

DFS(G)

```

1 for each vertex  $u \in G.V$ 
2    $u.color = WHITE$ 
3    $u.\pi = NIL$ 
4    $time = 0$ 
5 for each vertex  $u \in G.V$ 
6   if  $u.color == WHITE$ 
7     DFS-VISIT( $G, u$ )
  
```

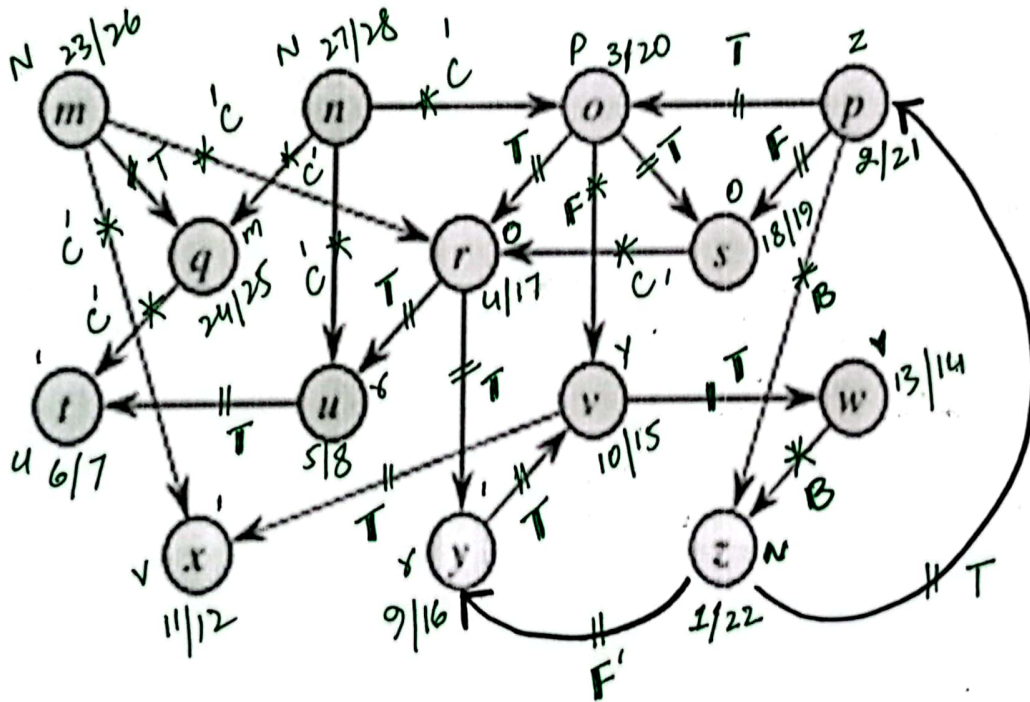
DFS-VISIT(G, u)

```

1   $time = time + 1$ 
2   $u.d = time$ 
3   $u.color = GRAY$ 
4  for each  $v \in G.Adj[u]$ 
5    if  $v.color == WHITE$ 
6       $v.\pi = u$ 
7      DFS-VISIT( $G, v$ )
8   $u.color = BLACK$ 
9   $time = time + 1$ 
10  $u.f = time$ 
  
```

Apply DFS algorithm on the given graph and answer the following questions. (Note: The adjacent nodes of a vertex are to be traversed in alphabetical order, and DFS algorithm will also work in alphabetical order.) The source node is 'Z'.

1. Write the type of each edge of the below graph, complete work should be there.
2. Write updated details for all the vertices when DFS-VISIT (G, u) [7th line inside the DFS-VISIT] called for the 6th time (Just Called) write the values for all vertices ('Parent', 'color', 'd-time', 'f-time').
3. Write down details for all the vertices when Line 8 of DFS-VISIT (G, u) completed its work for 5th time - write the values of their ('Parent', 'color', 'd-time', 'f-time').



