

Reg. No. :

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**C 3196**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2008.

Third Semester

Computer Science and Engineering

CS 1203 — SYSTEM SOFTWARE

(Common to Information Technology)

(Regulation 2004)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the need for a modification record?
2. Draw the instruction formats of SIC computer.
3. Can an assembler have a single pass? What are the advantages and limitations?
4. What are the functions of EXTREF and LTORG assembler directives.
5. What is the meant by relocation? How does the assembler pass on this information to the loader?
6. What is a boot strap loader?
7. For a small code fragment to be used respectively in the program, how is it decided whether to implement it using a subprogram or macro?
8. How are local labels handled in macroprocessing?
9. What are the main functions accomplished by a typical debugger?
10. List down the user interface criteria.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Generate the object code for the following SIC source program.

Label	Operation	Operand	Opcode
SUM	START	1000	
FIRST	LDX	ZERO	04
LDA	ZERO		00
LOOP	ADD	TABLE, X	18
TIX	COUNT		2C
JLT	LOOP		38
STA	TOTAL		0C
RSUB			4C
TABLE	RESW	3000	
COUNT	RESW	1	
ZERO	WORD	0	
TOTAL	RESW	1	
END	FIRST		

- (ii) Discuss the SIC/XE architecture, explaining in detail the addressing modes and the instruction formats.

Or

- (b) Generate the object code for the following SIC/XE source program.

Label	Operation	Operand	Opcode
SUM	START	0	
FIRST	LDX	#0	04
	LDA	#0	00
	+LDB	#TABLE2	68
LOOP	ADD	TABLE, X	18
	ADD	TABLE2, X	18
	TIX	COUNT	2C
	JLT	LOOP	38
	+STA	TOTAL	0C
	STA	@TOTAL	

Label	Operation	Operand	Opcode
	RSUB		4C
COUNT	RESW	1	
TABLE	RESW	3000	
TABLE2	RESW	3000	
TOTAL	RESW	1	
	END	FIRST	

12. (a) Discuss the detailed design of pass 1 of a two-pass assembler. Mention clearly the formats of the data structures used. Include all the assembler directives that need to be processed in pass 1 in your design.

Or

- (b) Discuss the detailed design of pass 2 of a two-pass assembler. Mention clearly the formats of the data structures used. Indicate the inputs taken from pass 1 and the outputs generated by pass 2.

13. (a) Discuss the detailed design of a linking and relocating loader.

Or

- (b) Consider the following SIC/XE program :

```

0000   PROGA  START   0
                EXTDEF  VAR_1A, VAR_2A
                EXTREF  VAR_1B, VAR_2B

0050   REF1   LDA     VAR_1A - 48
0053   REF2   +LDT   (VAR_2B - VAR_1B) + VAR_2A
0090   VAR_1A EQU   *
00C2   VAR_2A EQU   *
00D0   REF3   WORD   VAR_1B + VAR_1A + 20
                END    REF1
-----
0000   PROGB  START   0
                EXTDEF  VAR_1B, VAR_2B
                EXTREF  VAR_1A, VAR_2A

```

```

0030    REF1    +LDA    VAR_1A - 48
0034    REF2    +LDT    (VAR_2B - VAR_1B) + VAR_2A
0080    VAR_1B EQU      *
00A5    VAR_2B EQU      *
00C2    REF3    WORD    VAR_1B + VAR_1A + 20
        END

```

The opcode for LDA is 00 and the opcode of LDT is 74. Show the object programs generated by the assembler for these two programs. Show how these two programs will appear in memory after linking and loading, assuming the program starting address is 2000.

14. (a) Discuss the algorithm for a one-pass macro processor.

Or

- (b) Write notes on (i) conditional macro expansion, (ii) ANSI C macro processing.

15. (a) Discuss clearly the design of the Functional components of a text editor.

Or

- (b) List down the options provided by any debugger that you have used. Discuss briefly the possible design of this debugger.