

N.B.

- 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) | What do you mean by 32-bit microprocessor? | 1 |
| b) | What are functions of i) Assembler and ii) Emulator. | 2 |
| c) | Mention the trade-off of choosing between assembly language and high level language. | 2 |
| d) | What are differences between the following instructions?
(i) REP and REPE
(ii) JMP and JAE
(iii) CLD and STD
(iv) ROL and ROR
(v) REP and loop | 5 |
| 2. a) | What do you know about addressing modes? Determine what kind of addressing modes have been used in the following instructions.
(i)MOV AX,[BX] (ii) MOV [1234H],AX (iii) MOV CL,[BX+4] (iv) MOV [BX+SI],BP | 3 |
| b) | Describe the function of 8086 microprocessor queue. How does the queue speed up the processing? | 3 |
| c) | Draw the coding template for MOV instruction and code
(i)MOV 43H[SI],DH (ii)MOV CL,[BX]
showing detail rationale. | 4 |
| 3. a) | Discuss signed and unsigned overflow with example. | 2.5 |
| b) | What are the functions of following assembler directives?
(i)ASSUME (ii) DW (iii) PROC (iv) EQU (v) ENDP | 3 |
| c) | Describe the procedure of converting two ASCII codes to Packed BCD with example. Write an assembly language program that produces a packed BCD byte from 2 ASCII-encoded digits and check packed BCD is odd or even. | 4.5 |
| 4. a) | Discuss EQU and TEST operator with example. | 3 |
| b) | Write down the output for the following carry flag (CF) and zero flag (ZF)
CMP BX, CX
Condition CF ZF
CX>BX
CX<BX
CX=BX | 3 |
| c) | Write an assembly language program that adds a profit factor to each element in a COST array and puts the result in a PRICES array. | 4 |

Section-B

- | | | |
|-------|--|---|
| 5. a) | What are the differences between near call and far call? | 2 |
| b) | Describe the operations and results of each of the following instructions or group of instructions:
(i)ROL BX,1 (ii) DIV BL (iii) MOV [BX][SI],CL (iv) MOV CX,[246BH]
(v) DOWN: MOV BL,94H
DEC BL
JNZ DOWN | 4 |
| c) | Write the pseudo code using REPEAT-UNTIL structure to pass '01H' to the accumulator if the input Temperature is $\geq 100^{\circ}\text{C}$ and '00H' to the same else. Then translate it into assembly language program. | 4 |

6. a) Draw and explain the flow diagram for computing $5!$ by recursive procedure.
b) Write an assembly language program that moves a string from the location TEST-MESS to the location NEW-LOC.
c) Calculate the value of N for the following code if you want to produce 1 ms delay with 5 MHZ microprocessor.

;clock cycles

```
MOV CX, N      ;4
KILL_TIME: NOP ;3
    NOP        ;3
LOOP KILL_TIME ; 17 or 5
```

7. a) What is reentrant procedure? Draw the execution flow of a reentrant procedure and explain in brief. 2.5
b) Use the 8086 string instruction to write a program which inputs a password and sound an alarm if the password is incorrect. 4
c) Use a stack map to show the effect of each of the following instructions on the stack pointer and on the contents of the stack 3.5

```
MOV SP, 2000H
MULTO PROC NEAR
PUSHF
PUSH AX
PUSH BX
PUSH CX
```

```
POP CX
POP BX
POP AX
POPF
RET
MULTO ENDP
```

8. a) What are INT 21H and LEA? 2
b) How processor indicate signed and unsigned overflow. 2
c) What is the range problem of conditional jumps? Discuss with example how the problem can be solved. 4
d) What do you mean by assembler directive? Mention some assembler directives with their tasks. 2

Course No.: CSE350

Full Marks: 60

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Section-A

- | | | |
|-------|--|---|
| 1. a) | How computer graphics differ from digital image processing? | 3 |
| b) | Explain the CMY color model. | 3 |
| c) | "Lookup table reduces the storage requirement of an image." – justify this. | 2 |
| d) | If we use 2-byte pixel values in a 24-bit lookup table representation, how many bits does the lookup table occupy? | 2 |
| 2. a) | Explain the DDA algorithm for scan converting a line. How it take advantages against to direct use of line equation? | 5 |
| b) | "Unequal brightness in one of the major adverse side effect of scan conversion." – justify this. | 3 |
| c) | Draw a third order Koch curve. | 2 |
| 3. a) | Why we need to clip the objects or portion of objects? | 2 |
| b) | Compare between convex and concave polygon with necessary figure. | 3 |
| c) | Clip the polygon P1,...,P7 in Fig-1 against the window ABCD using the Sutherland-Hodgman algorithm. | 5 |

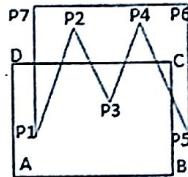


Fig-1: A Polygon.

