Indian Institute of Technology, Madras - BS in Data Science and Applications

Notations :

1.Options shown in green color and with ✔ icon are correct.

2.Options shown in red color and with ✖ icon are incorrect.

Question Paper Name :	IIT M DEGREE AN2 EXAM QPE2 16 JULY 2023
Subject Name :	2023 July: IIT M DEGREE AN2 EXAM QPE2
Creation Date :	2023-07-10 17:54:46
Duration :	120
Total Marks :	575
Display Marks:	Yes
Share Answer Key With Delivery Engine :	Yes
Actual Answer Key :	Yes
Calculator :	Scientific
Magnifying Glass Required? :	No
Ruler Required? :	No
Eraser Required? :	No
Scratch Pad Required? :	No
Rough Sketch/Notepad Required? :	No
Protractor Required? :	No
Show Watermark on Console? :	Yes
Highlighter :	No
Auto Save on Console?	Yes
Change Font Color :	No
Change Background Color :	No

Change Theme :	No
Help Button :	No
Show Reports :	No
Show Progress Bar :	No

Group I

Group Number :	1
Group Id :	64065313733
Group Maximum Duration :	0
Group Minimum Duration :	90
Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	575
Is this Group for Examiner? :	No
Examiner permission :	Cant View
Show Progress Bar? :	No
Revisit allowed for group Instructions? :	Yes
Maximum Instruction Time :	0
Minimum Instruction Time :	0
Group Time In :	Minutes
Navigate To Group Summary From Last Question? :	No
Disable Submit Button During Assessment? :	No
Section Selection Time? :	0
No of Optional sections to be attempted :	0

Sw Testing

Section Id :	64065339125
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	15
Number of Questions to be attempted :	15
Section Marks :	100
Display Number Panel :	Yes
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	64065382919
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 1 Question Id : 640653578817 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : SOFTWARE TESTING (COMPUTER BASED EXAM)"

ARE YOU SURE YOU HAVE TO WRITE EXAM FOR THIS SUBJECT?
CROSS CHECK YOUR HALL TICKET TO CONFIRM THE SUBJECTS TO BE WRITTEN.

(IF IT IS NOT THE CORRECT SUBJECT, PLS CHECK THE SECTION AT THE TOP FOR THE SUBJECTS REGISTERED BY YOU)

Options :

6406531932709. ✔ YES

6406531932710. ✖ NO

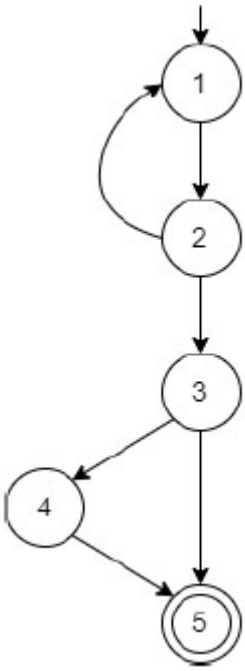
Sub-Section Number :	2
Sub-Section Id :	64065382920
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 2 Question Id : 640653578818 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4

Question Label : Multiple Choice Question

Consider the control flow graph (CFG) below.



What are the minimum numbers of test paths are required for node and edge coverage?

Options :

6406531932711. ✖ Minimum 1 test path for both node and edge coverage.

6406531932712. ✖ Minimum 2 test paths for both node and edge coverage.

6406531932713. ✔ Minimum 1 test path for node coverage and 2 test paths for edge coverage.

6406531932714. ✖ Minimum 2 test path for node coverage and 3 test paths for edge coverage.

Question Number : 3 Question Id : 640653578823 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4

Question Label : Multiple Choice Question

Match the following.

Type of testing	Descriptions
1. Stress testing	A. Done to evaluate the user interface, aesthetics etc.
2. Performance testing	B. Done after modifying/upgrading a component, to ensure that the modification is working correctly and other components are not affected by the modification.
3. Usability testing	C. Done to evaluate the speed and response time of the system.
4. Regression testing	D. Done to evaluate how the system behaves under peak (or in unfavourable) conditions or inputs.

