

**IS602**

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M S RAMAIAH INSTITUTE OF TECHNOLOGY

(AUTONOMOUS INSTITUTE, AFFILIATED TO VTU)

BANGALORE - 560 054

SEMESTER END EXAMINATIONS - MAY / JUNE 2014Course & Branch : **B.E. - INFORMATION SCIENCE & ENGG.**Semester : **VI**Subject : **System Software**Max. Marks : **100**Subject Code : **IS602**Duration : **3 Hrs****Instructions to the Candidates:**

- Answer one full question from each unit.

UNIT - I

1. a) Write an SIC program to copy the 16-byte character string "Welcome to MSRIT" to another. (06)
- b) 1. Illustrate the role of the flag bits 'n', 'i', 'x' in addressing modes of format 3 and 4 SIC/XE instructions. (10)
2. Design the pass-1 of the two-pass assembler.
- c) Suppose COPY is the name of the program written for SIC/XE machine and its length is 001B. Write the object program for the COPY which has the following machine codes. Generate the object program for the following object code. Starting address of the following is 105D. (04)

Location	Object Code
105D	B410
105F	774000
1062	E32011
1065	332FFA
1068	53C003
106B	DF2008
1070	75101000
1074	4F0000
1077	05

2. a) Discuss the SIC Machine architecture. (06)
- b) Generate the object code for each instruction of the SIC/XE program given below using a 2-pass assembler. (09)
The Opcodes are: LDA=00, ADD=18, STA= 0C,
CLEAR=B4,SUB=1C,LDB=68.
START 0
first LDA @t1
ADD # t2
STA t3, X
CLEAR A, S
+SUB t4
LDB #5
t1 RESW 4
t2 RESB 6
t3 WORD 9
t4 BYTE X'1234'
END
- c) With an example, explain how the program relocation problem can be solved for a SIC/XE object program. (05)



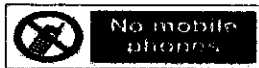
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UNIT - II

3. a) Indicate the purpose of the following assembler directives (05)
1. LTORG 2.CSECT 3. EQU 4. USE 5. BASE
- b) Generate the object program for the following SIC/XE program. Given that (10)
the opcode of LDA = 00, LDT=74, LDX = 04.
PROGA START 0
 EXTDEF LA,EA
 EXTREF LB,EB
0020 R1 LDA LA
0023 R2 +LDT LB+4
0027 R3 LDX #EA - LA
002A LA EQU *
002A R4 WORD EA-LA
002D EA EQU *
002D R5 WORD EA-LA-(EB-LB)
0030 R6 WORD LB-LA
 END R1
PROGB START 0
 EXTDEF LB,EB
 EXTREF LA,EA
0036 R1 + LDA LA
003A R2 LDT LB+4
003D R3 +LDX #EA - LA
0040 LB EQU *
0040 R4 WORD EB-LB
0043 EB EQU *
0043 R5 WORD EA-LA-(EB-LB)
0046 R6 WORD LB-LA
 END R1
- c) With a flowchart discuss the processing of an object program using linkage editors. (05)
4. a) Define absolute loader. Design the algorithm for absolute loaders. (06)
b) Provide the multi-pass assembler operations for the following sequence of symbol-defining statements that involve forward references. (06)
HF EQU MAX
MAX EQU BUF-BU
PRE EQU BUF-1
BUF RESB 1024
BU EQU *
Location value for BUF is 1034.
- c) Describe the process of loading and calling of a subroutine using dynamic linking. (08)

UNIT - III

5. a) Discuss the following with respect to lex and yacc: (05)
i) yywrap() ii) yylex()
- b) Write a lex program to count the number of words, capital letters, small letters, numbers, special characters and lines in a given input file. (08)
- c) With an example explain what YACC cannot parse. (07)
6. a) Write a YACC program to evaluate an valid arithmetic expression. (10)
Note: Write the LEX part of the program. Consider precedence and associativity.

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(06)

- b) Given a grammar of the form
stmt \rightarrow Name = expr
expr \rightarrow Number
| expr + Number
| expr - Number

Where stmt and expr are non terminal symbols and Name and Number are terminal symbol.

Explain shift reduce parsing for the input $y=30-10+25-5$. Also obtain parse tree.

- c) Provide the lex specification for decimal numbers.

(04)

UNIT - IV

7. a) Expand the following macro invocation statements using the given macro definitions-

(08)

1. Sum AETA

Macro definition

```
SUM      MACRO  &VAL
          LDA    x&VAL->4
          ADD    X&VAL->5
          ADD    X&VAL->3
          STA    X&VAL->2
```

2. WHI f1,R, (40,60)

Macro definition

```
WHI      MACRO  &I, &Len, &List
&C1      SET    %NITEMS(&List)
          +LDT   #4096
$Loop    TD     =X'&I'
          JEQ    $Loop
          RD     =X'&I'
&C2      SET    1
          WHILE ( &C2 LE &C1)
          COMP   =X'0000&List[&C2]'
          JEQ    $Exit
&C2      SET    &C2+1
          ENDW
          TIXR   T
          JLT    $Loop
&Exit    STX    &Len
          MEND
```

- b) Explain the basic compiler functions.

(06)

- c) Write a note on General-purpose macro processors.

(06)

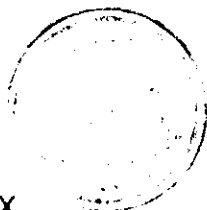
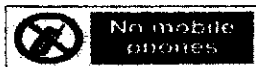
8. a) What are the data structures used in one-pass macroprocessor. Discuss with an example.

(06)

- b) Given the following macro definition

(06)

```
RDB      MACRO  &INDEV=F1, &EOR = , &MAX = 4096
          IF    (&EOR NE '')
&EORCK   SET    1
          ENDIF
          CLEAR X
          CLEAR A
          IF    (&EORCK EQ 1)
          LDCH  =X'&EOR'
          ENDIF
```



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```
+LDT  #&MAX
$LOOP TD  =X'&INDEV'
JEQ  $LOOP
MEND
```

Indicate the macro expansion performed for the macro invocation

1. RDB EOR=04 followed by
2. RDB INDEV=F3,MAX=2048

- c) Illustrate the concept of Lexical Analysis with an example. (08)

UNIT - V

9. a) Generate the intermediate code for the following instructions using quadruples. (08)

PROGRAM STATS

VAR

SUM, SUMSQ,I,VAL:INTEGER

BEGIN

SUM=0; SUMSQ = 0;

FOR I:= 1 TO 100 DO

BEGIN

READ(VAL);

SUM =SUM + VAL;

SUMSQ = SUMSQ + VAL + VAL;

END

WRITE (SUM,SUMSQ);

END.

- b) Explain block-structured languages with a suitable example. (06)

- c) Show and elaborate the automated compiler construction using a compiler-compiler. List its advantages. (06)

10. a) 1. Generate code for the following array reference (10)

B: ARRAY[0..3,1..6] OF INTEGER

B[I,J] := 5;

2. Rearrange the following quadruples for code optimization

* MEAN MEAN i_2

DIV SQ #100 i_1

- i_1 i_2 i_3

:= i_3 VARIANCE

- b) Describe the Recursive invocation of a procedure using automatic storage allocation. (10)