- | | | |
|-------|--|---|
| 4. a) | What is clipping window? | 1 |
| b) | Discuss the general pivot point rotation. | 3 |
| c) | What is shear? Briefly discuss about shear transformation. | 3 |
| d) | Explain how a line is clipped against a rectangular clip window. | 3 |

Section-B

- | | | |
|-------|--|---|
| 5. a) | Compare between geometric and coordinate transformation in 3D space. | 3 |
| b) | "To project an image, engineers and drafters use parallel projection." – justify this. | 3 |
| c) | Distinguish between orthographic and oblique parallel projection. | 4 |
| 6. a) | Explain the following two anomalies for the perspective projection. | 3 |
| | i. Perspective foreshortening ii. View confusion | |
| b) | Mention two fundamental differences between perspective projection and parallel | 2 |

projection.

- c) The unit cube (Fig-2) is projected onto the xy plane. Draw the projected image using the standard perspective transformation with $d = 2$, where d is the distance from the view plane.

5

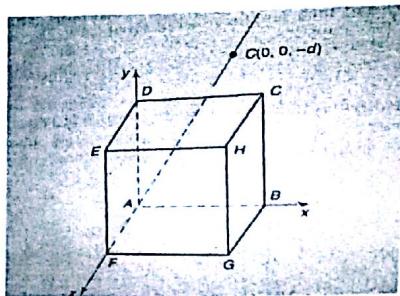


Fig-2: A cube.

7. a) What is spline? 1
b) Discuss different types of parametric continuity. 4
c) What is Hermite spline? Explain with example. 5
8. a) Represent the cube (Fig-2) through the method of polygon listing. 2
b) Implement the depth-buffer method to display the visible surface of a given polyhedron. 4
c) Develop a depth-sorting program to display the visible surfaces of any given object with plane faces. 4

Course No.: CSE352

Course Title: Compiler Design

Full Marks: 60

Time: 03 hours

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Section-A

- | | | |
|-------|--|---|
| 1. a) | How does a compiler differ from an interpreter? | 2 |
| b) | What are the Phases of a compiler? Why do we divide Compiler into different Phases? | 4 |
| c) | Discuss the action taken by every phase of compiler on the following instruction of source program while compilation. Total= num1 + num2*60 | 4 |
| 2. a) | Consider the context free grammar
$E \rightarrow E+T \mid T$
$T \rightarrow T^*F \mid F$
$F \rightarrow (E) \mid a$ | 6 |
| i) | Show how the string $(a+a)^*$ a can be generated by this grammar. | |
| ii) | Construct a parse tree for this string. | |
| iii) | What language does this grammar generate? Justify your answer. | |
| b) | What do you mean by left recursive and left factoring? Write algorithm to eliminate left recursive and left factoring from a grammar. | 4 |
| 3. a) | Differentiate between token, pattern and lexeme with example. | 3 |
| b) | Consider the following grammar of an arbitrary programming language
$STMT \rightarrow \text{if EXPR then STMT else STMT} \mid \text{while EXPR do STMT} \mid \text{begin STMTS}$
end
$STMTS \rightarrow STMT; STMTS \mid \epsilon$
$EXPR \rightarrow \text{id}$ | 7 |
| i) | Calculate the FIRST and Follow set. | |
| ii) | Develop the LL(1) Parse table | |
| iii) | Show the stack movement for the input "while id do begin begin end ; end" | |
| 4. a) | What is peephole optimization? Write down the Characteristics of this optimization. | 3 |
| b) | Explain "Structure preserving Transformation" with proper example. | 3 |
| c) | What is a flow graph? Given the following code fragment
$x := a*a + 2*a*b + b*b;$
$y := a*a - 2*a*b + b*b;$
Draw a dependency graph before and after common subexpression elimination. | 4 |