T	F	B	C
11	3	2	7

6th
✓
5th
*

N/13/1/22 Z → P, Y *¹¹

Z/13/2/21 P → O, S, Z *¹⁰

P/13/3/20 O → Y, S, V *⁹

O/13/4/19 X → U, Y *⁷

X/13/5/18 U → T *²

U/13/6/17 T → *¹

X/13/9/16 Y → V *⁶ (x f w f - -)

Y/13/10/15 V → X, W *⁵

V/13/11/12 X → *³

V/13/13/14 W → Z *⁴

O/13/18/19 S → Y *⁶

N/13/23/26 M → Q, Y, X *¹³

~~M/13/25/28~~

M/13/24/25 Q → T *¹²

N/13/27/28 N → O, Q, U


```

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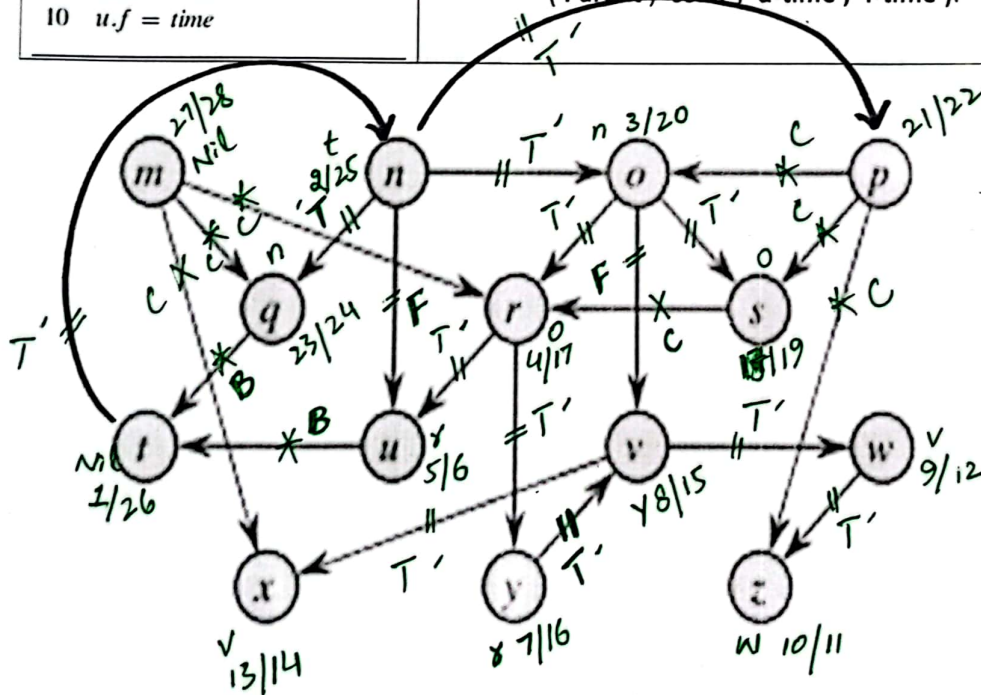
```

DFS-VISIT( $G, u$ )
1   $time = time + 1$ 
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4  for each  $v \in G.Adj[u]$ 
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8   $u.color = BLACK$ 
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10  $u.f = time$ 

```

Apply DFS algorithm on the given graph and answer the following questions. (Note: The adjacent nodes of a vertex are to be traversed in alphabetical order, and DFS algorithm will also work in alphabetical order.) The source node is 't'.

1. Write the type of each edge of the below graph, complete work should be there.
2. Write updated details for all the vertices when DFS-VISIT (G, u) [7th line inside the DFS-VISIT] called for the 6th time (Just Called) write the values for all vertices ('Parent', 'color', 'd-time', 'f-time').
3. Write down details for all the vertices when Line 8 of DFS-VISIT (G, u) completed its work for 5th time - write the values of their ('Parent', 'color', 'd-time', 'f-time').



2 - C
 2 - B
 2 - F
 12 - T

Q-2

Inside DFS-VISIT called for (6th) time (Line 7)
(only that vertex parent changed)

	(1)	(2)			(3)	
m	n	o	p	q	r	s
w	G	G	w	w	G	w
N	t	n	N	N	o	N
-	2	3	-	-	4	-
-	-	-	-	-	-	-
	(4)	(6)			(5)	
t	u	v	w	x	y	z
G	B	w	w	w	G	w
N	8	y	N	N	8	N
1	5	-	-	-	7	-
6	-	-	-	-	-	-

Sorry
here
also not
parent
not

Q-3 Line-8 vertex work has been completed, but time (if not assigned)
(5th)

m	n	o	p	q	r	s
w	G	G	w	w	G	w
N	t	n	N	N	o	N
-	2	3	-	-	4	-
-	-	-	-	-	-	-
t	u	v	w	x	y	z
G	B	B	G	B	G	B
N	y	y	v	v	8	w
1	5	8	9	13	7	10
-	6	-	12	14	-	11
		*				
		↑				

DFS(G)

```

1 for each vertex  $u \in G.V$ 
2    $u.color = WHITE$ 
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4  $time = 0$ 
5 for each vertex  $u \in G.V$ 
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```

