

Course Title: Compiler Design

Full Marks: 60

N.B.

Course No.: CSE352

Time: 03 hours

i) Answer **SIX** questions, taking any **THREE** from each section.

ii) All questions are of equal values.

iii) Use separate answer script for each section.

## Section-A

1. a) Give a comparison among the parse tree, syntax tree and dag. Draw a dag for the following expression:  $((((a+b)-c)*(d+e)) + (a+b))*(((a+b)*(d+e))-e)$ . 4
- b) The following grammar generates programs, represented by the non-terminal P. Consisting of a sequence of declarations D following by a single expression E.  
 $P \rightarrow D; E$   
 $D \rightarrow D; D \mid id; T$   
 $T \rightarrow char \mid integer \mid array [ num ] of T \mid \uparrow T$   
 $E \rightarrow literal \mid num \mid id \mid E \text{ mod } E \mid E [ E ] \mid E \uparrow$   
 i. Write the type checking expression for the all bodies of E. 4
- c) Define the Coercions. What are the differences between implicit and explicit type conversion? 2
2. a) Draw the block diagram for phases of a compiler showing input & output in each phase according to the string : position:= initial + rate \* 90. 4
- b) What do you mean by ambiguity of a grammar? Show that the following grammar is ambiguity. 2  
 $list \rightarrow list + list$   
 $list \rightarrow list - list$   
 $list \rightarrow 0 \mid 1 \mid 2 \mid 3 \mid 4 \mid 5 \mid 6 \mid 7 \mid 8 \mid 9$
- c) What do you mean by annotated parse tree? Draw the annotated parse tree for the string "200 - 50 + 25" by using the following CFG: 4  
Productions:  
 $expr \rightarrow expr + term$   
 $expr \rightarrow expr - term$   
 $expr \rightarrow term$   
 $term \rightarrow 0$   
 $term \rightarrow 1$   
 $\dots$   
 $term \rightarrow 9$   
Semantic Rules:  
 $expr.t := expr.t \parallel term.t \parallel '+'$   
 $expr.t := expr.t \parallel term.t \parallel '-'$   
 $expr.t := term.t$   
 $term.t := '0'$   
 $term.t := '1'$   
 $\dots$   
 $term.t := '9'$
3. a) Write down the concept of synthesized and inherited attributes. 2
- b) Consider the syntax directed definitions of a simple desk calculator in table 3(b) and draw the annotated parse tree for  $4*9+5n$ . 4

PRODUCTION	SEMANTIC RULES
1) $L \rightarrow E \ n$	$L.val = E.val$
2) $E \rightarrow E_1 + T$	$E.val = E_1.val + T.val$
3) $E \rightarrow T$	$E.val = T.val$
4) $T \rightarrow T_1 * F$	$T.val = T_1.val \times F.val$
5) $T \rightarrow F$	$T.val = F.val$
6) $F \rightarrow ( E )$	$F.val = E.val$
7) $F \rightarrow digit$	$F.val = digit.lexval$

Syntax-directed definition of a simple desk calculator

Table 3(b)

- c) A declaration generated by the non-terminal D in the syntax-directed definition in Fig.3 (c) consists of a keyword int or real, followed by a list of identifiers. The nonterminal T has a synthesized attribute type, whose value is determined by the keyword in the declaration. 4

Production	Semantic Rules
$D \rightarrow TL$	$L.in := T.type$
$T \rightarrow int$	$T.type := integer$
$T \rightarrow real$	$T.type := real$
$L \rightarrow L_1, id$	$L_1.in := L.in$
	$addtype(id.entry, L.in)$
$L \rightarrow id$	$addtype(id.entry, L.in)$

Fig-3(c)

- (i) Draw the parse tree with i-attribute in at each node labeled L.
- (ii) Draw the annotated parse tree for the sentence int id1, id2, id3.
- (iii) Draw the dependency graph and Show the evaluation order for the annotated parse tree found.

4. a) Design DFA for the following language: 5  
 "All strings of lowercase letters that contain the five vowels in order."
- b) For the NFA of Fig-4.1, indicate all the paths labeled aabb. Does the NFA accept aabb? 5  
 Explain the answer.

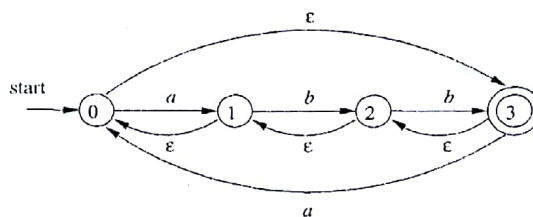


Fig-4.1: An NFA.