Section-B

- | | | |
|-------|--|---|
| 5. a) | What are the problems of top-down parsing? | 2 |
| b) | What are the necessary conditions to be carried out before construction of predictive parsing? | 4 |
| c) | Show that the following grammar
$S \rightarrow A$
$A \rightarrow aB \mid aC \mid Ad \mid Ac$
$B \rightarrow bBc$
$C \rightarrow a$ is LL(1). | 4 |
| 6. a) | What is the difference between quadruples and triples? Suppose an statement
$A := B * (C + D)$, Can you translate it to triple? | 3 |
| b) | Define symbol table. Write down the contents of a symbol table. | 3 |
| c) | Consider a context free grammar as follows:
$S \rightarrow (L) \mid a$ | 4 |

L→L , S|S

- i) What are the terminals, non-terminals and start symbols?
- ii) Find the parse tree for (a, ((a, a), (a, a))).
- iii) Find the left most derivation for (a, ((a, a), (a, a))).

7. a) Define intermediate code with block diagram. What is the purpose of intermediate code generation? 3
- b) Using Backpatching generate an intermediate code for following expression 3
- A < B OR C < D AND P < Q
- c) Develop the semantic rules for generating intermediate code for while statement and switch-statement. 4
8. a) What do you understand by code optimization? Describe the classification of optimization. 3
- b) Compare local optimization with global optimization. Give suitable example. 4
- c) Write the properties of intermediate language? 3

Course No.: CSE360

Course Title: Java Technology

Full Marks: 60

Time: 03 hours

N.B.

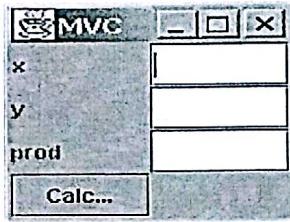
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Section-A

1. a) Write down the principles of Java. Show the difference between Java and C++. 3
b) Explain Java Runtime Architecture. 3
c) Write down a simple Java program and show the step to compile and run the .java file. 4
2. a) What is Inheritance? Describe the Superclass and Subclass according to the idea of inheritance. 3
b) Describe the Java garbage collection operation. 2
c) What is an exception? Describe the exception handling in Java through try and catch mechanism. 5
3. a) What do you mean by InputStream and OutputStream in java? Describe the Java Run Time Type Identification with a proper example. 3
b) Describe Class and Object according to the object oriented paradigm of Java with an example. 4
c) What is Thread in Java? Write down the advantages of Multithreading in Java. 3
4. a) Write down the concept for Multiple Threads on single and multiple CPUs. 2
b) Describe the processes to create a thread in Java. Also describe the Thread termination process. 3
c) Draw and describe the Thread States in Java. 5

Section-B

5. a) What is an Applet? Define an Applet and describe its life cycle. 3
b) What is MVC? Describe the MVC pattern for the corresponding simple calculator application in Java



5. c) What is Layout Managers? Describe Flow Layout, Box Layout and Grid Layout with figures. 3
6. a) Describe process to use Create, Configure, Add and Listen to JButton as a GUI component in Java. 3
b) Discuss the anatomy of a Java Application GUI that is built from bottom up approach. 5
c) What is an Event? Describe Event with respect to button ActionEvent and ActionListener. 2
7. a) What is JDBC? Explain the general architecture of JDBC. 4
b) Write down the purpose of each of the following methods:
 - i. lastIndexOf();
 - ii. toCharArray();
 - iii. charAt();4
- c) How to handle exception in JDBC through finally {...} block? Describe the Metadata from database with an example. 2
8. a) What is Exception Handling in Java? Classify Exception in Java. 4
b) What is Socket? Explain Socket programming with TCP according to TCP service 3
c) What is Servlet? Draw the diagram Servlet vs. CGI 3

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Section-A

1. (a) What do you mean by Software engineering? Software engineering is a layered technology, explain it briefly. 4
- (b) What are the five generic process framework activities? Explain with appropriate diagram. 3
- (c) What are the Umbrella activities? Briefly describe them. 3

