Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VI EXAMINATION – WINTER 2025

Subject Code:3160715 Date:25-11-2025

Subject Name:System Software

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Define the following terms: i) System Programming ii) Logical Address Space iii) Device Driver	**03**
	(b)	Discuss the various recent trends in software development.	**04**
	(c)	Explain the role of symbol table data structure in language processor and also, discuss how one can organize the symbol table using linear data structure?	**07**
Q.2	**(a)**	Discuss various desirable properties of an intermediate representation (IR) of a code in language processor.	**03**
	(b)	Explain the following assembler directives: i) END ii) ORIGIN	**04**
	(c)	An assembly program contains the statement A EQU B+10 Indicate how the EQU statement can be processed if i) B is a back reference ii) B is a forward reference	**07**
		OR	
	(c)	Discuss in detail the various data structures involved in PASS-I of the assembler.	**07**
Q.3	**(a)**	What do you mean by lexical and semantic macro expansion?	**03**
	(b)	Explain nested macro call with example.	**04**
	(c)	Compare and contrast the properties of macros and subroutines with respect to the following: i) code space requirements ii) execution speed iii) processing required by the assembler	**07**
		OR	
Q.3	**(a)**	Draw the schematic design of a macro preprocessor.	**03**
	(b)	Explain the use of REPT and IRP statement in macros.	**04**

(c) Explain the various attributes of the following tables involved in macro preprocessor. **07**

i) MNT
ii) KPDTAB
iii) SSTAB
iv) EVTAB

Q.4 **(a)** What do you mean by non relocatable program? **03**

(b) Explain absolute loader with suitable example. **04**

(c) Discuss in detail how linker resolves the external references. **07**

OR

Q.4 **(a)** Define the following terms. **03**

i) Overlay program
ii) Relocating loader
iii) Program relocation

(b) A self-relocating program needs to find its load address before it can execute its relocating logic. Comment on how this information can be determined by the program. **04**

(c) Explain various components of an object module. **07**

Q.5 **(a)** Describe the ambiguity in grammar specification. **03**

(b) Explain the difference between pure and impure interpreter. **04**

(c) Demonstrate the use of triples and quadruples representation used in compiler with suitable example. **07**

OR

Q.5 **(a)** Explain the role of LEX and YACC utility. **03**

(b) Discuss the top down parsing without backtracking with example. **04**

(c) Discuss various optimizing transformation techniques commonly used in compilers. **07**

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Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VI (NEW) EXAMINATION – WINTER 2024

Subject Code:3160715 Date:05-12-2024

Subject Name:System Software

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	Explain semantic gap, specification gap and execution gap.	**03**
	(b)	Explain the various tasks performed during analysis and synthesis phases of the assembler.	**04**
	(c)	List various phases of Language Processor. Explain any one phase in detail.	**07**
Q.2	**(a)**	Describe ambiguous grammar with suitable example.	**03**
	(b)	Explain Left recursion in brief and remove left recursion from the following grammar: S -> A A -> aB / Ad B -> bBC / f C -> g	**04**
	(c)	Explain various Assembler directives with suitable example.	**07**
		OR	
	(c)	Describe following data structures: OPTAB, SYMTAB, LITTAB and POOLTAB.	**07**
Q.3	**(a)**	Define: Parse tree, Syntax tree, DAG	**03**
	(b)	Differentiate between single pass Assembler and 2-pass Assembler.	**04**
	(c)	Explain recursive descent parsing algorithm with example.	**07**
		OR	
Q.3	**(a)**	Define: Token, Lexeme and Pattern	**03**
	(b)	Construct LL(1) parsing table for following grammar. S -> iCtSeS | iCtS | a C -> b	**04**
	(c)	Obtain minimized DFA for the following regular expression: aa*bc*#	**07**
Q.4	**(a)**	Explain handle pruning with respect to the bottom up parsing.	**03**
	(b)	Explain macro preprocessor in brief.	**04**
	(c)	What is intermediate code? Explain types of intermediate code in compilers.	**07**
		OR	
Q.4	**(a)**	Define: Subroutine, DEFTAB, ARGTAB	**03**
	(b)	Explain basic structure of a LEX program.	**04**
	(c)	Define macro in the context of programming language. Explain the structure of a macro definition.	**07**

Q.5	**(a)**	Enlist different loading schemes.	**03**
	(b)	Describe Absolute loader in brief.	**04**
	(c)	Explain how relocation and linking is performed.	**07**
		OR	
Q.5	**(a)**	Enlist the languages using interpreter.	**03**
	(b)	Describe the classification of Debuggers.	**04**
	(c)	Define: Interpreter, Explain the merits and demerits of interpretation	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – WINTER 2023

