

MODEL QUESTION PAPER
Nth SEMESTER B.E (COMPUTER SCIENCE & ENGINEERING/
INFORMATION SCIENCE & ENGINEERING)
SYSTEM SOFTWARE

Time: 3 Hrs

Max Marks: 100

Note: Answer any Five Complete questions

- 1 a Explain different instruction formats used in SIC/XE machine. 6
- b Write a Sequence of instructions for SIC/XE to clear a 20 byte string to all blanks, use immediate addressing and register-to-register instructions to make process as efficient as possible 6
- c Explain the addressing modes of power PC architecture 8
- 2 a Bring out the differences between CISC and RISC machine Architecture 4
- b Explain the algorithm of a pass 2 of two pass assemblers 10
- c What is the difference between a literal and an intermediate operand? explain with an example 6
- 3 a Give the Format for the following record necessary to obtain object code 12
 - Header Record
 - Text Record
 - Refer Record
 - Define Record
 - Modification Record(Revised)
 - End Record
- b Explain the algorithm of a pass1 of linking loader 8
- 4 a Differentiate between Dynamic Linking & Linking Editor; also write advantages & disadvantages of both. 8
- b With example, explain Keyword parameters 6
- c Explain function of macro processing within language translators 6
- 5 a Explain Lexical analysis phase of a Compiler? 6
- b Define parse tree? Construct the parse tree for the following statement 6
$$\text{Variance} = \text{sumsq}/\text{DIV}100 - \text{mean} * \text{mean}$$

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$$\text{Variance} = \text{sumsq}/\text{DIV}100 - \text{mean} * \text{mean}$$

- c Explain Recursive Descent parsing with example? 8
- 6 a Explain any two machine independent compiler features 10
- b Briefly explain interactive Debugging Systems 10
- 7 a Explain the Meta Characters used in Regular expression with an example 8
- b Explain the conflicts in YACC with example 6
- c Write YACC program to evaluate the arithmetic expression having the operators +, -, *, / 6
- 8 Write a Short Notes on the following
 - MASM Assemblers
 - P-Code Compilers
 - Linking Loader
 - Recursive macro Expansion

FIFTH SEMESTER B.E. (COMPUTER SCIENCE AND ENGINEERING)
INFORMATION SCIENCE AND ENGINEERING DEGREE
EXAMINATION, MARCH 2001

SYSTEM SOFTWARE

Time : Three Hours

Maximum : 100 Marks

Answer any five complete questions.

1. (a) Bring out the differences between system software and application software. (4 marks)
- (b) Briefly discuss the various instruction formats available in SIC/XE machine architecture. (6 marks)
- (c) With reference to Cray T3E architecture, explain the following :—
 - (i) Memory.
 - (ii) Registers.
 - (iii) Instruction formats.
 - (iv) Addressing modes.
 - (v) Input and output.
 (10 marks)
2. (a) Enlist the various assembler features that are machine-dependent and machine-independent. Explain any one of them from each. (10 marks)
- (b) Generate the complete object program for the following assembly level program. Assume suitable machine equivalents for the mnemonic opcodes.

```

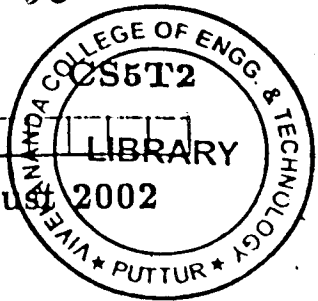
SUM      START      0000
FIRST    LDX         # 0
          LDA         # 0
          + LDB      # TABLE 2
          BASE      TABLE 2
LOOP     ADD         TABLE, X
          ADD         TABLE 2, X
          TIX        COUNT
          JLT        LOOP
          + STA      TOTAL
          RSUB
COUNT   RESW        1
TABLE    RESW        2000
TABLE 2  RESW        2000
TOTAL    RESW        1
          END        FIRST
  
```

(10 marks)

3. (a) Briefly explain a simple boot-strap loader, with an algorithm or a source program. (10 marks)
- (b) Discuss, how an object program is processed using :
 - (i) Linking loader.
 - (ii) Linkage editor.
 (10 marks)

Turn over

4. (a) Briefly describe the significant features of the microsoft MS-DOS linker for pentium and other X86 systems. (10 marks)
- (b) List the important four tasks to be accomplished by a text editor for an interactive-user-computer dialogue. (6 marks)
- (c) Write a note on the aspect of user-interface criteria in a text editor. (4 marks)
5. (a) With regard to the machine-independent macro processor features, explain the following :— (12 marks)
- Concatenation of macro parameters.
 - Generation of unique labels.
 - Conditional macro expansion.
 - Keyword macro parameters.
- (b) With an illustrative example, describe the macro processing features of microsoft MASM macro processor. (8 marks)
6. (a) With regard to machine-dependent compiler features, explain one common way of representing a program in an intermediate form. (10 marks)
- (b) How the following factors govern the compiler design ? (10 marks)
- Division into passes.
 - Storage allocation.
7. (a) What are LEX and YACC tools ? Explain. (8 marks)
- (b) Give the LEX and YACC specifications to recognise the grammar $\{a^n b^n \mid n > 0\}$. (12 marks)
8. Write short notes on the following :— (4 × 5 = 20 marks)
- AIX assembler.
 - Debugging facilities in text editor.
 - ELENA macro processor.
 - Compiler-compilers.



Fifth Semester B.E. Degree Examination, July/August 2002
Computer Science and Engineering
System Software

Time: 3 hrs.]

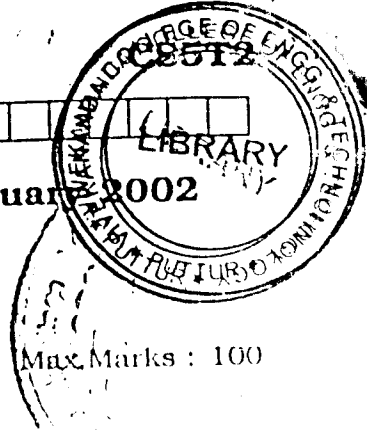
[Max.Marks : 100

Note: 1. Answer any FIVE full questions.
2. All questions carry equal marks.