Options :

6406531932727. ✖ 1-D, 2-A, 3-C, 4-B

6406531932728. ✔ 1-D, 2-C, 3-A, 4-B

6406531932729. ✖ 1-B, 2-C, 3-A, 4-D

6406531932730. ✖ 1-B, 2-A, 3-C, 4-D

Sub-Section Number : 3

Sub-Section Id : 64065382921

Question Shuffling Allowed : No

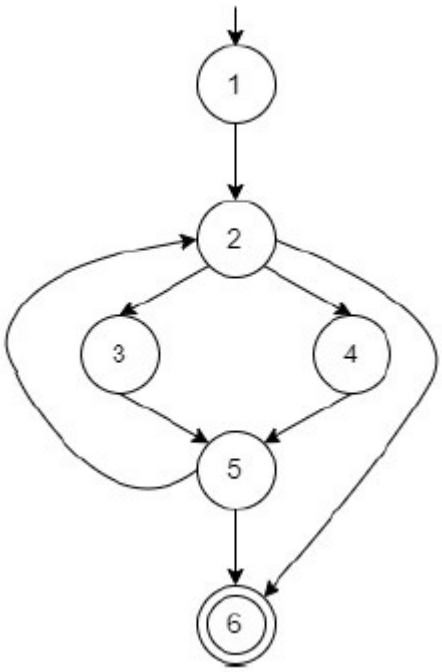
Is Section Default? : null

Question Id : 640653578819 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (4 to 6)

Question Label : Comprehension

Consider the CFG given below and answer the subquestions.



Sub questions

Question Number : 4 Question Id : 640653578820 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4

Question Label : Multiple Choice Question

Find the number of test requirements for edge pair coverage.

Options :

6406531932715. ✖ 9

6406531932716. ✖ 10

6406531932717. ✖ 11

6406531932718. ✔ 12

Question Number : 5 Question Id : 640653578821 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 6

Question Label : Multiple Choice Question

Find the number of simple paths.

Options :

6406531932719. ✖ 13

6406531932720. ✖ 25

6406531932721. ✖ 37

6406531932722. ✔ 42

Question Number : 6 Question Id : 640653578822 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 8

Question Label : Multiple Choice Question

Find the number of prime paths.

Options :

6406531932723. ✖ 12

6406531932724. ✔ 13

6406531932725. ✖ 14

6406531932726. ✖ 15

Sub-Section Number :	4
Sub-Section Id :	64065382922
Question Shuffling Allowed :	Yes
Is Section Default? :	null

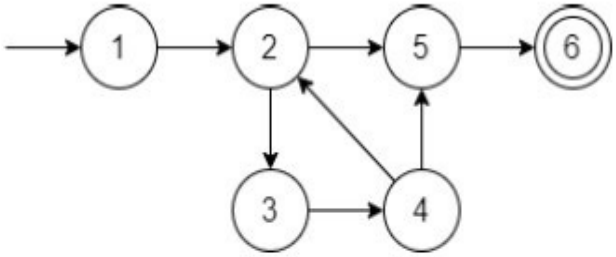
Question Number : 7 Question Id : 640653578824 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 8

Question Label : Multiple Choice Question

Consider the CFG given below and the prime path $[1, 2, 5, 6]$.



Match the following for touring the prime path in the given CFG.

Type of tour	Path
1. Touring the prime path without side trips and detours	A. $[1, 2, 3, 4, 5, 6]$
2. Touring the prime path with a side trip	B. $[1, 2, 5, 6]$
3. Touring the prime path with a detour	C. $[1, 2, 3, 4, 2, 5, 6]$

Options :

6406531932731. ✖ 1-B, 2-A, 3-C

6406531932732. ✔ 1-B, 2-C, 3-A

6406531932733. ✖ 1-C, 2-B, 3-A

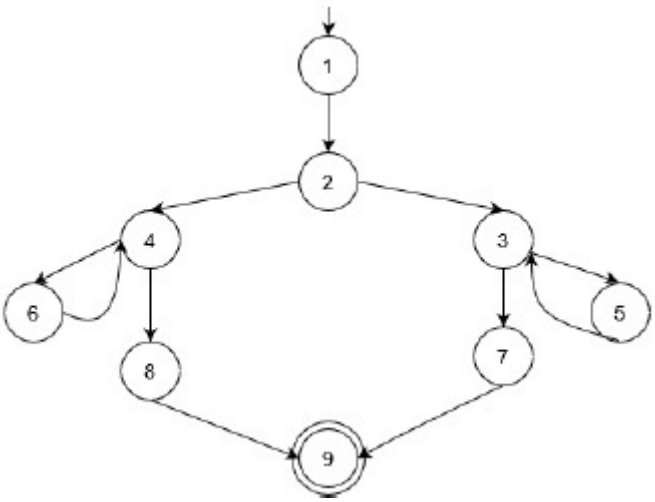
6406531932734. ✖ 1-C, 2-A, 3-B

Question Number : 8 Question Id : 640653578828 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 8

Question Label : Multiple Choice Question

Consider the following control flow graph (CFG).