DFS-VISIT(G, u)

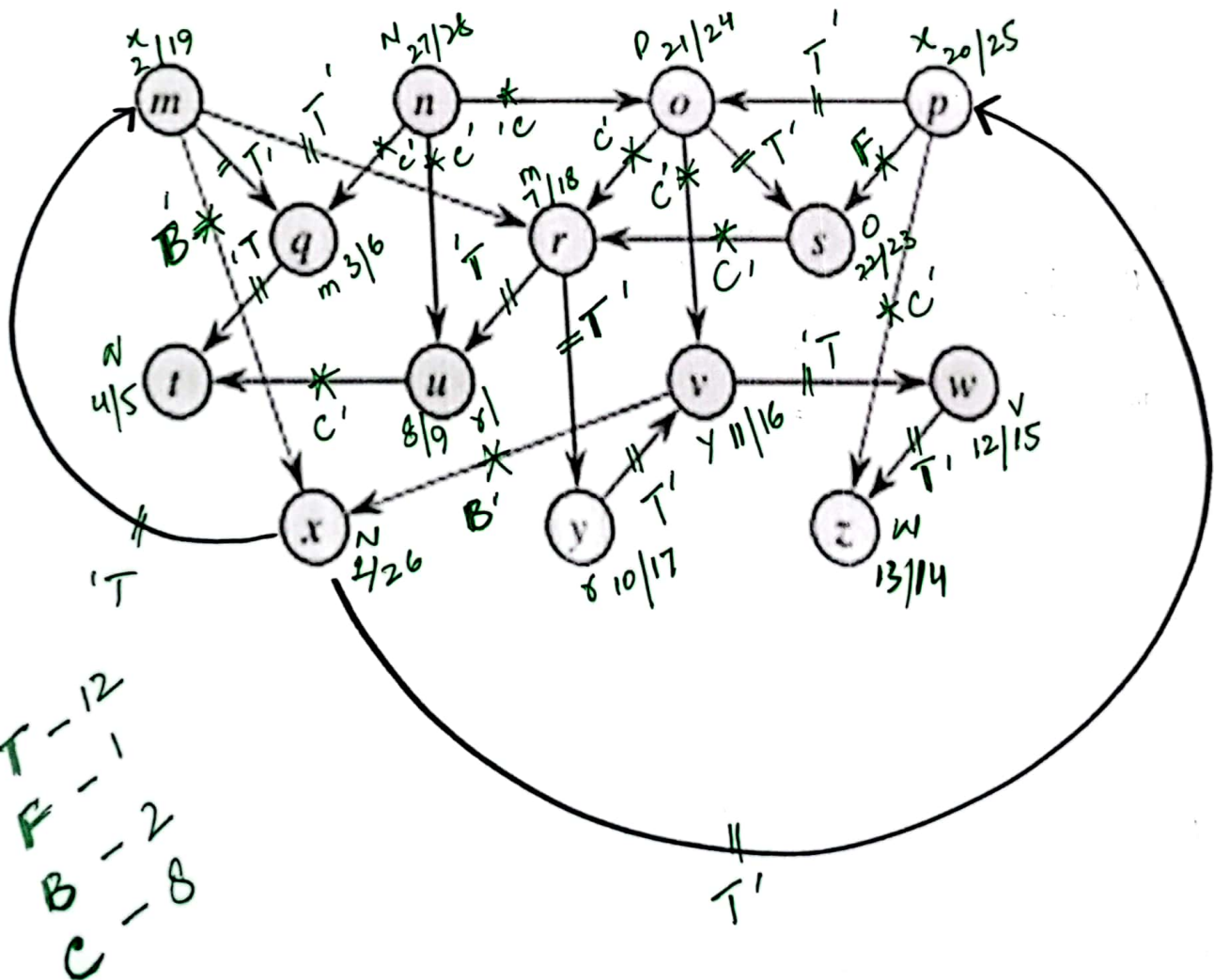
```

1  $time = time + 1$ 
2  $u.d = time$ 
3  $u.color = GRAY$ 
4 for each  $v \in G.Adj[u]$ 
5   if  $v.color == WHITE$ 
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7     DFS-VISIT( $G, v$ )
8  $u.color = BLACK$ 
9  $time = time + 1$ 
10  $u.f = time$ 

```

Apply DFS algorithm on the given graph and answer the following questions. (Note: The adjacent nodes of a vertex are to be traversed in alphabetical order, and DFS algorithm will also work in alphabetical order.) The source node is 'x'.