1. (a) Explain instruction formats & addressing modes of SIC/XE machine. (8 Marks)
- (b) Write an assembly program for SIC/XE to set array elements to 0, if the value of the array element is less than 16 or else set to 1 [Assuming that array of 100 words] (7 Marks)
- (c) Discuss the features of power PC Architecture. (5 Marks)
2. (a) Explain the data structures used in assemblers. (6 Marks)
- (b) Write an algorithm for pass 2 of an assembler. (6 Marks)
- (c) Explain machine-independent features of assembler. (8 Marks)
3. (a) Give and explain the algorithm for boot strap loader. (6 Marks)
- (b) Discuss the features of linkage editors. (6 Marks)
- (c) Define dynamic linking. Explain dynamic linking with diagrams. Discuss about its advantages. (8 Marks)
4. (a) Give and explain the algorithm for a one pass macro processor. (10 Marks)
- (b) Explain.
 - a) General purpose macroprocessor. (5 Marks)
 - b) Conditional macroprocessor. (5 Marks)
5. (a) Explain operator precedence passing with example. (10 Marks)
- (b) Discuss the following compiler features.
 - a) Block-structured languages. (5 Marks)
 - b) Storage allocation. (5 Marks)
6. (a) What is an interpreter? Explain the features. (4 Marks)
- (b) Explain editor structure with a neat diagram. (8 Marks)
- (c) Explain the features of interactive debugging systems. (8 Marks)
7. (a) Discuss about the structure of lex & yacc program. (6 Marks)
- (b) Write a lex program to validate a given 'C' identifier. (7 Marks)
- (c) Write a yacc program to evaluate arithmetic expressions. (7 Marks)
8. (a) Write notes on the following:
 - (a) AIX Assembler.
 - (b) MS-DOS linker.
 - (c) Masm Macro processor.
 - (d) Compiler - compiler. (20 Marks)

H6/c
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Reg. No.



Fifth Semester B.E. Degree Examination, February 2002

**Computer Science and Engineering
System Software**

Time: 3 hrs.]

Max. Marks : 100

Note: Answer any FIVE full questions.

1. (a) Explain the addressing modes of SIC/XE machine. (6 Marks)
- (b) Write an assembly program on SIC/XE machine to implement block move from a memory address A1 to another address A2, without overlap. (7 Marks)
- (c) Discuss the features of CISC (VAX) machines. (7 Marks)
2. (a) Give the algorithm or program of a bootstrap loader. (10 Marks)
- (b) How is relocation done using the following? (10 Marks)
 - i) Modification records
 - ii) Bit masks
3. (a) Explain any four assembler directives with an example for each. (10 Marks)
- (b) Explain the algorithm of a one-pass assembler. (10 Marks)
4. (a) How does a Z-pass linking loader algorithm work? (10 Marks)
- (b) Discuss dynamic linking with suitable diagrams. (10 Marks)
5. (a) Explain with examples : (12 Marks)
 - i) Concatenation of macro parameters.
 - ii) Generation of unique labels.
 - iii) Recursive macro expansion.
- (b) What is a grammar & a parse tree as applicable to compilers? (8 Marks)
6. (a) Give recursive descent parsing algorithm for an assignment statement. (10 Marks)
- (b) Discuss the code generation phase in a compiler. (10 Marks)
7. (a) How does a compiler deal with a block structured language? (12 Marks)
- (b) Write a lex program to remove uppercase letters & white spaces in a file. (8 Marks)
8. Write short notes on any FOUR (20 Marks)
 - i) Sun OS linker
 - ii) Storage allocation
 - iii) YACC
 - iv) Interpreter
 - v) P-code compilers

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H6/C

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Fifth Semester B.E. Degree Examination, January/February 2003
Computer Science and Engineering
System Software

Time: 3 hrs.]

[Max.Marks : 100

Note: Answer any FIVE full questions.

1. (a) Bring out the difference between system software and application software. (4 Marks)
- (b) Explain SIC/XE machine instruction formats and all addressing modes, clearly indicating setting of flag bits. (10 Marks)
- (c) With reference to pentium pro architecture explain
 - i) Registers
 - ii) Memory
 - iii) Instruction set (6 Marks)
2. (a) What are Assembler Directives? Explain START and LTORG. (4 Marks)
- (b) Briefly explain data structures required for a simple Assembler. (6 Marks)
- (c) Generate object code for the below SIC/XE assembly language program. Also show the contents of symbol table at the end of Assembly process.

```

SUM      START  4000
          LDX    # 0
          LDA    # 0
          BASE  COUNT
          ADD   TABLE, X
          TIX   COUNT
          JLT   LOOP
+        STA   TOTAL
          RSUB
TOTAL    RESW   1
TABLE    RESW  4000
COUNT   RESW   1
          END

```

Assume below OP codes (all in hexadecimal)

```

LDX - 04   JLT - 38
LDA - 00   STA - 0C
ADD - 18   RSUB - 4C
TIX - 2C

```

(10 Marks)

3. (a) Explain different methods for specifying relocation as a part of object program. (6 Marks)
- (b) Explain Dynamic linking. (4 Marks)
- (c) Write the algorithm for 2 - pass linking loader. (10 Marks)
4. (a) Write the algorithm for 1 - pass macro processor. (10 Marks)
- (b) Using the following macro definition, expand the 2 macro calls, which are called in a sequence.

