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B.Tech. Degree V Semester Regular Examination November 2021

CS 19-202-0502 SYSTEM PROGRAMMING (2019 Scheme)

Time: 3 Hours

Maximum Marks: 60

PART A (Answer *ALL* questions)

(8 × 3 = 24)

- I. (a) Suppose an assembly language allows the use of literals and literals can be allotted memory space either at the end of the program code or at places corresponding to "LTORG" statements in the program. Describe how this can be handled by an assembler.
- (b) Show the role of a *mnemonic table* in an assembler? What all information may be maintained in it? When is a mnemonic table built? Describe a possible organization of a mnemonic table
- (c) Briefly explain the phenomena of static and dynamic linking. Why is dynamic linking generally preferred?
- (d) How can *program relocation* be performed?
- (e) Why do programming languages provide the *macro* feature despite the procedure call mechanism? How does it affect the size and efficiency of the machine language program generated?
- (f) Give a small example to show the use of a *macro* in some hypothetical assembly language. Your example should contain *parameters* and *conditional expansion statements*.
- (g) Show how a virtual machine is differ to containers with diagram.
- (h) Briefly explain the user interface and runtime environment of an operating system.

PART B

(4 × 12 = 48)

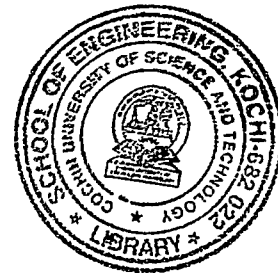
- II. (a) Given below is a program PROG that has been written using the SIC/XE machine. (8)

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LDT    NUM
LDA     ALPHA
ADDR   T, A
SUB     #8
STA     SUM1
LDA     GAMMA
ADDR   T, A
SUB     #12
STA     SUM2
ALPHA   RESW 1
SUM1    RESW 1
GAMMA   RESW 1
SUM2    RESW 1
NUW     RESW 1

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- (i) Study the program carefully and write mathematical expressions that correspond to the given code.



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- (ii) Assuming that it is to be loaded in memory from 0058 H, generate the corresponding addresses for each instruction and write the corresponding machine code. The operation codes for the instructions are LDT = 74, LDA = 00, ADDR = 90, SUB = 1C, STA = 0C and the addresses for registers A and T are 0 and 5 respectively.
- (iii) Write the corresponding text listing for the generated machine instructions.
- (b) Two passes are usually used to assemble an Assembler language program; explain briefly what is accomplished in each pass. (4)
- OR**
- III. (a) Draw the detailed Pass 2 flowchart of an assembler. (6)
- (b) Write the architecture of machine independent assembler features. (6)
- IV. (a) List and explain any five common loader options. (6)
- (b) Write the algorithm of GETC subroutine of a BOOTSTRAP LOADER? Explain its use. (6)
- OR**
- V. (a) Draw the detailed Pass 2 flowchart of a linking loader. (6)
- (b) With a neat diagram Show how linkage editor is differ to linking loader? Explain. (6)
- VI. (a) What are positional parameters, keyword parameters and expansion time variables in macros ? Give a sample example to show their usage. (6)
- (b) Define two macros of your choice to illustrate nested calls to these macros. Also show their corresponding expansion. (6)
- OR**
- VII. (a) Explain with an example how macros handle generation of unique labels. (4)
- (b) Draw a flowchart and explain simple one pass macro processor. (8)
- VIII. (a) List out the major functions of an operating system. (4)
- (b) Discuss about the various categories of operating systems with suitable diagrams. (8)
- OR**
- IX. (a) Explain the hierarchical structure of an operating system with diagrams. (4)
- (b) With the help of a neat diagram show how the distributed operating system is differed with network operating system. (8)