1. Write the type of each edge of the below graph, complete work should be there.
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$\frac{8}{10/11/12/13} \rightarrow m, p$
 $\frac{6}{14/15/16/17} \rightarrow q, r, x$
 $\frac{5}{18/19/20/21} \rightarrow t$
 $\frac{4}{22/23/24/25} \rightarrow u, y$
 $\frac{3}{26/27/28/29} \rightarrow v$
 $\frac{2}{30/31/32/33} \rightarrow x, w$
 $\frac{1}{34/35/36/37} \rightarrow z$
 $\frac{0}{38/39/40/41} \rightarrow o, s, z$
 $\frac{0}{42/43/44/45} \rightarrow y, s, v$
 $\frac{0}{46/47/48/49} \rightarrow s$
 $\frac{0}{50/51/52/53} \rightarrow o, q, u$

\rightarrow hold only v parent changed

\rightarrow m also changed but not in this case

✓th?
*th?

$N|B|1|26 \ X \rightarrow m, p$
 $x|B|2|19 \ m \rightarrow q, r, x$
 $m|B|3|6 \ q \rightarrow t$
 $q|B|4|5 \ t \rightarrow *$
 $m|B|7|18 \ r \rightarrow u, y$
 $r|B|8|9 \ u \rightarrow t$
 $r|B|10|17 \ y \rightarrow v$
 $y|B|11|16 \ v \rightarrow x, w$
 $v|B|12|15 \ w \rightarrow z$
 $w|B|13|14 \ z \rightarrow *$
 $x|B|20|25 \ p \rightarrow o, s, z$
 $o|B|21|24 \ o \rightarrow r, s, v$
 $s|B|22|23 \ s \rightarrow r$
 $v|B|27|28 \ n \rightarrow o, q, u$

here only v parent changed

w color changed but u.f not assign

DFS(G)

```

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```

DFS-VISIT(G, u)

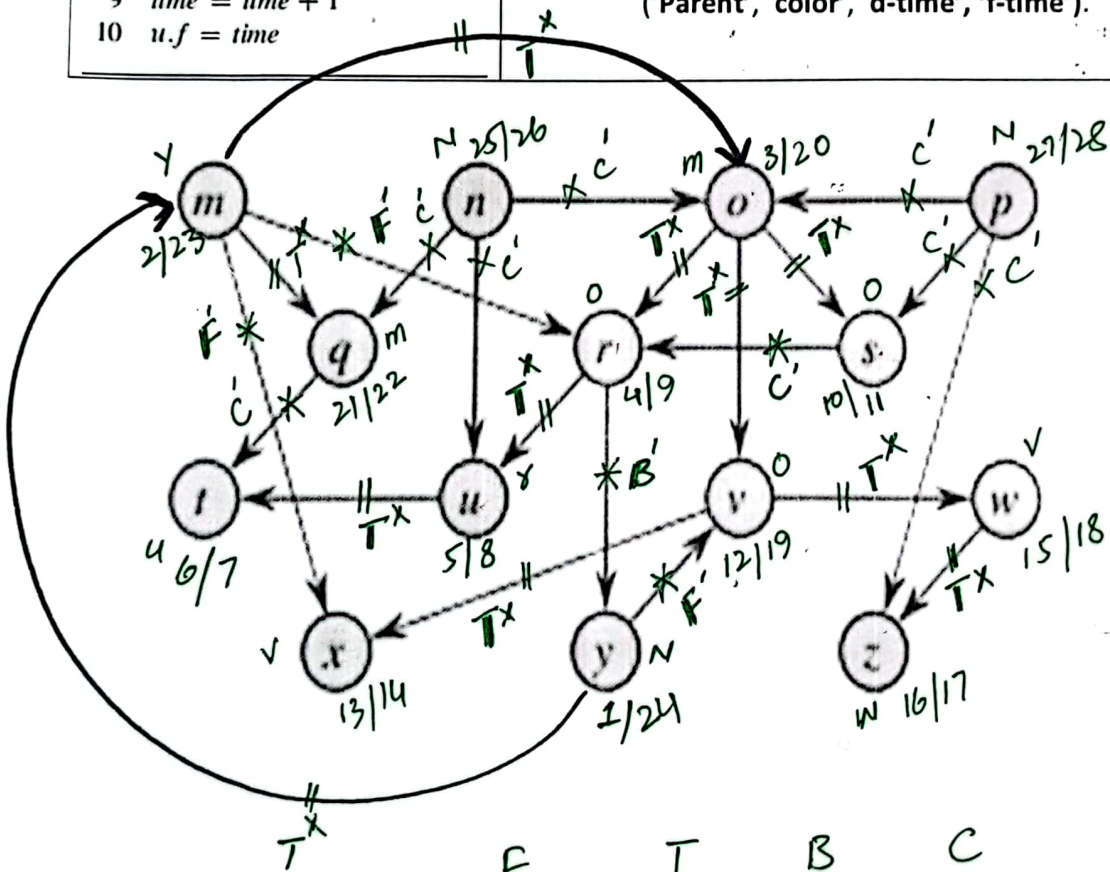
```