### Section-B

5. a) Describe the languages denoted by the following regular expressions: 5  
 I.  $(a|b)^*a(a|b)(a|b)$   
 II.  $a^*ba^*ba^*ba^*$
- b) Write the regular definitions for the following languages: 5  
 i. All strings of a's and b's with an even number of a's and an odd number of b's.  
 ii. All strings of a's and b's that do not contain the subsequence abb.
6. Consider the grammar: 10  
 $S \rightarrow iEtS \mid iEtSeS \mid a$   
 i. Left factor this grammar.  
 ii. In addition to left factoring, eliminate left recursion from the original grammar.  
 iii. Compute FIRST and FOLLOW after eliminating the left recursion.  
 iv. Generate a predictive parsing table for this grammar.
7. a) Draw the Syntax tree and dag for the expression:  $a = b * - c + b * - c$  and also represent 3  
 each node of the syntax tree as (i) a record and (ii) an array of records.
- b) Translate the assignment statement  $d := (a-b) + (a-c) + a-c$  into the three address code. 4  
 Also give the Quadruple, Triple and Indirect triples representation of three address statements.
- c) What do you mean by instruction cost? Find the instruction cost for the following 3  
 instructions.  
 (i) MOV b, R0  
 ADD c, R0  
 MOV R0, a  
 (iii) MOV Mj, R  
 MOV b, a(R)
8. a) Draw the corresponding three address code for the expressions- 4  
 $((((2+3)-4)*(5+6))+(2+3))*(((2+3)*(5+6))-6)$

- b) Define the basic block and flow graph. Consider the fragment of source code show in fig.8 (b). It computes the dot products of two vectors a and b of length 20. Write down the tree-address code for the fragment; then draw the basic block and flow graph for the program. 3

```

begin
  Prod := 0;
  i := 1;
  do begin
    prod := prod + a[i] * b[i];
    i := i + 1;
  end
  while i <= 20
end

```

Fig.8(b)

- c) For the three address code shown fig-8(c) identify the basic blocks and draw the flow graph. 3

(1) i := m-1	(16) t <sub>7</sub> := 4*i
(2) j := n	(17) t <sub>8</sub> := 4*j
(3) t <sub>1</sub> := 4*n	(18) t <sub>9</sub> := a[t <sub>8</sub> ]
(4) v := a[t <sub>1</sub> ]	(19) a[t <sub>7</sub> ] := t <sub>9</sub>
(5) i := i+1	(20) t <sub>10</sub> := 4*j
(6) t <sub>2</sub> := 4*i	(21) a[t <sub>10</sub> ] := x
(7) t <sub>3</sub> := a[t <sub>2</sub> ]	(22) goto (5)
(8) if t <sub>3</sub> < v goto (5)	(23) t <sub>11</sub> := 4*i
(9) j := j-1	(24) x := a[t <sub>11</sub> ]
(10) t <sub>4</sub> := 4*j	(25) t <sub>12</sub> := 4*i
(11) t <sub>5</sub> := a[t <sub>4</sub> ]	(26) t <sub>13</sub> := 4*n
(12) if t <sub>5</sub> > v goto (9)	(27) t <sub>14</sub> := a[t <sub>13</sub> ]
(13) if i >= j goto (23)	(28) a[t <sub>12</sub> ] := t <sub>14</sub>
(14) t <sub>6</sub> := 4*i	(29) t <sub>15</sub> := 4*n
(15) x := a[t <sub>6</sub> ]	(30) a[t <sub>15</sub> ] := x

Fig-8(c)

- i) Answer **SIX** questions, taking any **THREE** from each Section
- ii) All questions are of equal values.
- iii) Use separate answer script for each section