Contd.... 2

```

i)          RDBUFF  F1, BUFFER, LENGTH, 00, 1024
ii) LOOP   RDBUFF  F2, BUFFER, LTH
           RDBUFF  MACRO & INDEV, & BUFADR, & RECLTH,
                   & EOR, & MAXLTH
           &EORCK  IF (& FOR NE")
                   SET  1
                   ENDIF
                   CLEAR  X
                   CLEAR  A
                   IF  ( & EORCK = EQ 1)
                   LDCH  = X'& FOR'
                   RMO  A,S
                   ENDIFF
                   IF (& MAXLTH EQ ")
+                LDT  # 4096
                   ELSE
+                LDT  # MAXLTH
                   ENDIF
$ LOOP      TD  = X'& INDEV'
           JEQ  $ LOOP
           RD  = X'& INDEV'
           IF  (& EORCK EQ 1)
           COMPR  A, S
           JEQ  $ EXIT
           ENDIF
           STCH  & BUFADR, X
           TIXR  T
           JLT  $ LOOP
$ EXIT      STX  & RECLTH
           MEND

```

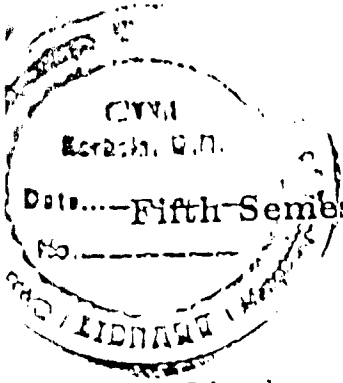
(10 Marks)

- 5. (a) Explain lexical phase of a compiler. (6 Marks)
- (b) Explain operator precedence parser. (6 Marks)
- (c) Write Recursive Descent Parser Procedure for write statement, whose grammar is

< write > ::= WRITE(< id - list >)
< id - list > ::= id{,id} (8 Marks)

- 6. (a) Explain different machine-dependent code optimization techniques. (10 Marks)
- (b) How does a compiler deal with Block structured languages. (10 Marks)
- 7. (a) With a neat diagram, explain the structure of a text editor. (10 Marks)
- (b) Explain lex and yacc tools. Write a lex program to count the number of signed integers and fractions. (10 Marks)

- 8. Write short notes on:
 - (a) One-pass Assembler
 - (b) Linkage Editor
 - (c) Debugging facilities in text editor
 - (d) P-code compiler. (5×4=20 Marks)



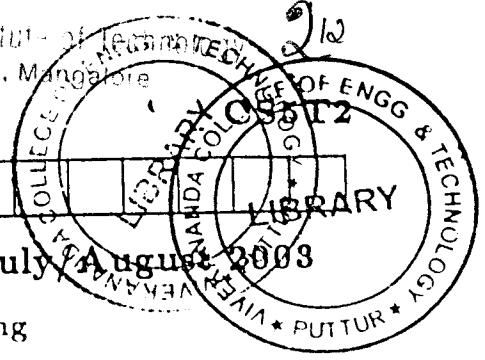
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Library, Mangalore

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Fifth Semester B.E. Degree Examination, July/August 2003

Computer Science and Engineering
System Software

[Max.Marks : 100

Note: Answer any FIVE full questions.

- (a) Differentiate between CISC and RISC machine architecture. (4 Marks)

(b) Explain the register organization, data formats, instruction formats and addressing modes of SIC/XC machine architecture (8 Marks)

(c) Explain the memory, addressing modes, instruction set and data formats of cray T3E architecture. (8 Marks)
- (a) What are the assembler directives? (3 Marks)

(b) Write an algorithm for pass 1 of two pass assembler. (10 Marks)

(c) Explain the program relocation with an example. (7 Marks)
- (a) Explain a simple bootstrap loader. (10 Marks)

(b) Write an algorithm for pass 2 of linking loader. (10 Marks)
- (a) Explain the concept of dynamic linking. (10 Marks)

(b) Explain the term linkage editors with example. (10 Marks)
- (a) Explain any two machine independent macro processor features. (10 Marks)

(b) Explain the general purpose macro processors. (10 Marks)
- (a) Explain the lexical analysis phase of compiler with suitable example. (10 Marks)

(b) Explain the operator - precedence parsing with an example. (10 Marks)
- (a) Explain the concept of storage allocation. (10 Marks)

(b) Explain the block-structured languages. (10 Marks)
- (a) Explain the general format of lex source with example. (8 Marks)

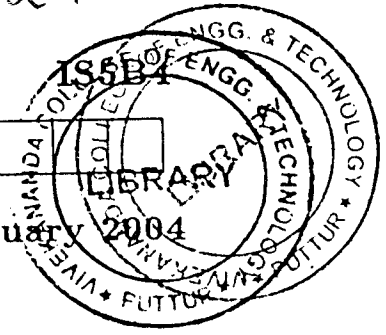
(b) Write a lex program that histograms the lengths of words, where a word is defined as a string of letters. (6 Marks)

(c) Write a short note on "Yacc" (6 Marks)

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Fifth Semester B.E. Degree Examination, January/February 2004

Information science and Engineering

System Software

Time: 3 hrs.]

[Max.Marks : 100

Note: Answer any FIVE full questions.

1. (a) Bring out the differences between system software and application software. (4 Marks)
- (b) Briefly discuss the various instruction formats available in SIC / XE machine architecture. (6 Marks)
- (c) List different registers used in SIC / XE and their uses. (10 Marks)
2. (a) What are the advantages and disadvantages of RISC system? (6 Marks)
- (b) Explain the following with respect to SPARC machine
i) overlap windows ii) data format iii) addressing modes (10 Marks)
- (c) List the register set of Pentium Pro Architecture. (4 Marks)
3. (a) What are the data structures used in two pass assembler? List the permanent and temporary databases. (10 Marks)
- (b) What is the displacement possible in case of base relative and PC relative addressing mode? Why is this restriction? (6 Marks)
- (c) What are the difference between literal and immediate operand? How does the assembler handles literal operand? (4 Marks)
4. (a) Write two pass assemble algorithm. The following information needs to be considered while writing the algorithm. LC value, WORD, RESW, BYTE and RESB. Error messages need to maintained in terms of number or code. (12 Marks)
- (b) When is a program called relocatable program? What is the problem if the program is not relocatable? Give an example of an instruction that does not support program relocation? (8 Marks)
5. (a) Write the difference between a linkage editor and a linkage loader. (5 Marks)
- (b) Write a Bootstrap loader program for SIC / XE system. Write comments to explain the program. (10 Marks)
- (c) Explain how relocation is indicated by mask bit. (5 Marks)
6. (a) Write the macro instruction definition format. (4 Marks)
- (b) Write a macro program to save the contents of all the registers. Write the main program to call the above macro. Show also the macro expansion. (10 Marks)
- (c) List the data structures involved in one pass macro processor. Explain briefly each of them. (6 Marks)

