53 (CS 501) SYPR

2018

SYSTEM PROGRAMMING

Paper : CS 501

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Question number **1** *is* ***compulsory****. Answer* ***any five*** *questions from rest.*

1. *(a)* Write True / False : 1×5=5

   (i) Delay in time is allowed in Hard RTOS.

   (ii) Before executing, a program must be loaded in RAM.

   (iii) MAR and MBR are the two registers used by memory in IBM 360.

   (iv) Group of 16-bits are called Full Word.

(v) MACRO is an abbreviation used for a particular set of instructions.

(b) Fill in the blanks : 1×5=5

(i) $(1011100111011000)_2 = (\_\_)_{16}$.

(ii) IBM 360 has ____ general purpose registers.

(ii) ____ is a register which maintains the states of program being executed.

(iv) The address of current instruction to be executed stored in ____.

(v) For the instruction
USING *, 15 the base register is ____ and the content of base register is ____.

(c) Short answer questions : 2×5=10

(i) What do you understand by the instruction BALR 15 ?

(ii) Suppose relative address 892 stores a value 20, write the machine level instruction to store this value in register.

(iii) Differentiate between pseudo-op and machine-op.

(iv) What is the use of base register and offset ?

(v) What do you understand by the instruction BASE equ 7 ?

(d) Create symbol table, literal table and base table for the following program : 5

```
CITKOK  START
BEGIN   BALR BASE
        USING BEGIN+2, BASE
LOOP    L    2, = F '50'
        A    2, DATA
        ST   2, DATA
        A    1, = F '40'
        BCT  3, LOOP
        LTORG
DATA    DC   F '4, 5, 6, 7, 8, 9, 10'
BASE    EQU  15
        END
```

2. (a) What do you understand by an Assembly Language and a Machine Language ?

(b) What is an Assembler ?

(c) Convert the program mentioned in question 1(*d*) into machine language code. Assume the registers as necessary. 4+3+8=15

3. *(a)* What do you understand by Relocation ?

(b) Explain One-Pass and Multi-Pass assemblers.

(c) Explain Pass-1 and Pass-2 of design of assembler with algorithms and flow chart as necessary.

2+3+10=15

4. *(a)* What is MACRO ?

(b) Consider the program :

```
A    1,   DATA 1
A    2,   DATA 1
A    3,   DATA 1
     :
     :
     :
A    1,   DATA 2
A    2,   DATA 2
A    3,   DATA 2
DATA 1 DC   F '45'
DATA 2 DC   F '46'
```

Write the MACRO code for the above instruction, so that you can call using MACRONAME with DATA as argument.

(c) Explain various features of MACRO.

2+5+8=15

5. *(a)* What is a loader ?

(b) What do you understand by loader scheme ?

(c) Explain various loading schemes mentioning their advantages and disadvantages.

3+2+10=15

6. *(a)* What are compilers and interpreters ?

(b) Explain various phases of a compiler with examples.

5+10=15

7. Write an Assembly Language program to add ten numbers stored in the contiguous memory location defined using symbol DATA DC F '10, 11,12, 13, 14, 15, 16, 17, 18, 19' and store the result in STORAGE DS F110 memory location. Use looping, index/base registers as appropriate and generate the symbol table, base table and machine equivalent code mentioning the Pass-1 and Pass-2 values. 15

8. Write short notes on : ***(any three)*** 5×3=15

(a) General Machine Architecture of IBM 360

(b) Storage format of IBM 360 data types

(c) High-Level Language

(d) Multiprogramming and Multiprocessing.