**Section-A**

1.
  - a) Why Java is called OS and machine independent? Explain. 3
  - b) What are the differences between default constructor and user defined constructor. Explain with examples. 3
  - c) What are the rules for constructor in Java? Can a constructor perform other tasks instead of initialization? If yes, how? 2
  - d) "A constructor does not return anything". Justify this statement. 2
2.
  - a) What are the roles of JVM and JIT? 2
  - b) Write down different access modifiers and non-access modifiers in Java. 3
  - c) What is the output of the following code: 2  

```
class Base{  
    public void fun(){  
        System.out.println("Base fun");  
    }  
}  
  
class Derived extends Base{  
    public void fun(){  
        System.out.println("Derived fun");  
    }  
}  
  
public static void main(String[] args){  
    Base obj = new Derived();  
    obj.fun();  
}
```
  - d) Write down the procedures to create an applet and execute it. 3
3.
  - a) What will be the result of compiling and running the following program? 2  

```
public class MyClass{  
    public void methodA(int i){  
        System.out.println(i);  
    }  
    public int methodA(int i){  
        System.out.println(i+1);  
        return i+1;  
    }  
}  
  
public static void main(String args[]) {  
    MyClass X = new MyClass();  
    X.methodA(5);  
}
```
  - b) A consultant contains all the properties of a person but a few properties of an engineer. Declare a person class that contains hasName(), hasAge(), hasAddress() and an engineer class that contains hasQuality(), hasFieldWork(). A consultant inherits everything of a person but only the quality of an engineer. Implement this phenomenon in Java code. **N.B.** person and engineer are such classes whose instances are not possible. 5
  - c) Write Java code that creates five threads, each is started after initialization. When they run, a common variable 'counter' gets incremented. If it becomes greater than equal to 1000, each thread stops. 3
4.
  - a) What is a thread? How can you create a thread? Give examples. 2
  - b) What is an exception? Describe the exception handling in Java through try and catch 3



- mechanism.
- c) What do you mean by multithreaded program and context switch in Java? Explain them with respect to thread priorities. 3
- d) What is the use of *synchronized* keyword in Java? "If a thread calls the method *wait()*, it can never be alive again". Justify this statement. 2

### Section-B

5. a) Write down differences between throw and throws keywords in Java? 2
- b) A number and a string are taken as input from the console. You are asked to show one error message if the number is not in between 20 and 100 and another error message if the string does not contain any capital letter. Create your own exception class/classes. 5
- c) How can you make an object eligible for Garbage Collector in Java? 2
- d) What is the use of *finalize()* method in Java? 1

6. a) Consider a class Student like the following: 4

```
class Student {
    int id;
    String name;
    int age;
}
```

Define a method *boolean equalsTo(Object obj)* in the class Student which returns a boolean value. For example:

```
Student s1 = new Student(1, "Aaa", 20);
Students2 = new Student(2, "Bbb", 21);
Students3 = new Student(3, "Ccc", 23);
Students4 = new Student(4, "Bbb", 21);
s1.equalsTo(s2); // returns false
s1.equalsTo(s3); // returns false
s2.equalsTo(s4); // returns true
```

- b) What is a socket? Write down a simple socket programming code so that a client can connect to a server. 3
- c) Write short note on constructor chaining in Java. What is the output in the following program: 3

```
public class Person {
    String name;
    public Person(String n){
        name = n;
        System.out.println("The name of the person is: "+name);
    }
}

public class Student {
    public Student(String n){
        super(n);
        System.out.println("The name of the student is: "+name);
    }
}

public class Test {
    public static void main(String[] args){
        Student s1 = new Student("XYZ");
        Person p1 = new Person("PQR");
    }
}
```

7. a) Write short notes on local, instance and static variables? 2
- b) How to handle exception in JDBC through finally {...} block? Describe the Metadata from database with an example. 3
- c) Create a frame of size 400X400 and it contains two labels, two textFields and a button. 3
- d) Distinguish between following terms: 2

8. a) Consider the following code snippet:

4

```
public class Main{  
    public static void main(String[] args){  
        int a = calculate("sS", 6, 4, 3); //a = 6+4-3 = 7  
        int b = calculate ("Ss", a, 4, 7); //b = a-4+7 = 10  
        int c = calculate ("Sm", b, a, 3); //c = (b-a)*3 = 9  
        int d = calculate ("ds", c, 3, -3); //d = (c/3)+(-3) = 0  
    }  
}
```

Write the Java method 'calculate' in the appropriate way. You can write only one 'calculate' method.

- b) Write a program in java to read information from a file named "in.txt" located at F:\CSE and display that information in a message dialog. 4
- c) Write down the components of RMI in Java. 2

N.B.

- Answer **SIX** questions taking any **THREE** from each section.
- All questions are of equal values.
- Use separate answer script for each section.