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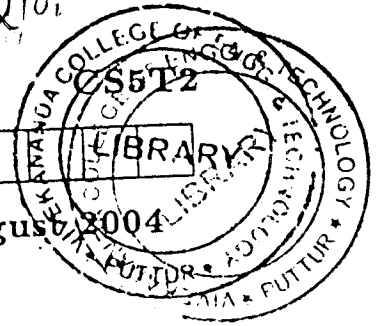
7. (a) Describe the following terms ; Lexical Analysis, Syntax Analysis and Grammar. (6 Marks)
- (b) Give an example to differentiate between syntax and semantics. (4 Marks)
- (c) Explain with an example shift reduce parsing. (10 Marks)
8. (a) Give the general format of LEX source and explain. (5 Marks)
- (b) Write a LEX source program that finds the length of words. Where a word is defined as a string of letters. (5 Marks)
- (c) List the Debuggers User - Interface criteria. (5 Marks)
- (d) Write short notes on Text command oriented method. (5 Marks)

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Fifth Semester B.E. Degree Examination, July/August 2004
Computer Science and Engineering
System Software

[Max.Marks : 100

Time: 3 hrs.]

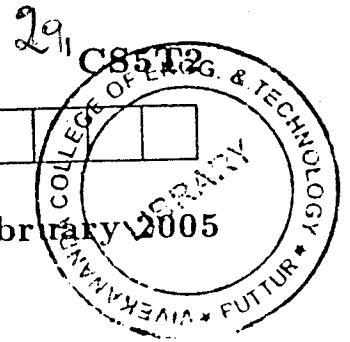
Note: Answer any FIVE full questions.

1. (a) Briefly explain the instruction formats and addressing modes of SIC/XE computing system. (8 Marks)
- (b) Develop an assembly level program for SIC/XE machine to sort the array elements in the descending order. Assume the array of 100 words. (7 Marks)
- (c) Enlist and discuss the features of power PC architecture. (5 Marks)
2. (a) Discuss the program or the algorithm of a bootstrap loader. (10 Marks)
- (b) Describe how relocation is accomplished using the following: (10 Marks)
 - i) Modification records
 - ii) Bit masks.
3. (a) Discuss the need for a two pass assembler and explain the functions performed. (8 Marks)
- (b) Write an explanatory note on 'SUN OS LINKER'. (6 Marks)
- (c) Explain in brief, the capabilities of inter active system and explain debugging. (6 Marks)
4. (a) Describe the important features of the Microsoft MS-DOS linker for pentium and X86 systems. (10 Marks)
- (b) List four significant tasks to be performed by a text editor for an interactive user computer dialogue and explain. (6 Marks)
- (c) Briefly explain the aspect of user interface criteria in a text editor. (4 Marks)
5. (a) Describe any two machine independent macro processor features. (10 Marks)
- (b) Explain the general purpose macro processors. (10 Marks)
6. (a) Briefly discuss the different machine dependent code optimization techniques. (10 Marks)
- (b) Describe how a compiler deals with block structured languages. (10 Marks)

Contd.... 2

7. (a) Discuss about the structure of lex and yacc programs. (6 Marks)
- (b) Develop a lex program to validate an identifier for any programming language that you are familiar with. (7 Marks)
- (c) Write a yacc program to evaluate the arithmetic expressions. Consider all possible cases. (7 Marks)
8. Write short notes on the following : (5×4=20 Marks)
- i) ALX assembler
 - ii) Debugging facilities in text editor
 - iii) ELENA macro processor
 - iv) P-Code compiler

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Fifth Semester B.E. Degree Examination, January/February 2005

Computer Science and Engineering


(Old Scheme)

System Software

Time: 3 hrs.]

[Max.Marks : 100

Note: Answer any FIVE full questions.

1. (a) What are the differences between line editor and graphic editor? (5 Marks)
- (b) Explain the different editor operation modes. (7 Marks)
- (c) Give an algorithm for vertical scrolling in editor design. (8 Marks)
2. (a) List all the instructions that affect conditional flags in a SIC machine. (5 Marks)
- (b) Explain supervisor call (SVC interrupt) on SIC/XE machine. (8 Marks)
- (c) Write a program for SIC/XE m/c to evaluate the expression $2A+6B=Z$. Assume whatever is necessary and mention it clearly. Give comments. (7 Marks)
3. (a) List all the assembler directives used in SIC/XE. Explain each one with example. (10 Marks)
- (b) Write the first pass for a two pass assembler taking literal operands. (10 Marks)
4. (a) Is more than two passes required for an assembler? Give example and support your statement. (Limitations should not be considered). (10 Marks)
- (b) Write an absolute loader algorithm.  (5 Marks)
- (c) How does the object program specify instruction to relocation loads? (5 Marks)
5. (a) Write a one-pass macro processor algorithm. (10 Marks)
- (b) List the different tables used for a macro processor. Explain their functions. (6 Marks)
- (c) Explain dynamic linking loader function briefly. (4 Marks)
6. (a) Give an example to differentiate between syntax and semantics. (5 Marks)
- (b) Write a recursive descent parsing algorithm for an assignment statement. (10 Marks)
- (c) List the major differences between interpreter and compiler. (5 Marks)

Contd.... 2

7. (a) Explain code-generation process for the assignment statement

$VARIANCE := SUMSQ \text{ DIV } 100 - MEAN * MEAN.$

(10 Marks)

(b) How does a compiler search for the identifier in nested block?

(5 Marks)

(c) Write the code generation for two dimensional array.

(5 Marks)

8. (a) Explain how the lexical analyzer recognize the IF statement.

IF ($X > n$)

{

:

}

(10 Marks)

(b) Write a Y_{acc} program to recognize a valid arithmetic expression that uses +, -, |, *. The tokens are passed from a lex program. (10 Marks)

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NEW SCHEME

CS51

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Fifth Semester B.E. Degree Examination, January/February 2005

Computer Science / Information Science and Engineering

Systems Software

Time: 3 hrs.]

[Max.Marks : 100

Note: Answer any FIVE full questions.