Subject Code:3160715 Date:13-12-2023

Subject Name: System Software

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Explain different kinds of system software.	**03**
	(b)	Difference between Procedure oriented language and Problem oriented language.	**04**
	(c)	Explain the various stages of the life cycle of a source program with a neat diagram.	**07**
Q.2	**(a)**	Eliminate left recursion E → E + T | T	**03**
	(b)	Describe following data structures: OPTAB, SYMTAB, LITTAB and POOLTAB.	**04**
	(c)	Compare Top Down and Bottom Up Parsing. Find out First and Follow and construct LL (1) parser table for following Grammar: E→TE' E'→+TE'|ε T→FT' T'→*FT'|ε F→(E) | id	**07**
		OR	
	(c)	Consider following assembly language program: Show (i) Contents of Symbol Table (ii) Intermediate codes using Variant-I representation.	**07**

```
          START 101
          READ N
          MOVER BREG, ONE
          MOVEM BREG, TERM
AGAIN     MULT BREG, TERM
          MOVER CREG, TERM
          ADD CREG, ONE
          MOVEM CREG, TERM
          COMP CREG, N
          BC LE, AGAIN
          MOVEM BREG, AGAIN
          PRINT RESULT
          STOP
N         DS 1
RESULT    DS 1
ONE       DC '1'
TERM      DS 1
          END
```

Instruction opcode: STOP – 00, ADD – 01, MULT – 03, MOVER – 04, MOVEM –05, COMP – 06, BC – 07, READ – 09, PRINT – 10, LE – 02
Assembler directives: START – 01, END – 02
Declaration statements: DC – 01, DS – 02
Register code: BREG – 02, CREG – 03

Q.3	**(a)**	Draw a flowchart of maintaining Table of Incomplete Instruction (TII) in assembler.	**03**
	(b)	Explain REPT and IRP statement with proper example.	**04**
	(c)	Explain advanced assembler directives with suitable example.	**07**

OR

Q.3	**(a)**	Explain memory allocation in block structured language.	**03**
	(b)	What is the difference between Keyword parameters and positional parameters?	**04**
	(c)	Explain lexical and semantic expansion of macro with example.	**07**
Q.4	**(a)**	Write regular expressions of a given language. The language consists no. of zero should be multiple of 3	**03**
	(b)	Explain in brief design of an absolute Loader.	**04**
	(c)	Explain Self relocating program and overlay structure program.	**07**

OR

Q.4	**(a)**	Write a regular expression for a language containing both 11 and 00 as substring	**03**
	(b)	Write and explain the algorithm for macro expansion.	**04**
	(c)	What is program relocation? How relocation is performed by linker? Explain with example.	**07**
Q.5	**(a)**	Explain types of grammar.	**03**
	(b)	Explain the front end of toy compiler with suitable example.	**04**
	(c)	What is interpreter? Explain pure & impure interpreters.	**07**

OR

Q.5	**(a)**	Explain Boostrap loader.	**03**
	(b)	Given following expression: x = -a * b + -a * b (1) Write three address codes for the expression. (2) Give triple implementation for the three-address code of the expression.	**04**
	(c)	What is interpreter? Explain benefits of interpreter. Compare interpreter and compiler.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI(NEW) EXAMINATION – WINTER 2022

Subject Code:3160715 Date:17-12-2022

Subject Name:System Software

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Differentiate Compiler and Interpreter.	**03**
	(b)	Define following terms: 1)Linker 2)Loader 3) Parser 4)Assembler	**04**
	(c)	Explain phases of Compiler with suitable example.	**07**
Q.2	**(a)**	What is a Symbol Table?	**03**
	(b)	Define following terms: 1)Semantic Gap 2)Execution Gap	**04**
	(c)	Find First and Follow Set from following grammar S-> Aa|bAc|Bc|bBa A-> d B-> d Check grammar is LL(1) or not?	**07**
		OR	
	(c)	Find First and Follow Set from following grammar S-> AaAb|BbBa A-> € B-> € Check grammar is LL(1) or not?	**07**
Q.3	**(a)**	What is a semantic expansion?	**03**
	(b)	List out advantages and disadvantages of macro.	**04**
	(c)	Draw a flowchart and explain a simple one pass macro processor.	**07**
		OR	
Q.3	**(a)**	What is a macro?	**03**
	(b)	Explain recursive macro with example.	**04**
	(c)	Explain design of macro preprocessor.	**07**
Q.4	**(a)**	What is a macro preprocessor?	**03**
	(b)	Define following terms: 1)START 2)END 3)BYTE 4)WORD	**04**
	(c)	Explain the tasks performed by the PASS-1 and PASS-2 assembler?	**07**
		OR	
Q.4	**(a)**	What is backtracking?	**03**
	(b)	Define following terms: 1)OPTAB 2)SYMTAB 3)LITAB 4)POOLTAB	**04**

	(c)	Explain forward reference with suitable examples .How to solve it using back -patching?	**07**
Q.5	**(a)**	Explain types of grammar.	**03**
	(b)	Differentiate Absolute loader and Direct linking loader.	**04**
	(c)	Explain any three Code Optimization Techniques.	**07**
		OR	
Q.5	**(a)**	Explain Ambiguous grammar with any suitable example.	**03**
	(b)	List out advantages of Relocating loader.	**04**
	(c)	Write Quadruple,Triples and Indirect Triples for expression, x= -a*b+ -a*b	**07**

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