From the following code segments identify the one that is best presented by the given CFG.

Options :

6406531932748.

```
int i, j = 10;
for(i = 0; i < 10; i++){
    if(j < 0)
        j++
    else
        j--;
}
for(i = 0; i < 10; i++){
    if(j > 0)
        j++
    else
        j--;
}
System.out.println("j = " + j);
```

6406531932749.

```
int i = 0, j = 10;
while(i < 10){
    j++;
    i++;
}
while(i < 10){
    j--;
    i++;
}
if(j >= 0)
    System.out.println("j = " + j);
```

6406531932750.

```
int i, j = 10;

for(i = 0; i < 10; i++){
    if(j < 0)
        j++
    else
        j--;
}
System.out.println("j = " + j);
```

```
int i = 0, j = 10;
if(j < 0){
    while(i < 10){
        j++;
        i++;
    }
}
else{
    while(i < 10){
        j--;
        i++;
    }
}
System.out.println("j = " + j);
```

6406531932751.

Sub-Section Number :	5
Sub-Section Id :	64065382923
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 9 Question Id : 640653578825 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 8 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the following code segment in Java.

```
class Stack{
    private Object[] items;
    private int top = -1;
    private static final int size = 3;
    public Stack() {
        items = new Object[3];
        top = -1;
    }
    public boolean isEmpty() {
        if(top == -1)
            return true;
        return false;
    }
    public boolean isFull() {
        if(top == size - 1)
            return true;
        return false;
    }
     public void push(Object o) throws NullPointerException, IllegalStateException {
         if(o == null) {
             throw new NullPointerException();
         }
         else if(isFull()) {
             throw new IllegalStateException();
         }
         else {
             items[++top] = o;
         }
     }

     public Object pop() throws IllegalStateException{
         if(isEmpty()) {
             throw new IllegalStateException();
         }
         else {
             return items[top--];
         }
     }
}
```

Consider designing a FSM for the class `Stack` with the following assumption:
We ignore the specific object that is in the class `Stack` -- therefore the values in `Stack` are

`[null, null, null]`, `[obj, null, null]`, `[obj, obj, null]` and `[obj, obj, obj]`.
Identify the statements which correctly describes the FSM.

Options :

6406531932735. ✖ `[null]` and `[obj]` are the states in the FSM.

6406531932736. ✔ A transition from `[obj, obj, null]` to `[obj, obj, obj]` is triggered by the `push` method.

6406531932737. ✖ A transition from [null, null, null] to [obj, null, null] is triggered by the pop method.

6406531932738. ✔ isFull is guard for the transition from [obj, obj, null] to [obj, obj, obj] .

6406531932739. ✖ isEmpty is guard for the transition from [null, null, null] to [obj, null, null].

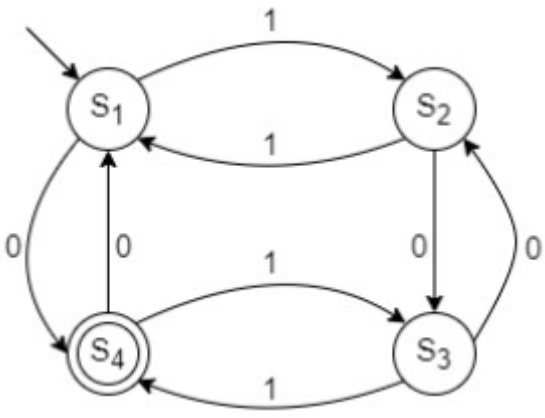
Sub-Section Number :	6
Sub-Section Id :	64065382924
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 10 Question Id : 640653578826 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 6

Question Label : Multiple Choice Question

Consider the finite state machine (FSM) as given below.



Identify the statement that correctly describes the given FSM.

Options :

6406531932740. ✖ It accepts all strings that have odd number of 0s and odd number of 1s.

6406531932741. ✖ It accepts all strings that have even number of 0s and even number of 1s.

6406531932742. ✔ It accepts all strings that have odd number of 0s and even number of 1s.

6406531932743. ✖ It accepts all strings that have even number of 0s and odd number of 1s.

