



| | | | | | |
|---|-------------------|----------|----------|----------|------------|
| NUMBER : NAME : SIGNATURE : | EVALUATION | | | | |
| | 1[.....] | 2[.....] | 3[.....] | 4[.....] | SUM[.....] |

[Exam Execution Instructions of Faculty of Engineering](#) should be obeyed. Questions are related to 1,4,12 of [Program Learning Outcomes](#)

```

DoublyLinkedList* pLeft = new DoublyLinkedList;
pLeft->insertOrdered(p->hNextScr(1));

DoublyLinkedList* pRight = new DoublyLinkedList;
pRight->insertOrdered(p->hNextScr(3));

if (p->downPtr(1)->down != NULL)
{
  pLeft->downPtr(1)->down = p->downPtr(1)->down;
  pLeft->downPtr(1)->down->up = pLeft->downPtr(1);
}

if (p->downPtr(2)->down != NULL)
{
  pLeft->downPtr(2)->down = p->downPtr(2)->down;
  pLeft->downPtr(2)->down->up = pLeft->downPtr(2);
}

if (p->downPtr(3)->down != NULL)
{
  pRight->downPtr(1)->down = p->downPtr(3)->down;
  pRight->downPtr(1)->down->up = pRight->downPtr(1);
}

if (p->downPtr(4)->down != NULL)
{
  pRight->downPtr(2)->down = p->downPtr(4)->down;
  pRight->downPtr(2)->down->up = pRight->downPtr(2);
}

DoublyLinkedList* pUpper = new DoublyLinkedList;
pUpper->insertOrdered(p->hNextScr(2));
root = pUpper;

pUpper->downPtr(1)->down = pLeft;
pLeft->up = pUpper->downPtr(1);

pUpper->downPtr(2)->down = pRight;
pRight->up = pUpper->downPtr(2);
  
```

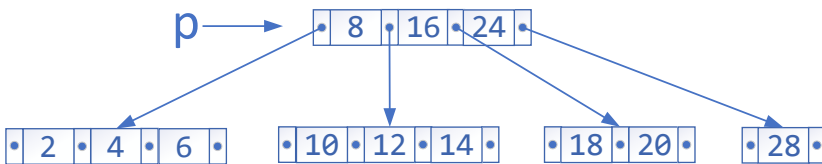
2. Draw the **2-3-4 tree** after inserting 22? (25P)

1 2 3 4 5 6 7 8

3. Assume that the numbers above are inserted into a **binary tree**. Which tree traversal methods output the same result? (25P)

- (A) inorder & preorder
- (B) inorder & postorder
- (C) preorder & postorder
- (D) inorder & preorder & postorder

4. What is the output of **eulerTour** traversal of the binary tree above? (25P)



1. Assuming 22 is inserted into the **2-3-4 tree** above, which node does **pLeft** point to after insertion? (25P)