

(1)  
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Subject: Design and Analysis  
of Algorithms.

Dept: BS CS 4th

Submitted to: Sir Adif

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(i) Question No 1

Fill in the blanks:

1. vertex
2. Multiple / Parallel Edge.
3. adjacent edges
4. Simple Path.
5. Cycle
6. Source Node
7. Sink
8. Isolated or Null Graph.
9. Regular Graph.
10. Labeled Graph.

## Question No 2

(i)  $D - Y * (F/G)$

Pre-fix

$$\underline{D - Y * (F/G)}$$

$$- \underline{D Y * (F/G)}$$

$$- D * Y \underline{(F/G)}$$

$$- D * Y ( \underline{F/G} )$$

Post - Fix

$$\underline{D - Y * (F/G)}$$

$$D Y * \underline{(F/G)} -$$

$$D Y (F/G) * -$$

$$D Y (FGI) * -$$

(ii)  $T/W ^ R + S * M - Y ^ K$

Pre - Fix

$$\underline{T/W ^ R + S * M - Y ^ K}$$

$$+ \underline{T/W ^ R} \quad \underline{S * M - Y ^ K}$$

$$+ \frac{T}{W} \underline{R} - \underline{S} * \underline{M} \underline{Y}^K$$

$$+ \frac{T}{W} \wedge \underline{WR} - * \underline{SM} \wedge \underline{YK}$$

Post-Fix

$$\underline{T/W} \wedge \underline{R} + \underline{S} * \underline{M} - \underline{Y}^K$$

$$\bullet \underline{T/W} \wedge \underline{R} \quad \underline{S} * \underline{M} - \underline{Y}^K +$$

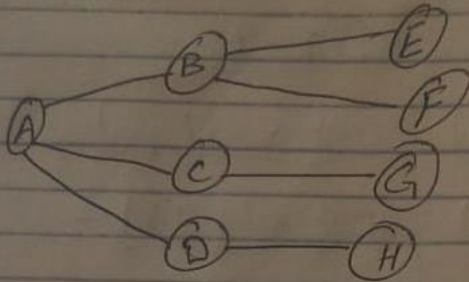
$$\bullet \cancel{\underline{T/W} \wedge \underline{R}} / \underline{SM} * \underline{Y}^K - +$$

$$\underline{T/W} \wedge \underline{R} / \underline{S} * \underline{M} \underline{Y}^K - +$$

$$\underline{TWR} \wedge / \underline{S} * \underline{M} * \underline{YK} \wedge - +$$

Ans.

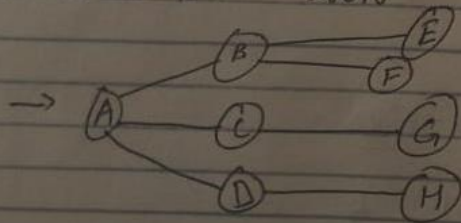
### Question No 3



① Add Root A to the output sequence.

\* Mark A visited.

\* A is CWN



Output sequence

A

② A is adjacent to B, C and D.

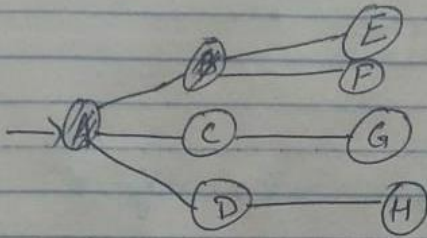
\* Select B and push it into queue



B | | |

\* Add B to the output sequence.

\* Mark B visited.



Output sequence

A, B

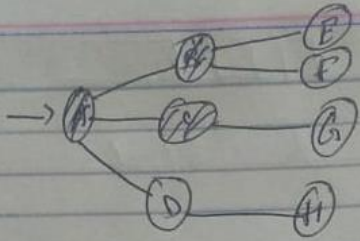
③ \* From CWN i.e 'A' the adjacent node is "B"

\* 'B' is pushed into the Queue

B | C |

\* 'C' is marked visited.

\* 'C' is added to output sequence



Output sequence:

A, B, C

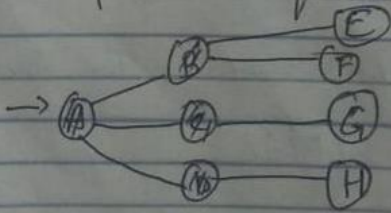
(4) As 'D' is also adjacent to 'A'.

\* D is pushed into the Queue  

B	C	D		
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\* D is Mark visited.

\* D is added to the output sequence.



Output sequence

A, B, C, D

\* New CWN is updated

\* 'B' is selected as new CWN.

\* 'B' is popped from Queue.

| C | D | |

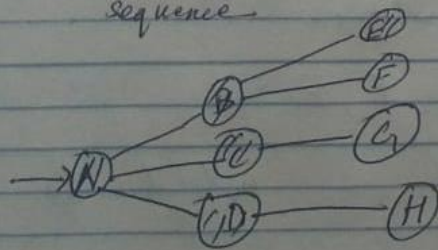
⑤ A B is adjacent to E, and F

\* 'E' is selected and pushed into the Queue.

| C | D | E | |

\* 'E' is marked visited.

\* 'E' is added to output sequence.



