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Ans1 Greedy algo paradigm : Greedy is an algorithm paradigm that builds up a sol^n piece by piece, always choosing the next piece that offers the most obvious & immediate benefits.

There are multiple applications of the greedy techniques as :

1. CPU scheduling
2. Minimum Spanning Tree
3. Several graph based algo

Ans 2

	Activity Selection	Job Sequencing	Fractional Knapsack	Huffman Encoding
T. C.	$O(n \log n)$	$O(n^2)$	$O(n \log n)$	$O(n \log n)$
S. C.	$O(n)$	$O(n)$	$O(n)$	$O(n)$

Ans 3 Huffman Encoding

Char	Frequency
a	45
b	23
c	22
d	20
e	19
f	15

Sorted Frequency

f	e	d	c	b	a
15	19	20	22	23	45

f — 15
e — 19
d — 20
c — 22
b — 23
a — 45
fe — 34
dc — 44
feb — 57
adc — 89
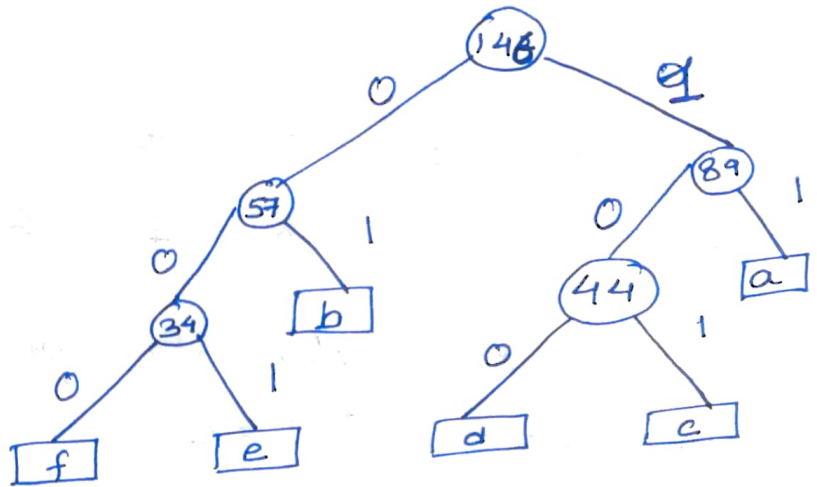
a = 11
b = 01
c = 101
d = 100
e = 001
f = 000

Ans 4 Binary tree is used for building Huffman coding & it is also used for Huffman encoding.

Application of Huffman encoding
1. It is used to convert fixed length codes into variable length codes, which results in lossless compression.

2. Compressed codes may be further compressed using JPEG and MPEG to get desired compression ratio.

Ans 5 $W = 15$

Value	10	5	15	7	6	18	3
Weight	2	3	5	7	1	4	1
v/w	5	1.6	3	1	6	4.5	3

- Choose highest v/w ratio for which $w \leq W$
- Let current weight = c

$X =$

0	0	0	0	1	0	0

$C = 1$

$X =$

1	0	0	0	1	0	0

$c = 3$

$X =$

1	0	0	0	1	1	0

$c = 7$

$X =$

1	0	1	0	1	1	0

$c = 12$

$X =$

1	0	1	0	1	1	1

$C = 13$

$X =$

1	2/3	1	0	1	1	1

Next highest weight is 1·6 which has 3 unit weight, but $c + 3 \neq 15$.

So we'll use fraction as per requirement.

Required weight = $W - c = 15 - 13 = 2$

∴ $\frac{2}{3}$ weight is added.

$X W =$ | 2 | 2 | 5 | 0 | 1 | 4 | 1 |

$\sum x_i w_i = W$

$V X =$ | 10 | 3.3 | 15 | 0 | 6 | 18 | 3 |

Max profit/max value = $\sum v_i x_i$

= 55

Ans 6 Knapsack Algo : To solve the problem we take the value/weight ratio & on the basis of this ratio a weight is, which has highest v/w ratio, added to the Knapsack, until we can't add the next weight as a whole and that point of time we take the required fraction of the weight & add it to the Knapsack. This is nothing but greedy approach of taking the highest ratio everytime.

Huffman Coding : It is based on the frequency of the character. We assign the variable length code to input characters. Length of the assigned codes are based on the frequencies of corresponding characters. Hence, it is a greedy approach as we are using a predefined structure everytime to solve the problem.

Ans 7
=

	a	b	c	d	e	f
Start time	1	2	0	6	9	10
End time	3	5	7	8	11	12

Timeline
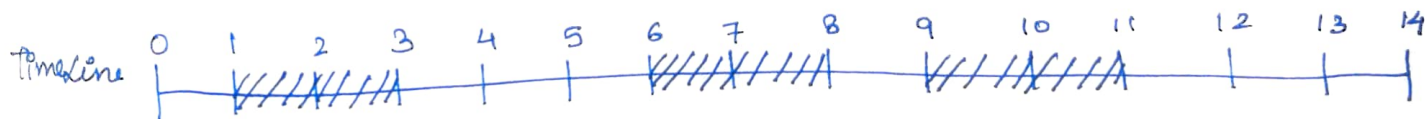
Included process = a, d, e

Max. no. of process = 3

Ans 9 Greedy algorithm are not suitable for problems where a solution is required for every subproblem, like sorting. In such problems the greedy strategy can be wrong, in the worst can lead to a non optimal soln.