Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech Degree Examination December 2021 (2019 scheme)

Course Code: CST305

Course Name: SYSTEM SOFTWARE

Max. Marks: 100 Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks) Marks

1		Explain the different I/O instructions in SIC.	3
2		Describe the different instruction formats available in SIC/XE machine.	3
3		With a simple example describe what is meant by forward reference and how is it handled in one pass assembler.	3
4		Write a sequence of instructions for SIC/XE to set ALPHA equal to 4*BETA-9. Use immediate addressing modes for constants and assume ALPHA and BETA to be floating point numbers.	3
5		Give the structure and purpose of Modification record and Define record.	3
6		How is a feature of an assembler categorized as machine dependent or machine independent? Support your answer with an example for each category.	3
7		Describe the structure and the use of the ESTAB data structure used in the two pass linking loader.	3
8		Outline the need and functions of a bootstrap loader.	3
9		List the three data structures used in one pass macro processor and describe its usage.	3
10		With a simple diagram illustrate the communication pathway of an application program to a device through a device driver.	3

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

11	a)	Compare the SIC and SIC/XE architecture with respect to: (i) Registers (ii) Instruction Formats (iii) Data Formats Supported	6
	b)	Illustrate the roles and functions of Operating System, Assembler, Compiler and Linker in a modern computer system.	8

12 a) Compare the Input-Output capabilities of the SIC and SIC/XE machine. Also list the I/O instructions available in SIC and SIC/XE machines. 6

b) Describe the use of n,i,x,b,p and e bits in the SIC/XE instruction format. Write the binary combination for these bits such that the resultant target address would be as below and also state what would be the addressing modes for each. 8

i. (PC) + disp ii. (B) + disp iii. (PC) + disp + (X) iv. (B) + disp + (X)

Module -2

13 a) Outline in detail the function and algorithm for pass one of a two pass assembler. 8

b) Write a SIC program to perform linear search in an array of 100 elements. 6

14 a) Outline in detail the function and algorithm for the pass two of the two pass assembler. 8

b) Generate the assembled object program for the below SIC program. The machine code for the instructions used are: LDX – 04, LDA – 00, ADD – 18, TIX – 2C, STA – 0C, JLT – 38 and RSUB – 4C. Show the location counter value for each instruction. 6

```
SUM       START     4000
FIRST     LDX       ZERO
          LDA       ZERO
LOOP      ADD       TABLE,X
          TIX       COUNT
          JLT       LOOP
          STA       TOTAL
          RSUB
TABLE     RESW      2000
COUNT     RESW      1
ZERO      WORD      0
TOTAL     RESW      1
          END       FIRST
```

Module -3

15 a) Define Control Section. With an example illustrate how a control section is declared within an assembly program and what are the constituents of the object code program of a control section. 7

b) What is the need of relocation in assembly programs? With a small example illustrate how relocation is handled in assemblers. 7

16 a) Describe how the concepts of segments are handled in MASM assembler for 8086. Also compare near and far jump concept and its handling in MASM. 6

b) Define Program Blocks. With an example and diagram demonstrate how the different program blocks within an assembly program are organised within the 8

memory. Also mention how the object code program for a program block is organised.

Module -4

17	a)	Define Absolute loader and outline the algorithm for it.	6
	b)	Give the algorithm for the pass two of a two pass linker loader.	8
18	a)	Write the algorithm for the pass one of a two pass linker loader.	7
	b)	List the different machine dependent and machine independent features of a loader. Explain any two machine independent features.	7

Module -5

19	a)	State the algorithm for a one pass macro processor.	10
	b)	Distinguish between character and block device driver.	4
20	a)	With a neat diagram outline the structure of a text editor.	10
	b)	Compare induction and backtracking mode of debugging.	4

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