2. (a) What do you mean by software process models? Describe the classification of software process models. 3
- (b) Let you are a software engineer. You have to develop the train ticket reservation system. Which software process model needs to use? Why? 3
- (c) If requirements are well understood and project scope is constrained, then Which software process model needs to be used? Explain briefly. 4

3. (a) Why make/buy decision technique is used in case of developing the software? Compute the expected cost along the branches of the decision tree as shown in figure-2(a). 4

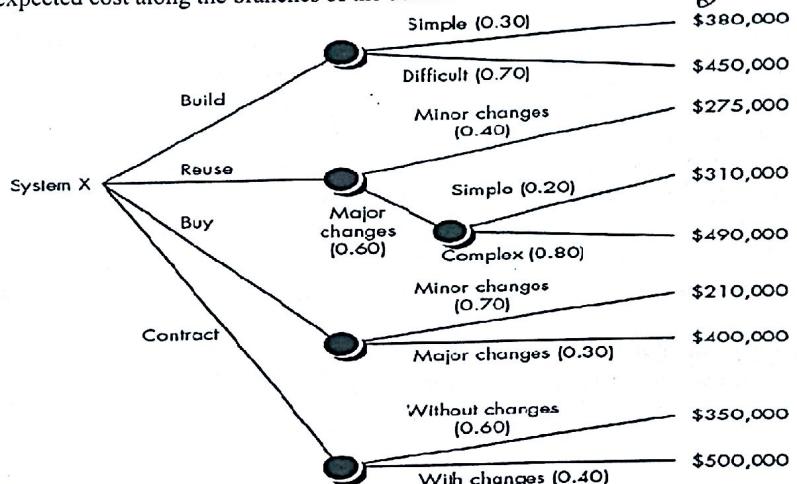


Figure 2(a)

- (b) Define the software quality control and software quality assurance. 2
- (c) What do you mean by software review? Describe the defect amplification and removal model with an appropriate example. 4

4. (a) What is feasibility study? What are the contents we should contain in the feasibility report? 3
- (b) What are the purposes of Data Flow diagrams, Entity-Relationship diagrams? Give an example 4 diagram of each.
- (c) Explain the spiral model in details. 3

Section-B

5. (a) How Zipf's law is used to measure the complexity of the software? Derive the length equation 4 from the Zipf's first law.
- (b) What is the difference between verification and validation of the software? Draw the 4 relationship between design processes and testing processes.
- (c) Mention the number of ways to compute complexity of the software with examples. 2

6. (a) Find the flowgraph and cyclomatic complexity from the following code as shown in figure- 7

Q(a).

PROCEDURE average;

* This procedure computes the average of 100 or fewer numbers that lie between bounding values; it also computes the sum and the total number valid.

INTERFACE RETURNS average, total.input, total.valid;
INTERFACE ACCEPTS value, minimum, maximum;

TYPE value[I:100] IS SCALAR ARRAY;
 TYPE average, total.input, total.valid;
 minimum, maximum, sum IS SCALAR;

TYPE I IS INTEGER;

```

1 { i = 1;
total.input = total.valid = 0; 2
sum = 0;
DO WHILE value[i] <> -999 AND total.input < 100 3
    4 increment total.input by 1;
        IF value[i] >= minimum AND value[i] <= maximum 6
            6 THEN increment total.valid by 1;
                sum = sum + value[i]
            ELSE skip
        ENDIF
        8 increment i by 1;
    9 ENDDO
    IF total.valid > 0 10
        10 THEN average = sum / total.valid;
    12 ELSE average = -999;
    13 ENDIF
END average

```

- (b) Differentiate between White-box testing and Black-box testing. 3

7. (a) Write down the differences between software reliability and software availability. In case of 4 software reliability, prove that $R(t) = 1 - F(t)$. Here symbol represent their usual meaning.

- (b) Derive the maintenance force equation and development force equation in case of software 4 maintenance cost model. Let 20% of the work force is left behind for maintenance each time and here have 6 projects of 2 years each. Find the maintenance force and development force.

- (c) What do you mean by software error and software fault? 2

8. (a) Why a highly couple model is difficult to unit test? 2

- (b) What is user acceptance testing? Explain different testing in user acceptance testing. Why is it 4 necessary?

- (c) What are functional and non-functional requirements? 2

- (d) What is the use of User Interface prototyping? 2