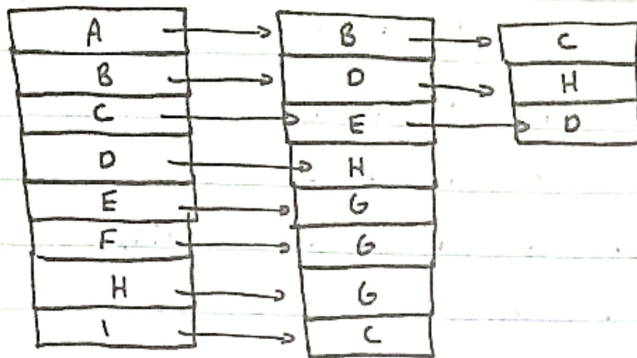


بر اساس فرقی

Adjacency
matrixادامہ پانچ سوال
۶

	A	B	C	D	E	F	G	H	I
A	0	1	1	0	0	0	0	0	0
B	0	0	0	1	0	0	0	1	0
C	0	0	0	1	1	0	0	0	0
D	0	0	0	0	0	0	0	1	0
E	0	0	0	0	0	0	1	0	0
F	0	0	0	0	0	0	1	0	1
G	0	0	1	0	0	0	0	0	0
H	0	0	0	0	0	0	1	0	0
I	0	0	1	0	0	0	0	0	0

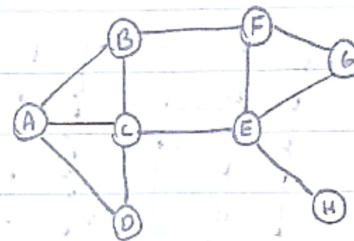
اداره پانچ شوال ۶



7 Breadth First Traversal آئل سے

Queue: A B C D E F G H

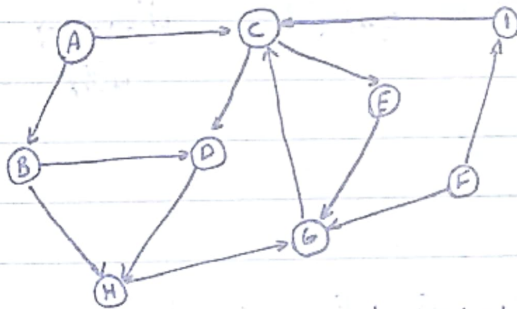
result: A B C D E F G H



Depth First Traversal آئل سے

result: A, B, C, D, E, F, G, H

using stack



Breadth First Traversal آئل سے

آئل سے : Queue: A B C D H E F
result: A B C D H E G

آئل سے : Queue: A B C D H E F
result: A B C D H E G I F

Depth First Traversal آئل سے

using stack

آئل سے : ABD H G C

آئل سے : ABD C E G H F I