Question Number : 11 Question Id : 640653578829 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 6

Question Label : Multiple Choice Question

Consider the following classes for the code base to be tested and the test class.

```
//code base
public class NumberProc {
    private int[] items;
    public NumberProc(int[] it) {
        items = it;
    }
    public int find(int key) {
        for(int i = 1; i < items.length; ++i) {
            if(items[i] == key)
                return i;
        }
        return -1;
    }
}

//test class
import static org.junit.Assert.*;
import org.junit.*;
public class TestNumberProc {
    private NumberProc obj;
    @Before
    public void setUp() {
        int[] arr = {5, 4, 6, 1, 7};
        obj = new NumberProc(arr);
    }
    @Test
    public void testcase1() {
        assertEquals(-1, obj.find(3));
    }
    @Test
    public void testcase2() {
        assertNotEquals(-1, obj.find(5));
    }
    @Test
    public void testcase3() {
        assertTrue(obj.find(7) == 4);
    }
    @Test
    public void testcase4() {
        assertFalse(obj.find(2) != -1);
    }

    }
```

Identify the test case method which will fail for the given code base.

Options :

6406531932752. ✖ testcase1()

6406531932753. ✔ testcase2()

6406531932754. ✖ testcase3()

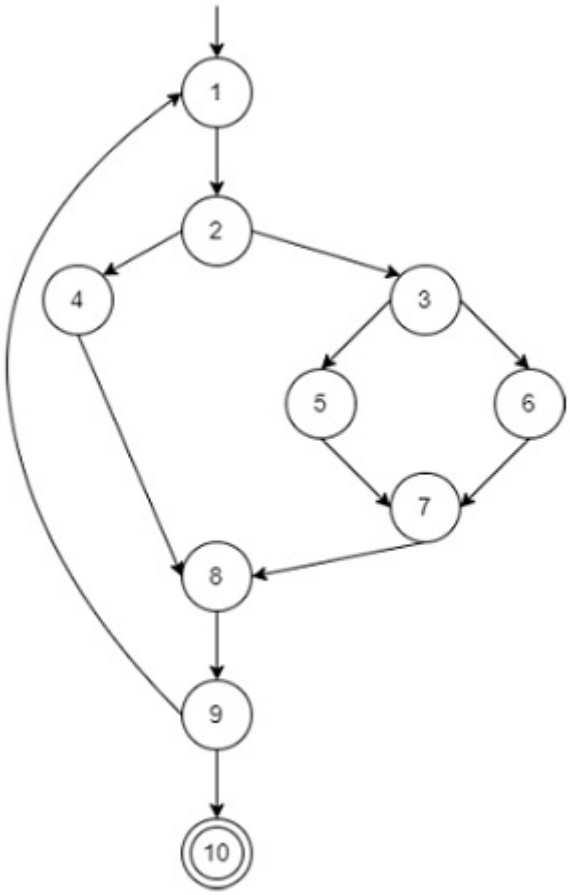
6406531932755. ✖ testcase4()

Question Number : 12 Question Id : 640653578835 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 6

Question Label : Multiple Choice Question

Consider the CFG given below.



Identify the number of linearly independent paths.

Options :

6406531932772. ✖ 3

6406531932773. ✔ 4

6406531932774. ✖ 5

6406531932775. ✖ 6

Question Number : 13 Question Id : 640653578836 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 6

Question Label : Multiple Choice Question

Consider the code below.

```
public static void compute(int x, int y, int z){
    if(x < y){
        x++;
        y--;
        if(x < 10){
            if(y > 5){
                //LINE-1: Error statement
            }
        }
    }
}
```

Identify the appropriate condition such that the execution will reach the error statement in LINE-1.

Options :

6406531932776. ✖ `(x < y) && (x > 10) && (y < 5)`

6406531932777. ✖ `(x <= y) && (x <= 10) && (y >= 5)`

6406531932778. ✖ `(x < y) && (x < 10) && (y > 5)`

6406531932779. ✔ `(x < y) && (x < 9) && (y > 6)`

Sub-Section Number :	7
Sub-Section Id :	64065382925
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 14 Question Id : 640653578830 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 6 Max. Selectable Options : 0

Question Label : Multiple Select Question

Identify the statement(s) that are true about graph coverage criteria.

Options :

6406531932756. ✖ Node coverage subsumes both edge coverage and edge pair coverage.

6406531932757. ✔ Prime path coverage subsumes both edge Coverage and all duPaths Coverage.

6406531932758. ✔ All duPaths Coverage subsumes both all uses coverage and all defs coverage.

6406531932759. ✖ Edge pair coverage subsumes both all uses coverage and all defs coverage.

