SRN 0 1 F E 1 8 B C S 1 2 3

V Semester B.E. Examinations
(Computer Science & Engineering)
System Software (17ECSC302)

Duration: 3 hours **Max. Marks: 100**

Note: ***i) Answer any TWO full questions from UNIT-I, any TWO full questions from UNIT-II and any ONE full question from UNIT-III.***

UNIT-I

Marks

1 a Explain the working of two-pass assembler. (10 Marks)

b Assume that ALPHA is an array of 100 words. Write a sequence of instructions for SIC/XE to set all 100 elements of the array to 0. Use immediate addressing and register to register instructions to make the process as efficient as possible. (10 Marks)

2 a Generate the object program for the following SIC/XE program by constructing necessary tables.

SIC/XE Program			OPTAB	
COPY	START	1000	LDX	04
READ	LDX	#0	LDT	74
	LDT	#100	TD	E0
RLOOP	TD	=X'F1'	JEQ	30
	JEQ	RLOOP	RD	D8
	RD	=X'F1'	STCH	54
	STCH	RECORD,X	TIXR	B8
	TIXR	T	JLT	38
	JLT	RLOOP		
	LTORG			
RECORD	RESB	100		
	END			

(10 Marks)

b Describe the following features of SIC/XE machine architecture.
i.Addressing Modes. ii.Instruction Formats. (10 Marks)

3 a I. Immediate operand and literals are both ways of specifying an operand value in a source statement. What is the difference between immediate operand and literals?

II. What is the difference between the following sequences of statements with regard to addressing modes?

a)	LENGTH	RESW	1
		LDB	#LENGTH
b)	LENGTH	EQU	4096
		LDB	#LENGTH

(08 Marks)

b/ Given the contents of registers PC=4000, B=8000, X=0080. Find the Target Address for the following machine instructions. (06 Marks)

I. 022030 II. 010030 III. 003600 IV. 4B101036

c I.Could the assembler decide for itself which instruction need to be assembled using extended format?

II. Suppose in SIC/XE program with literals, LTORG is not specified by programmer then where all the literals will be defined? (06 Marks)

UNIT-II

4 a Discuss the working of One-Pass Load and Go assembler with example. (10 Marks)

b Generate the object code and also write suitable modification records for the following program.

OPTAB	
LDA	00
LDT	74

LOCCTR	LABLE	OPCODE	OPERAND
0000	PROGA	START	0
		EXTDEF	LISTA,ENDA
		EXTREF	LISTB,ENDB,LISTC,ENDC
0003	REF1	LDA	LISTA
0006	REF2	+LDT	LISTB+4
000A	REF3	LDA	#ENDA-LISTA
000D	LISTA	EQU	*
0010	ENDA	EQU	*
0010	REF4	WORD	ENDA-LISTA+LISTC
0013	REF5	WORD	ENDC-LISTC-10
		END	

(10 Marks)

5 a
```
H^PROGA^000000^000063
D^LISTA^000040^ENDA^000054
T^000054^0F^000014^FFFFF6^00003F^000014^FFFFC0
M^000060^06^+LISTB
M^000060^06^-PROGA
H^PROGB^000000^00007F
D^LISTB^000060^ENDB^000070
T^000070^0F^000000^FFFFF6^FFFFFF^FFFFF0^000060
M^000079^06^+ENDA
M^000079^06^-LISTA
```
With a neat diagram, perform linking and relocation operation at address 000060 of PROGA and at address 000079 of PROGB. Assume that the linking loader gets a startt address as 5000H from operating system. (10 Marks)

b Explain the machine independent loader features. (10 Marks)

6 a Explain the working of multi-pass assembler for the following sequ
code.

	TAB1	EQU	TAB~~4~~2+TAB3
	TAB2	EQU	TAB4/2
	TAB3	EQU	TAB4-1
	CAP1	EQU	CAP2+CAP3
1036	CAP2	RESB	4096
	TAB4	RESB	2
	CAP3	EQU	*

(06 Marks)

b Modification records and Bit-masks are the two approaches of performing relocation. Illustrate these with examples. (06 Marks)

c List and explain all the loader design options with an example. (10 Marks)

UNIT-III

7 a Given the following input to the macro processor.

```
ADDS    MACRO     &A1,&A2,&A3
        STA       &A1
        IF        (&A1 EQ 5)
        IF        (&A2 NEQ ' ')
        ADD       &A2
        ELSE
        SUB       &A3
        ENDIF
        ELSE
        LDA       &A3
        STA       GAMMA
        ENDIF
        MEND
```

Expand the following invocations.
i.ADDS 5, , DELTA ii.ADDS 5, BETA, VAL iii.ADDS 10, , TEMP (10 Marks)

b I. Why relative addressing was used instead of labels in macro processor?
Name the feature which solve this problem?
II. Write the One Pass macro processor algorithm (10Marks)

8 a List and explain the different phases of compiler with diagram. (10 Marks)

b Write and explain code generation routine for READ and WRITE statement.

There is only one happiness in
this life, to love and be loved.