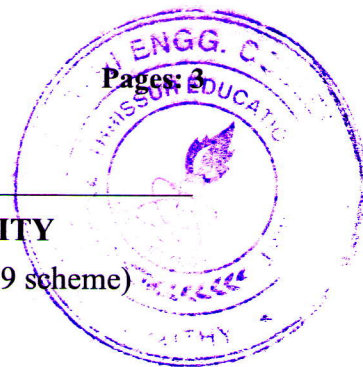


Reg No.: _____

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. | 3 |
| 5 | Use immediate addressing modes for constants and assume ALPHA and BETA to be floating point numbers. | 3 |
| 6 | Give the structure and purpose of Modification record and Define record. | 3 |
| 7 | How is a feature of an assembler categorized as machine dependent or machine independent? Support your answer with an example for each category. | 3 |
| 8 | Describe the structure and the use of the ESTAB data structure used in the two pass linking loader. | 3 |
| 9 | Outline the need and functions of a bootstrap loader. | 3 |
| 10 | List the three data structures used in one pass macro processor and describe its usage. | 3 |
| 11 | 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: | 6 |
| | | (i) Registers (ii) Instruction Formats (iii) Data Formats Supported | |
| | 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

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.

SUM	START	4000
FIRST	LDX	ZERO
	LDA	ZERO
b) 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

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

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|----|----|---|----|
| 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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