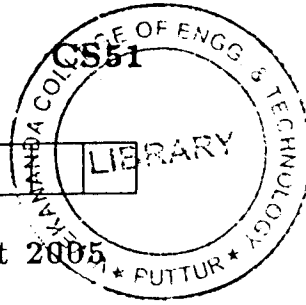
1. (a) Explain different instruction formats used in SIC/XE machine. (6 Marks)
- (b) With reference to pentium pro architecture, explain the following :
 - i) Memory ii) Register iii) Data format (8 Marks)
- (c) Suppose that Alpha is an array of 100 words, write a sequence of instruction for SIC to set all 100 elements to zero. (6 Marks)
2. (a) Bring out the differences between CISC & RISC. (4 Marks)
- (b) Enlist the various assembler features that are machine dependent and machine independent. Explain any one of them from each. (10 Marks)
- (c) Write a note on MASM assembler. (6 Marks)
3. (a) Give the format for the following record necessary to obtain object code:
 - Header record
 - Text record
 - Refer record
 - Define record
 - Modification record (revised)
 - End record(12 Marks)
- (b) With an example explain how program linking can be done. (8 Marks)
4. (a) With figure explain how loading & calling of a subroutine can be done using dynamic linking. (8 Marks)
- (b) Explain with example concatenation of macro parameter and generation of unique labels. (8 Marks)
- (c) What is the problem in invocation of macros within macros? Explain with an example. (4 Marks)
5. (a) What are the advantages & disadvantages of line-by-line microprocessor? (8 Marks)
- (b) Explain the lexical analysis phase of compiler with example. (10 Marks)
- (c) Give BNF grammar to recognise the following statements used in Pascal program :
 - i) the assignment statement
 - ii) Read statement(4 Marks)

6. (a) Explain operator-precedence parsing with an example. (10 Marks)
- (b) Explain briefly the following storage allocation used in compilation
- i) static storage allocation
 - ii) automatic storage allocation. (6 Marks)
- (c) Briefly explain Debugging functions. (4 Marks)
7. (a) Explain the meta characters used in regular expression with an example. (8 Marks)
- (b) Explain the conflicts in YACC with example. (6 Marks)
- (c) Write YACC program to check whether the given string $b^n a^n (n > 0)$ is accepted by the grammer or not. (6 Marks)
8. Write short notes on the following : (5×4=20 Marks)
- i) Compiler - compiler
 - ii) AIX - assembler
 - iii) ELENA macro processor
 - iv) Linkage editor

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NEW SCHEME

USN



Fifth Semester B.E. Degree Examination, July/August 2005

Computer Science / Information Science and Engineering

System Software

Time: 3 hrs.]

[Max.Marks : 100

Note: Answer any FIVE full questions.

1. (a) Explain data format, instruction format and addressing modes of SIC/XE machine architecture. (10 Marks)
- (b) What are the fundamental functions that any assembler must perform? With suitable example explain any six assembler directives. (10 Marks)
2. (a) Explain the two major internal data structures used in simple assemblers. Give reason for using that data structures. (10 Marks)
- (b) With required data structures & processing logic, explain the implementation of literals within an assembler. (10 Marks)
3. (a) Explain the structure and design of one pass assemblers. (10 Marks)
- (b) Explain the two methods for specifying relocation as a part of object program. (10 Marks)
4. (a) What do you mean by dynamic linking? Explain the process of loading and calling of subroutine using dynamic linking. (10 Marks)
- (b) What is an interactive editor? Explain the structure of a typical editor. (10 Marks)
5. (a) Explain the different debugging functions and debugging capabilities. (10 Marks)
- (b) What is the work of microprocessors? Explain the basic concept of macro processing. (10 Marks)
6. (a) Explain the basic functions of a simple one-pass compiler in brief. (10 Marks)
- (b) What is compiler - compilers? Explain the process of using typical compiler-compiler. Mention advantages & disadvantages. (10 Marks)

Contd.... 2

7. (a) What is a regular expression? Briefly explain all the characters that form regular expression. (14 Marks)

(b) Explain the three basic sections of lex program. (8 Marks)

8. Write a short note on the following :

a) RISC V/s CISC

b) SPARC assembler

c) Bootstrap loaders

d) Block structured languages

(4×5=20 Marks)

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NEW SCHEME

Reg. No.

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Fifth Semester B.E. Degree Examination, January/February 2006

**Computer Science/Information Science and Engineering
Systems Software**

Time: 3 hrs.)

(Max.Marks : 100)

Note: Answer any FIVE full questions.

1. (a) With reference to SIC/XC machine architecture explain
 - i) Instruction formats ii) addressing modes
 - iii) Data formats ii) Register organisation

(10 Marks)
- (b) Differentiate between CISC and RISC machine architecture. (4 Marks)
- (c) Suppose that ALPHA is an array of 100 words. Write a sequence of instruction for SIC/XC to set all 100 elements of the array to 0. Use immediate addressing and register to register instructions to make process as efficient as possible. (6 Marks)
2. (a) What are assembler directives? Give examples. (2 Marks)
- (b) Explain the algorithm for one pass of two pass assembler. (10 Marks)
- (c) What is the need for relocation of the program? With an example explain how relocation can be done. (8 Marks)
3. (a) Briefly explain a simple boot-strap loader with an algorithm. (8 Marks)
- (b) Explain with example the data structures used for a linking loader. (6 Marks)
- (c) With sketch explain how object program can be processed using linkage editor. (6 Marks)
4. (a) List the different tables used for a macro processor. Explain their functions. (6 Marks)
- (b) With an example explain conditional macro expansion. (6 Marks)
- (c) Write a note on processing macro within language translators. (8 Marks)
5. (a) With suitable example explain lexical analysis phase of a compiler. (10 Marks)
- (b) Describe the code generation for a read statement. (10 Marks)
6. (a) Explain the structure of lex program with example. (6 Marks)
- (b) Write a YACC program to recognize the grammar $a^n/n > 0$. (8 Marks)
- (c) Explain with an example reduce-reduce conflicts and shift reduce conflicts. (6 Marks)

Contd.... 2

7. (a) Write a note on P-code compiler.

(6 Marks)

(b) List the important tasks to be accomplished by a text editor for an interactive user - computer dialogue.

(4 Marks)

(c) With figure explain the structure of an editor.

(10 Marks)

8. Write short notes on :

(a) SPARC assembler

(b) Program blocks

(c) MASM macro processor

(d) Dynamic linking.