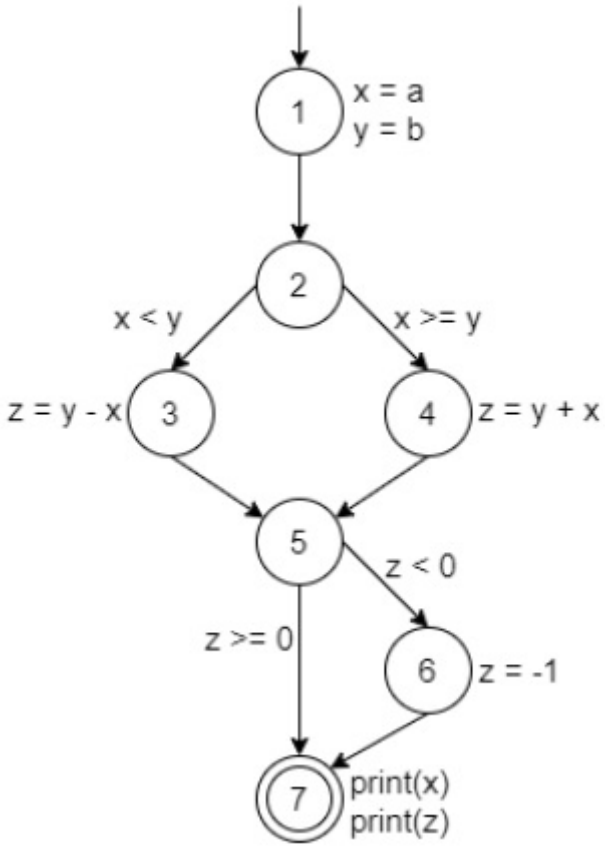
Sub-Section Number :	8
Sub-Section Id :	64065382926
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Id : 640653578831 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (15 to 16)

Question Label : Comprehension

Consider the annotated CFG given below and answer the subquestions.



Sub questions

Question Number : 15 Question Id : 640653578832 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 6

Question Label : Multiple Choice Question

How many *du-pairs* are there for the variable z?

Options :

6406531932760. ✖ 8

6406531932761. ✔ 9

6406531932762. ✖ 10

6406531932763. ✖ 11

Question Number : 16 Question Id : 640653578833 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 6

Question Label : Multiple Choice Question

How many unique *du-paths* are there for the variable z?

Options :

6406531932764. ✖ 4

6406531932765. ✔ 5

6406531932766. ✖ 6

6406531932767. ✖ 7

Sub-Section Number :	9
Sub-Section Id :	64065382927
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 17 Question Id : 640653578827 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following integration testing techniques may use scaffolding?

Options :

6406531932744. ✔ Top-down

6406531932745. ✔ Bottom-up

6406531932746. ✔ Sandwich

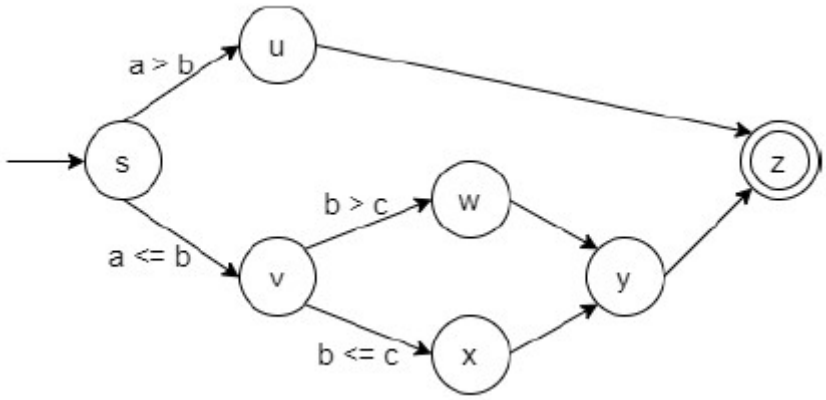
6406531932747. ✖ Big bang

Question Number : 18 Question Id : 640653578834 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the annotated CFG given below.



Identify the test case input(s) that test the path [s, v, x, y, z].

Options :

6406531932768. ✖ {a = 10, b = 20, c = 15}

6406531932769. ✔ {a = 10, b = 20, c = 30}

6406531932770. ✖ {a = 30, b = 20, c = 30}

6406531932771. ✔ {a = 30, b = 30, c = 30}

AI

Section Id :	64065339126
Section Number :	2
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	5
Number of Questions to be attempted :	5
Section Marks :	25
Display Number Panel :	Yes
Group All Questions :	No