### Section: A

- What is computer graphics? How computer graphics is related to real world system? 2
  - Define Koch curve? Why it is important? Prove that length of curve for  $K_n$  is  $(4/3)^n$ . 3
  - Determine the composite transformation matrix that transforms the circle ABCD in the figure Q(1a) to the ellipse A'B'C'D' in the figure Q(1b). Here A, B, C and D are transformed to the points A', B', C' and D' respectively. No need to multiply the matrices. 5

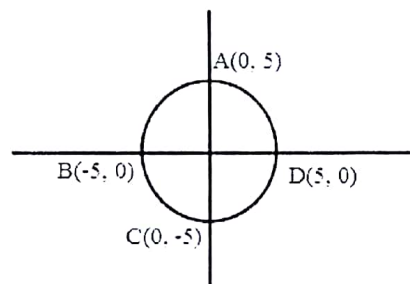


Figure Q(1a)

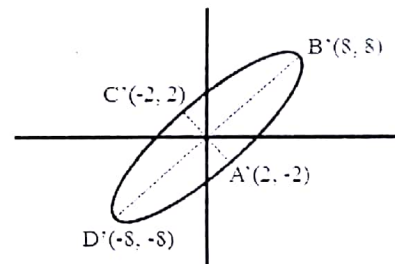


Figure Q(1b)

- Magnify the triangle with vertices A(0,1), B(1,1), C(5,2) twice its size while keeping C(5,2) fixed. 4
  - For the following figure Q(2b), determine which edges of the polygon will be drawn using polygon scan conversion. 6

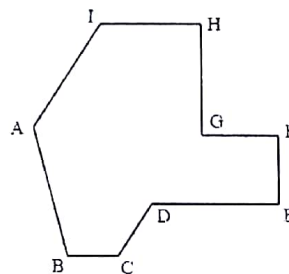


Figure Q(2b)

3. a) Consider following figure Q(2a), where we were at pixel  $P=(x_p, y_p)$  in previous iteration. For the current iteration we have chosen pixel NE. Determine the new value of the decision variable  $d$  using the Midpoint line algorithm.

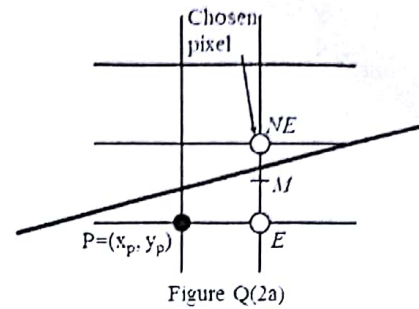
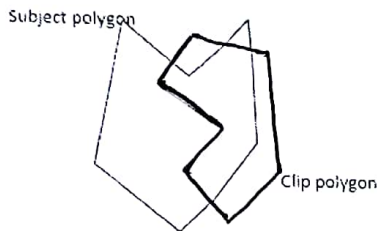


Figure Q(2a)

- b) Determine the color of a point inside the polygon applying Gouraud Shading. 3  
c) Use Weiler-Atherton algorithm to clip the following polygon: 3



4. a) Consider the figure Q(3) where surface normal are shown for each polygon edges. They indicate the front face of the edges. Now build up the BSP tree taking '3' as root and then display the edges of the BSP tree. 6

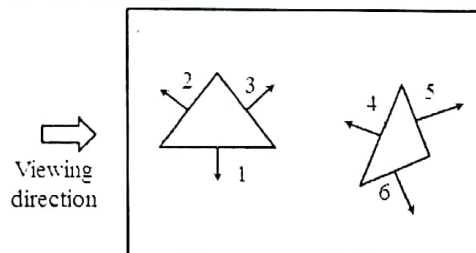


Figure Q(3)

- b) How can you add shadows of an object using shadow buffer? Explain. 4

## Section: B

5. a) Derive the equation of 3D plane representation of ray casting. 3  
b) If the position of the camera is  $3\hat{i}+5\hat{j}+4\hat{k}$  and the direction of a ray is  $-2\hat{i}+4\hat{j}-3\hat{k}$ , find out at which point on the xy plane i.e.  $z = 0$  the ray will intersect. 3  
c) A sphere is centered at origin and its radius is 5 units. If the position of the camera is  $-2\hat{i}-5\hat{j}+4\hat{k}$  and the direction of a ray is  $-\hat{i}-2\hat{j}+2\hat{k}$ , find out at which point on the sphere the ray will intersect. 4