(5 × 4 = 20 Marks)

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NEW SCHEME

**Fifth Semester B.E. Degree Examination, July 2006
CS / IS**

System Software

[Max. Marks: 100

Time: 3 hrs.]

Note: 1. Answer any FIVE questions.

- 1 a. Briefly explain architecture – registers, instruction format, status word and addressing mode of SIC machine. (10 Marks)
- b. Explain the following for Pentium pro architecture : (06 Marks)
i) Memory ii) Data formats iii) Instruction formats. (04 Marks)
- c. Explain any 4 assembler directives of SIC/XE with examples. (04 Marks)
- 2 a. Write an SIC/XE assembly language program to perform addition of two arrays of 100 words starting at locations ARRAYA and ARRAYB and store the resulting array at location ARRAYC. (08 Marks)
- b. Explain various addressing modes used in SIC/XE machine with examples. (07 Marks)
- c. Briefly explain program relocation advantages and disadvantages. (05 Marks)
- 3 a. Write algorithm of Pass2 of two-pass assembler. (10 Marks)
- b. Give the difference between program blocks and control sections and explain in detail processing of control sections. (10 Marks)
- 4 a. Explain the functions of loader. Also write an SIC/XE assembly language program for bootstrap loader. (08 Marks)
- b. Explain various data structures used for a linking loader. (07 Marks)
- c. With examples explain any 5 loader options. (05 Marks)
- 5 a. With a neat block diagram explain working of text editor. (10 Marks)
- b. Explain the functions and capabilities of debugging. (10 Marks)
- 6 a. Define macro. Write algorithm for one pass macroprocessor and explain. (10 Marks)
- b. Explain the following with examples. (10 Marks)
i) Concatenation of macro parameters.
ii) Generation of unique labels.
- 7 a. Define parsing and explain with examples various problems that are encountered in recursive descent parsing. (06 Marks)
- b. With examples explain any two machine independent optimization techniques. (08 Marks)
- c. Write code generation routine for Pascal READ statement. (06 Marks)
- 8 a. Briefly explain P-code compilers with a neat block diagram. (06 Marks)
- b. Explain Parser-Lexer communication. (05 Marks)
- c. Describe the YACC specification file. (09 Marks)

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NEW SCHEME

Fifth Semester B.E. Degree Examination, Dec. 06 / Jan. 07
CS / IS

System Software

Time: 3 hrs.]

[Max. Marks:100

Note : Answer any FIVE full questions.

1.
 - a. Bring out the difference between system software and application software. (04 Marks)
 - b. Explain SIC/XE machine instruction formats and all addressing modes. by clearly indicating setting of different flag bits. (10 Marks)
 - c. Suppose that RECORD contains a 100 byte record. Write a subroutine for SIC/XE that will write this record on to device 05. Use immediate addressing and register-to-register instructions to make the subroutine as efficient as possible. (06 Marks)

2.
 - a. Write and explain the algorithms of pass1 of two-pass assembler. (10 Marks)
 - b. Generate the machine code for the following :
 - i) +JSUB RDREC
 - ii) STL RETADR
 - iii) LDB #LENGTH
 Assume the opcode for :
 JSUB = 48H, STL = 14H and LDB = 68H
 The location counter value for :
 RDREC = 1036H, RETADR = 0030H and LENGTH = 0033H (10 Marks)

3.
 - a. Generate the object code for the program shown below :


```

LDX #0
LDT #100
Loop : TD INDEV
      JEQ Loop
      RD INDEV
      STCH RECORD, X
      TIXR T
      JLT Loop
INDEV BYTE X 'F1'
RECORD RESB 100
      END
          
```

 Assume starting address 1000H
 Opcode for mnemonics are as follows :
 LDX = 04H, LDT = 74H, TD = E0H, JEQ = 30H, RD = D8H, STCH = 54H,
 TIXR = B8H, JLT = 38H (10 Marks)
 - b. What is relocating loader? Explain the two methods for specifying relocation as a part of object program. (10 Marks)

4.
 - a. Differentiate between a linking loader and linkage editor, with the help of suitable diagrams. (10 Marks)
 - b. Explain a simple Boot-strap loader, with an algorithm or a source program. (10 Marks)

Contd.... 2

- 5 a. What is an interactive editor? Explain briefly, structure of a typical editor with the help of suitable block diagram. Also briefly discuss command language processor, traveling, editing, viewing and display functions. (12 Marks)
- b. Explain the different debugging functions and debugging capabilities. (08 Marks)
- 6 a. With regard to the machine-independent macroprocessor features, explain the following :
- i) Conditional macro expansion (08 Marks)
- ii) Keyword macro parameters. (08 Marks)
- b. Write the algorithm for one pass macroprocessor and explain. Briefly discuss various data structures required for a design of a macro processor. (12 Marks)
- 7 a. Explain recursive decent parsing. Write recursive decent parse for a READ statement. (10 Marks)
- b. Briefly explain shift-reduce parsing. (05 Marks)
- c. Write explanatory notes on interpreter. (05 Marks)
- 8 a. Explain :
- i) P-code compilers (10 Marks)
- ii) Compiler-compilers (10 Marks)
- b. i) Explain the structure of LEX program.
- ii) Write a program in LEX to count the number of vowels and consonants in a given string. (10 Marks)

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NEW SCHEME

Fifth Semester B.E. Degree Examination, July 2007
CS / IS

System Software

Time: 3 hrs.]

[Max. Marks:100]

Note : Answer any FIVE full questions.