Output sequence

A, B, C, D, E

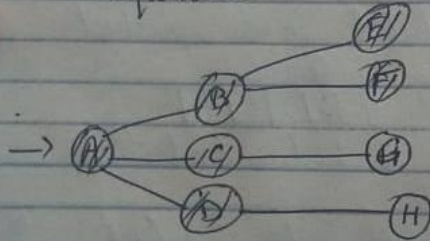
Q\* from CWN i.e 'B' the adjacent node 'F' is selected

\* 'F' is pushed into the Queue

C	D	E	F		
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\* 'F' is mark visited

\* 'F' is added to output sequence



Output sequence

A, B, C, D, E, F

\* Now CWN is updated to 'C'.

\* 'C' is popped from Queue

	D	E	F		
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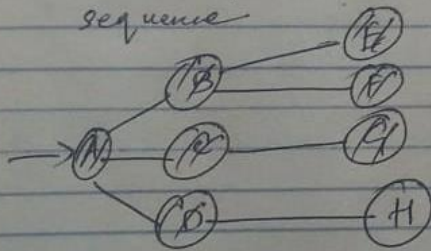
⑦ \* from CNN i.e. 'C', the adjacent node is 'G'.

\* G is pushed into the Queue.

|| D | E | F | G |

\* G is marked visited.

\* 'G' is added to output sequence



⑧ .S :-

A, B, C, D, E, F, G

\* Now CNN is updated to

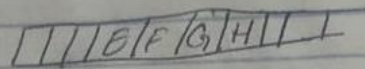
'D'.

\* 'D' is popped from Queue

|| | E | F | G |

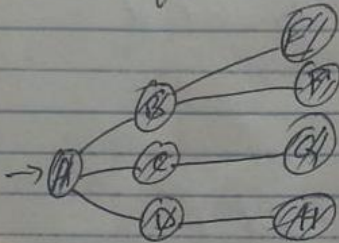
⑨ \* 'H' is adjacent node to 'D'

\* 'H' is pushed to Queue



\* 'H' is mark visited

\* 'H' is added to output sequence

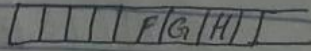


Q.S:-

A, B, C, D, E, F, G, H.

\* Now CWN is updated to 'E'.

\* 'E' is popped from Queue



\* No adjacent node to 'H'.

\* Now again CWN is updated to F.

8

\* "F" is popped from Queue.

□ □ □ □ G | H □ □ □

\* No adjacent node to 'F'

\* Now again CNV is updated to 'G'.

\* 'G' is popped from Queue.

□ □ □ □ □ | H □ □ □

\* No adjacent node to 'G'

\* Now again CNV is updated to 'H'.

\* 'H' is popped from Queue.

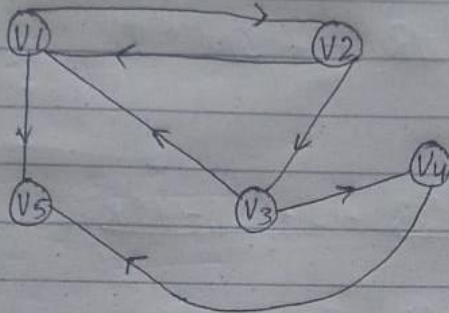
□ □ □ □ □ □ □ □

\* No adjacent node to 'H'

\* Queue is empty, So

BFS stops.

Question No 4



Sol:

No of nodes =  $m=5$

Order of  $A = m \times m$   
 $= 5 \times 5$

	$V_1$	$V_2$	$V_3$	$V_4$	$V_5$	Out degree
$V_1$	0	1	0	0	1	2
$V_2$	1	0	1	0	0	2
$V_3$	1	0	0	1	0	2
$V_4$	0	0	0	0	1	1
$V_5$	0	0	0	0	0	0
Indegree	2	1	1	1	2	7



Question No 5

$$A = \begin{bmatrix} 0 & 1 & 0 & 1 & 1 \\ 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 \\ 1 & 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

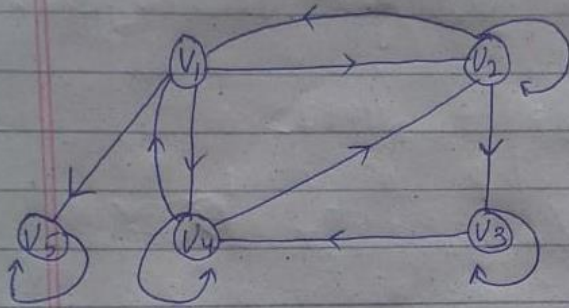
Sol:-

$$A = \begin{matrix} & \begin{matrix} v_1 & v_2 & v_3 & v_4 & v_5 \end{matrix} \\ \begin{matrix} v_1 \\ v_2 \\ v_3 \\ v_4 \\ v_5 \end{matrix} & \begin{bmatrix} 0 & 1 & 0 & 1 & 1 \\ 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 \\ 1 & 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} \end{matrix}$$

$$\begin{aligned} \text{Order of } A &= m \times m \\ &= 5 \times 5 = 25 \end{aligned}$$

$$\text{No of nodes} = 5$$

let the nodes be  
 $v_1, v_2, v_3, v_4$  and  $v_5$



Ans.