6. a) What is hidden surface in computer graphics? Is it necessary to remove the hidden surface from any image- explain it? 3
- b) Determine the dimension of the following fractals. State whether they are Peano curve or not. Explain the reason. 4

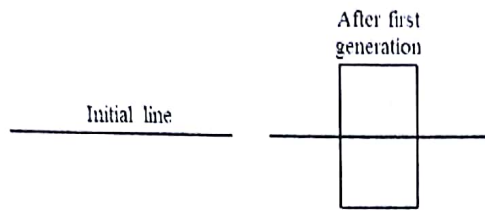


Figure Q(6a)

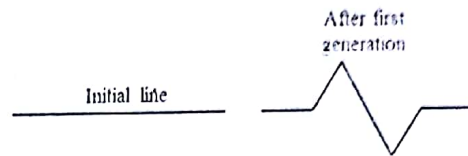


Figure Q(6b)

- c) Consider the fractal tree that is defined by following rules: 3

$0 \rightarrow 1[+0]0[-0]0$

$1 \rightarrow 11$

Atom: 0

**Meaning of the symbols:**

0 = Draw a line segment and stay at the end terminal

1 = Draw a line segment

+ = turn left  $45^\circ$

- = turn right  $45^\circ$

[ = Push current state (position and angle)

] = Pop the last saved state (position and angle)

Draw the first generation of the fractal tree.

7. a) Briefly describe the Z-buffer algorithm? Write down the advantages and disadvantages of it? 2
- b) Let abcdefgh be the polygon to be clipped and ABCD be the viewing window in figure Q(7). Using Sutherland-Hodgman polygon clipping algorithm, show the steps of clipping the polygon. 8

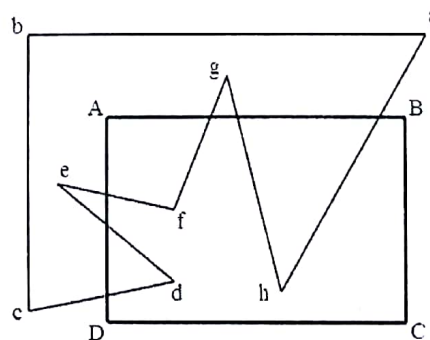


Figure Q(7)

8. a) Describe the Phong Model of Illumination. Show the mathematical calculation when there are  $n$  light sources. 4
- b) You are asked to remove the hidden surface using Back-face culling algorithm. Let the normal vector of a surface be  $8\hat{i}-5\hat{j}+2\hat{k}$  and the viewing direction be  $4\hat{i}-2\hat{j}-5\hat{k}$ . How can you determine whether the surface should be removed or not? 4
- c) What are the advantages and disadvantages of Back-face culling algorithm? 2

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Course No: CSE 362

Full Marks: 60

N.B.

- i) Answer any Six out of Eight questions.
- ii) All questions are of equal values.
- iii) Use separate answer sheet for each section.

Course Title: Microprocessor and Assembly Language

Time: 3 hours

**Section-A**

- Q.1 (a) Suppose a processor uses 20 bits for an address. How many memory bytes can be accessed? 2
- (b) Fill the blanks with appropriate instructions to print HELLO? 3
- ```
.MODEL SMALL  
.STACK 100H  
.DATA  
MSG DB 'HELLO! $'  
.CODE  
MAIN PROC  
MOV AX, @DATA  
MOV DS, AX  
    ????  
  
MOV AH, 4CH  
INT 21H  
MAIN ENDP  
END MAIN
```
- (c) Define port? Why we use port? Differentiate serial and parallel port? 3
- (d) What determines that microprocessor is an 8, 16 or 32 bits? 2
- Q.2 (a) Write assembly code for the following decision structures? 3
- ```
IF AX<BX  
THEN  
    PUT 0 IN AX  
ELSE  
    IF BX<CX  
    THEN  
        PUT 0 IN BX  
    ELSE  
        PUT 0 IN CX  
    END_IF  
END_IF
```
- (b) Differentiate between microprocessor and microcontroller. 2
- (c) Write down the important advances of 80286 microprocessor over its predecessors? 3
- (d) Differentiate external and internal bus with examples? 2
- Q.3 (a) What do you mean by Program Segment Prefix? When to use it or not? 2
- (b) What is LEA? When to use it or not? What does it mean by .STACK 100h in assembly language? 3