- 1 a. Explain all the addressing modes supported by SIC/XE by indicating the different b settings in an instruction. (08 Mark
- b. With reference to the VAX architecture, explain the following: (06 Mark
- i) Memory ii) Registers iii) data formats.
- c. Suppose a RECORD contains 100 byte record, write a subroutine for SIC/XE th will write this record into the output device 05. (06 Mark
- 2 a. Write an algorithm for a two pass SIC assembler. (12 Mark
- b. What is the difference between literal and immediate operand. How does assembler handle the literal operands? (04 Ma
- c. Explain the following assembler directives with example each: (04 Mar
- i) EQU ii) BASE iii) START iv) RESB.
- 3 a. Explain how relocation is implemented by relocating loader. (06 Mar
- b. Explain the algorithm for a linking loader. (10 Mar
- c. What is the difference between linkage editor and linking loader? (04 Mar
- 4 a. Explain the various data structures used in the implementation of one pass mac processor. (10 Mar
- b. What is conditional macro expansion and how it is implemented? (10 Mar
- 5 a. Write recursive-parsing algorithm for assignment statement. (12 Mar
- b. Discuss the different possibilities for performing machine dependent c optimization. (08 Mar
- 6 a. Explain the issues involved in compiling block-structured languages. (10 M
- b. Explain the structure of text editor. (10 Mar
- 7 a. Discuss some of the ways of performing storage allocation for a compiled progr (10 Mar
- b. Explain briefly the debugging functions. (06 Mar
- c. Explain the structure of a lex program. (04 Ma
- 8 Write short notes on the following:
 - a. Multi-pass assemblers
 - b. SPARC assemblers
 - c. Recursive macro expansion
 - d. Bootstrap loader. (20 Ma

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Fifth Semester B.E. Degree Examination, Dec. 07 / Jan. 08
System Software

Max. Marks:100

Time: 3 hrs.

Note : Answer any FIVE full questions.

- 1 a. With examples, show the target address calculation with different addressing modes of SIC/XE machine. (10 Marks)
b. Discuss about memory, addressing modes, registers and data formats of CRAY-T3E machine. (10 Marks)
- 2 a. List various data structures used in the assembling process. With an algorithm explain the usage of these data structures in pass-two of a two-pass assembler. (10 Marks)
b. Show the structure of a head record, text record and modification record taking one example for each. (06 Marks)
c. What is LTOrg? When is it used? Explain with an example. (04 Marks)
- 3 a. What is a program block? How multiple program blocks are handled by assemblers? (10 Marks)
b. Compare a two-pass assembler with a single pass assembler. How forward references are handled in one-pass assembler? (10 Marks)
- 4 a. What are the basic functions of a loader? Develop an algorithm for a bootstrap loader. (08 Marks)
b. How relocation is done using bit masking and modification records? Explain. (04 Marks)
c. Explain the procedure of program linking when the subprograms use external references. (08 Marks)
- 5 a. What is a macro? Develop a program for processing macro definitions and macro calls. (12 Marks)
b. With examples explain how unique labels are generated during macro expansions. (08 Marks)
- 6 a. What are the main functions of a compiler? List all phases of a compiler. (04 Marks)
b. Develop an algorithm for parsing arithmetic expressions using recursive descent parser. (10 Marks)
c. Write a note on intermediate code generation. (06 Marks)
- 7 a. Explain the structure of Lex and YACC programs. Show the procedure to get a parser using Lex and YACC Tools. (08 Marks)
b. Explain how grammar conflicts are handled by YACC? Write a YACC program for a desktop calculator. (12 Marks)
- 8 Write short notes on:
a. Editors
b. CISC machines
c. Conditional macro expansion
d. Automatic library search. (20 Marks)

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Fifth Semester B.E. Degree Examination, Dec.08/Jan.09
System Software

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting
at least TWO questions from each part.**

PART – A

1. a. Bring out the differences between Application software and System software. (04 Marks)
- b. Explain SIC/XE machine instruction formats and all addressing modes by clearly indicating the setting of different flag bits. (10 Marks)
- c. Write a subroutine in SIC/XE to read a 100-byte record from a device 'F5' into BUFFER. Use immediate and register-to-register instructions. (06 Marks)
2. a. Write and explain the algorithm of PASS-1 of two-pass assembler. (10 Marks)
- b. Generate the complete object program for the following assembly level program.

	SUM	START	0
	FIRST	CLEAR	X
		LDA	#0
		+LDB	#TOTAL
		BASE	TOTAL
LOOP		ADD	TABLE, X
		TIX	COUNT
		JLT	LOOP
		STA	TOTAL
	COUNT	RESW	1
	TABLE	RESW	2000
	TOTAL	RESW	1
		END	FIRST

Assume below opcodes (all in hexadecimal)

CLEAR – B4	LDA – 00	LDB – 68	ADD – 18
TIX – 2C	JLT – 38	STA – 0C	

(10 Marks)

3. a. Distinguish between literal and immediate operands. How does the assembler handle the literal operand? (04 Marks)
- b. Compare a two-pass assembler with a one-pass assembler. How forward references are handled in one-pass assemblers? (10 Marks)
- c. Write a note on MASM assembler. (06 Marks)
4. a. Give and explain the algorithm or source program for a simple Bootstrap loader. (08 Marks)
- b. Distinguish between linking loader and linkage editors. (04 Marks)
- c. Explain dynamic linking with suitable diagrams. (08 Marks)

PART – B

5. a. Explain the structure of a text editor with a neat diagram. (10 Marks)
- b. Explain the functions and capabilities of an interactive debugging system. (06 Marks)
- c. Write a note on the aspect of user-interface criteria. (04 Marks)
6. a. What are the basic functions of macroprocessor? Explain the various data structures used in the implementation of a one-pass macroprocessor. (10 Marks)

- b. Using the following definition, expand the following macro calls, called in sequence.

(i) LABEL RDBUFF F2, BUFFER, LENGTH, (04, 12)

(ii) RDBUFF OE, BUFF, RLENG, , 2048

```

RDBUFF MACRO &INDEV, &BUFADR, &RECLTH, &EOR, &MAXLTH
&EORCT SET %NITEMS (&EOR)
        CLAER X
        CLEAR A
        IF (&MAXLTH EQ ' ')
        +LDT #4096
        ELSE
        +LDT #&MAXLTH
        ENDIF
$LOOP TD =X '&INDEV'
      JEQ $LOOP
      RD =X '&INDEV'
&CTR SET 1
      WHILE (&CTR LE &EORCT)
      COMP =X '0000 &EOR[&CTR]'
      JEQ $EXIT
&CTR SET &CTR+1
      ENDW
      STCH &BUFADR, X
      TIXR T
      JLT $LOOP
$EXIT STX &RECLTH
      MEND

```

(07 Marks)

- c. Write a short note on 'Keyword macro parameters'.

(03 Marks)

- 7 a. List and explain the different design options for a macro processor.

(12 Marks)

- b. Write a short note on 'Parser – lexer communication'.