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3  $u.color = GRAY$ 
4 for each  $v \in G.Adj[u]$ 
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```

Apply DFS algorithm on the given graph and answer the following questions. (Note: The adjacent nodes of a vertex are to be traversed in alphabetical order, and DFS algorithm will also work in alphabetical order.) The source node is 'y'.

1. Write the type of each edge of the below graph, complete work should be there.
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F T B C
3 11 1 8

$N|6|1|24$ $y \rightarrow m, v$ *¹²
 $y|6|2|23$ $m \rightarrow o, q, r, x$ *¹¹
 $m|6|3|20$ $o \rightarrow r, s, v$ *⁹
 $o|6|4|9$ $r \rightarrow u, y$ *³
 $r|6|5|8$ $u \rightarrow t$ *²
 $u|6|6|7$ $t \rightarrow *$ *¹

$o|6|10|11$ $s \rightarrow y$ *⁴
 $o|6|12|19$ $v \rightarrow x, w$ *⁸
 $v|6|13|14$ $x \rightarrow *$ *⁵
 $v|6|15|18$ $w \rightarrow z$ *⁷
 $w|6|16|17$ $z \rightarrow *$ *⁶
 $m|6|21|22$ $q \rightarrow t$ *¹⁰
 $N|6|25|26$ $n \rightarrow o, q, u$ *¹³
 $N|6|27|28$ $p \rightarrow o, s, z$ *¹⁴

$6th$
 $* 5th$

m	n	$O^{(2)}$	p	q	$r^{(3)}$	$s^{(4)}$	$t^{(5)}$	$u^{(4)}$	v	w	x	y	z
1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	3	1	1	4	1	6	5	1	1	1	1	1
3	1	5	1	1	4	1	7	8	1	1	1	1	1
4	1	1	1	1	4	1	7	1	1	1	1	1	1
5	1	1	1	1	4	1	7	1	1	1	1	1	1
6	1	1	1	1	4	1	7	1	1	1	1	1	1
7	1	1	1	1	4	1	7	1	1	1	1	1	1
8	1	1	1	1	4	1	7	1	1	1	1	1	1
9	1	1	1	1	4	1	7	1	1	1	1	1	1
10	1	1	1	1	4	1	7	1	1	1	1	1	1
11	1	1	1	1	4	1	7	1	1	1	1	1	1
12	1	1	1	1	4	1	7	1	1	1	1	1	1
13	1	1	1	1	4	1	7	1	1	1	1	1	1
14	1	1	1	1	4	1	7	1	1	1	1	1	1
15	1	1	1	1	4	1	7	1	1	1	1	1	1

m	n	$O^{(2)}$	p	q	$r^{(3)}$	$s^{(4)}$	$t^{(5)}$	$u^{(4)}$	v	w	x	y	z
1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	3	1	1	4	1	6	5	1	1	1	1	1
3	1	5	1	1	4	1	7	8	1	1	1	1	1
4	1	1	1	1	4	1	7	1	1	1	1	1	1
5	1	1	1	1	4	1	7	1	1	1	1	1	1
6	1	1	1	1	4	1	7	1	1	1	1	1	1
7	1	1	1	1	4	1	7	1	1	1	1	1	1
8	1	1	1	1	4	1	7	1	1	1	1	1	1
9	1	1	1	1	4	1	7	1	1	1	1	1	1
10	1	1	1	1	4	1	7	1	1	1	1	1	1
11	1	1	1	1	4	1	7	1	1	1	1	1	1
12	1	1	1	1	4	1	7	1	1	1	1	1	1
13	1	1	1	1	4	1	7	1	1	1	1	1	1
14	1	1	1	1	4	1	7	1	1	1	1	1	1
15	1	1	1	1	4	1	7	1	1	1	1	1	1