- (c) Explain the following assembly language statement? What will happen if you do not write the first two instructions? 3  
 MOV AH, 4CH  
 INT 21H  
 MAIN ENDP  
 END MAIN
- (d) Define bus in microprocessor? Differentiate between address, data and control bus? 2
- Q.4 (a) How many '\*' will print as output from the following program? 3  
 .MODEL SMALL  
 .STACK 100H  
 .CODE  
 MAIN PROC  
 MOV CX, 'A'  
 MOV AH, 2  
 MOV DL, '\*'  
 TOP:  
 INT 21H  
 LOOP TOP  
 MOV AH, 4CH  
 INT 21H  
 MAIN ENDP  
 END MAIN
- (b) Tell whether each of the following instructions is legal or illegal. W1 and W2 are word variables, B1 and B2 are byte variables. 2  
 i. NOV DS, 1000H  
 ii. XCHG W1, W2  
 iii. ADD AL, 256  
 iv. MOV W1, B1  
 v. MOV CS, ES
- (c) Briefly describe the bus interface unit and execution unit of 8086 microprocessor (with figure)? 3
- (d) Write down the difference between turn of a computer in sleep mode and hibernate mode? 2

### Section-B

- Q.5 (a) Evaluate the following instructions and write the new settings of status flags? 5  
 i. ADD AL, BL where AL contains 80h and BL contains 80H.  
 ii. MOV AX, BX where AL contains 01h and BL contains FFH.  
 iii. NEG BL where BL contains 80H.  
 iv. SUB AL, AX where AL contains 2AH and AX contains 06ACH.  
 v. INC AL where AL contains EEH.
- (b) Write a program to display a '?', read two capital letters, and display them on the next line in alphabetical order? 3
- (c) Define mask? Clear the sign bit of AL while leaving the others bits unchanged? 1
- (d) Write down the instruction to convert the lowercase letter to uppercase and vice versa? 1
- Q.6 (a) Suppose AL contains 11001011b and CF=1. Give the new contents of AL after each of the following instructions is executed. Assume the preceding initial conditions for each of part of this question. 3  
 i. ROL AL, CL if CL contains 2  
 ii. ROR AL, CL if CL contains 3  
 iii. RCR AL, CL if CL contains 3



- (b) Use ROL to count the number of 1 bits in BX, without changing BX. Put the answer in AX (write only instructions). 3
- (c) Define the following terms with examples: 3
- Register addressing mode
  - Immediate addressing mode
  - Register indirect addressing mode
  - Implied addressing mode
- (d) Define flag in microprocessor? Why flag is used? 1
- Q.7 (a) Define stack? Write an assembly language program to reverse the input using stack instructions? 5
- (b) Suppose the stack segment is declared as follows: 3
- ```
.STACK 100H
```
- What is the hex content of SP when the program begins?
  - What is maximum hex number of words that the stack may contain?
- (c) Suppose that AX=1234h, BX=5678H, CX=9ABCH and SP= 100H. Give the contents of AX, BX, CX and SP after executing the following instructions: 2
- ```
PUSH AX
PUSH BX
XCHG AX, CX
POP CX
PUSH AX
POP BX
```
- Q.8 (a) Define addressing mode? Suppose that 5
- |                   |                             |
|-------------------|-----------------------------|
| BX contains 1000H | Offset 1000H contains 1BACH |
| SI contains 2000H | Offset 2000H contains 20FEH |
| DI contains 3000H | Offset 3000H contains 031DH |
- Where the above offsets are in the data segment addressed by DS. Write which of the following instructions are legal. If legal, give the source offset address and the result or number moved.
- MOV BX, [BX]
  - MOV CX, [SI]
  - MOV BX, [AX]
  - ADD [SI], [DI]
  - INC [DI]
- (b) Write some code to sum in AX the elements of the 5-element array W defined by (using Register Indirect Addressing mode). 2
- ```
W    DW    10,20,30,40,50
```
- (c) Write down the pin configuration of 8086 microprocessor? What are the functions of it? 3

**N.B.**

- i) Answer **SIX** questions, taking any **THREE** from each Section
- ii) All questions are of equal values.
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**Section-A**