(03 Marks)

- c. Write a LEX program to count the number of vowels and consonants in a given string.

(05 Marks)

- 8 a. Explain regular expressions in UNIX with proper examples.

(06 Marks)

- b. Explain the structure of a YACC program.

(06 Marks)

- c. Give the LEX and YACC specifications to recognize parenthesized arithmetic expressions.

(08 Marks)

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Fifth Semester B.E. Degree Examination, Dec.09/Jan.10
System Software

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, choosing at least two from each part.

PART-A

- 1 a. What is system software? Differentiate it from application software. (06 Marks)
- b. Explain the instruction formats and addressing modes of SIC/XE machine architecture. (10 Marks)
- c. Explain with an example, a simple input and output on SIC/XE machine architecture. (04 Marks)
- 2 a. What are the fundamental functions of any assembler? With an example, explain any six assembler directives. (10 Marks)
- b. Explain the data structures used in assembler algorithms. (06 Marks)
- c. What is program relocation? Explain the problems associated with it and their solutions. (04 Marks)
- 3 a. What are literals? Differentiate literals from immediate operands. (04 Marks)
- b. Explain the structure of load-and-go assembler. (06 Marks)
- c. Explain how multipass assembler handles the following forward reference.

1	HALFSZ	EQU	MAXLEN/2
2	MAXLEN	EQU	BUFEND-BUFFER
3	PREVBT	EQU	BUFFER - 1
4	BUFFER	RESB	4096
5	BUFEND	EQU	*

Assume that, when assembler goes to line 4, location counter contains 1.34(hex). (10 Marks)
- 4 a. Briefly explain the boot strap loader, with the algorithm. (10 Marks)
- b. With a diagram, explain how object program can be processed using linkage editor. (10 Marks)

PART-B

- 5 a. What is an interactive editor? Explain the typical editor structure. (10 Marks)
- b. Explain the different debugging functions and capabilities. (10 Marks)
- 6 a. Explain the data structures involved in macroprocessor algorithms. (06 Marks)
- b. Explain the advantages and disadvantages of general purpose macroprocessors. (08 Marks)
- c. Explain the features of MASM macroprocessor. (06 Marks)
- 7 a. Explain three basic sections of a LEX program. (08 Marks)
- b. What is regular expression? Briefly explain all the characters that form regular expression. (12 Marks)
- 8 a. What is shift/reduce parsing? Explain the parsing of the input "fred = 12 + 13" and represent it using parse tree. (10 Marks)
- b. Explain the ambiguity while parsing $2 + 3 \times 4$. Explain the solution for it. (10 Marks)

Important Note: 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or Equations written eg. 42+8=50, will be treated as malpractice.

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Fifth Semester B.E. Degree Examination, May/June 2010
Systems Software

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

- 1 a. List out registers used in SIC machine architecture along with their use. (07 Marks)
- b. Write a sequence of instructions for SIC/XE to set ALPHA equal to GAMMA* BEETA - 9. (Use register operation). (05 Marks)
- c. Write a program in both SIC and SIC/XE to copy a character string 'System Software' to another character string. (08 Marks)

- 2 a. Define the following with an example : i) Operation code table ii) Symbol table. (06 Marks)
- b. Generate the complete object program for the following assembly level program with the symbol table. Assume : (14 Marks)

CLEAR = B4	LDT = 74	TD = EO	JEQ = 30
TIXR = B8	JLT = 38	RSUB = 4C	LDCH = 50
WD = DC	X = 1	T = 5	

WRREC	START	105D
	CLEAR	X
	LDT	LENGTH
WLOOP	TD	OUTPUT
	JEQ	WLOOP
	LDCH	BUFFER, X
	WD	OUTPUT
	TIXR	T
	JLT	WLOOP
	RSUB	
OUTPUT	BYTE	X '05'
BUFFER	RESB	400
LENGTH	RESB	2
	END	WRREC

- 3 a. Describe how the assembler handles literal operands. (06 Marks)
- b. Give the format for DEFINE and REFER records. (06 Marks)
- c. Explain load and go assembler, with an example. (08 Marks)
- 4 a. With the help of an example, show how relocation and linking operations are performed. (12 Marks)
- b. Enlist any four different loader option commands. (04 Marks)
- c. Define the following : i) Linking loader ii) Dynamic linking. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. 2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42 & = 50, will be treated as malpractice.

PART - B

- 5 a. List the important four tasks to be accomplished by a text editor for an interactive user computer dialogue. (04 Marks)
- b. Discuss three basic types of computing environments for editors. (06 Marks)
- c. Define tracing and trace back in debugging functions. (04 Marks)
- d. Write a note on the concept of user interface criteria in a text editor. (06 Marks)
- 6 a. Write an algorithm for one pass macro processor. (10 Marks)
- b. RDBUFF HACRO & INDEV , & BUFADR , & RECLTH , & EOR (10 Marks)

```

& EORCT   SET      % N ITEMS ( & EOR)
          CLEAR    X
          CLEAR    A
          + LDT    # 4096
$ LOOP    TD      = X '& INDEV'
          JEQ     $ LOOP
          RD      = X '& INDEV'
& CTR     SET      1
          WHILE  ( & CTR LE & EORCT )
          COMP   = X '0000 & EOR [& CTR]'
          JEQ     $ EXIT
& CTR     SET      & CTR + 1
          END W
          STCH   & BUFADR, X
          TIXR   T
          JLT    $ LOOP
$ EXIT    STX     & RECLTH
          MEND

```

Expand the following macro invocation statements using the above given macro.

- i) RDBUFF F1, BUFFER, Length, (04, 12)
- ii) RDBUFF F1, BUFFER, Length
- 7 a. Write a note on ANSI C macro language. (05 Marks)
- b. Explain the following regular expressions with examples : (08 Marks)
- i) [] ii) { } iii) / iv) ()
- c. Explain various sections of a LEX specification using a basic word count program by reading from a file. (07 Marks)
- 8 a. Define YACC tools. What are the two types of conflicts in YACC? Give examples. (08 Marks)
- b. Write YACC program to validate a simple arithmetic expression involving operators +, -, *, /. (08 Marks)
- c. Define and explain the use of YY wva p(). (04 Marks)