1. a) Why Java is called OS and machine independent? Explain. 3  
b) What are the differences between default constructor and user defined constructor. Explain with examples. 3  
c) What are the rules for constructor in Java? Can a constructor perform other tasks instead of initialization? If yes, how? 2  
d) "A constructor does not return anything". Justify this statement. 2
2. a) What are the roles of JVM and JIT? 2  
b) Write down different access modifiers and non-access modifiers in Java. 3  
c) What is the output of the following code: 2  

```
class Base{  
    public void fun(){  
        System.out.println("Base fun");  
    }  
}  
  
class Derived extends Base{  
    public void fun(){  
        System.out.println("Derived fun");  
    }  
}  
  
public static void main(String[] args){  
    Base obj = new Derived();  
    obj.fun();  
}
```

  
d) Write down the procedures to create an applet and execute it. 3
3. a) What will be the result of compiling and running the following program? 2  

```
public class MyClass{  
    public void methodA(int i){  
        System.out.println(i);  
    }  
    public int methodA(int i){  
        System.out.println(i+1);  
        return i+1;  
    }  
    public static void main(String args[]) {  
        MyClass X = new MyClass();  
        X.methodA(5);  
    }  
}
```

  
b) A consultant contains all the properties of a person but a few properties of an engineer. Declare a person class that contains hasName(), hasAge(), hasAddress() and an engineer class that contains hasQuality(), hasFieldWork(). A consultant inherits everything of a person but only the quality of an engineer. Implement this phenomenon in Java code. **N.B.** person and engineer are such classes whose instances are not possible. 5  
c) Write Java code that creates five threads, each is started after initialization. When they run, a common variable 'counter' gets incremented. If it becomes greater than equal to 1000, each thread stops. 3
4. a) What is a thread? How can you create a thread? Give examples. 2  
b) What is an exception? Describe the exception handling in Java through try and catch 3

- mechanism.
- c) What do you mean by multithreaded program and context switch in Java? Explain them with respect to thread priorities. 3
- d) What is the use of *synchronized* keyword in Java? "If a thread calls the method *wait()*, it can never be alive again". Justify this statement. 2

### Section-B

5. a) Write down differences between *throw* and *throws* keywords in Java? 2
- b) A number and a string are taken as input from the console. You are asked to show one error message if the number is not in between 20 and 100 and another error message if the string does not contain any capital letter. Create your own exception class/classes. 3
- c) How can you make an object eligible for Garbage Collector in Java? 2
- d) What is the use of *finalize()* method in Java? 1

6. a) Consider a class *Student* like the following: 4

```
class Student {
    int id;
    String name;
    int age;
}
```

Define a method *boolean equalsTo(Object obj)* in the class *Student* which returns a boolean value. For example:

```
Student s1 = new Student(1, "Aaa", 20);
Student s2 = new Student(2, "Bbb", 21);
Student s3 = new Student(3, "Ccc", 23);
Student s4 = new Student(4, "Bbb", 21);
s1.equalsTo(s2); // returns false
s1.equalsTo(s3); // returns false
s2.equalsTo(s4); // returns true
```

- b) What is a socket? Write down a simple socket programming code so that a client can connect to a server. 3
- c) Write short note on constructor chaining in Java. What is the output in the following program: 3

```
public class Person {
    String name;
    public Person(String n){
        name = n;
        System.out.println("The name of the person is: "+name);
    }
}

// extends Person
public class Student {
    public Student(String n){
        super(n);
        System.out.println("The name of the student is: "+name);
    }
}

public class Test {
    public static void main(String[] args){
        Student s1 = new Student("XYZ");
        Person p1 = new Person("PQR");
    }
}
```

7. a) Write short notes on local, instance and static variables? 2
- b) How to handle exception in JDBC through finally {...} block? Describe the Metadata from database with an example. 3
- c) Create a frame of size 400X400 and it contains two labels, two textFields and a button. 3
- d) Distinguish between following terms: 2

8. a) Consider the following code snippet:

4

```
public class Main{  
    public static void main(String[] args){  
        int a = calculate("sS", 6, 4, 3); //a = 6+4-3 = 7  
        int b = calculate("Ss", a, 4, 7); //b = a-4+7 = 10  
        int c = calculate("Sm", b, a, 3); //c = (b-a)*3 = 9  
        int d = calculate("ds", c, 3, -3); //d = (c/3)+(-3) = 0  
    }  
}
```

Write the Java method 'calculate' in the appropriate way. You can write only one 'calculate' method.

- b) Write a program in java to read information from a file named "in.txt" located at F:\CSE and display that information in a message dialog. 4
- c) Write down the components of RMI in Java. 2