SUBJECT: COMPUTER ENGINEERING: PAPER – I SET-A

Time: 3 hours Full Marks: 200

Note: Answer Question No. 1 and any four from the rest. All questions carry equal marks.

Q. No. 1. Attempt any 10 (ten) 10 X 4 = 40

a. Let P is a 16-bit signed integer. The 2's complement representation of P is $(F87B)_{16}$. Compute the 2's complement representation for 8*P.
b. If A, B, C are Boolean variables, then simplify the expression (A+B')(AB'+AC)
c. Write the syntax of the following constructs in C language:
   i. if-else-if ladder
   ii. Conditional operator
   iii. do-while loop
   iv. continue statement
c. What do you understand by saturated logic family? Mention the classification of saturated bipolar logic families.
d. Explain how dynamic linking can be implemented.
e. What is a full binary tree? How many nodes are there in a full binary tree with n leaves?
f. What is load-and-go assembler? How do assemblers handle forward reference instructions?
g. Explain linking loader and relative loader.
h. Discuss about linkage editor and interactive editor.
i. What is the definition of a data type in a programming language? What does it mean for a language to be strongly typed, statically typed? What prevents, say, C language from being strongly typed?
j. What is a JK flip-flop? How is it different from SR flip-flop? Explain how will you convert a JK flip-flop to operate as a T flip-flop.
k. What are the types of general purpose registers in 8085? Write about the different types of flags used in 8085 microprocessor.
l. What is a re-entrant routine in a programming language? Write four characteristics of a re-entrant routine.

Q. No. 2. Attempt any 8 (eight) 8 X 5 = 40

a. Find the complement of the functions F1 = x'yz'+ x'y'z and F2 = x(y'z' + yz) using De-Morgan's theorem.
b. Explain the structure of circular queue. Give example.
c. Write about RST pins in 8085 microprocessor.
d. What do you understand by the term *late binding* during the linking stage of a program execution? How is it different from *early binding*?
e. Write about *call by value* and *call by reference* technique used by a programming language. Give suitable examples to explain them.
f. What is a linking loader? What are data structures needed for linking loader?
g. Explain the direct addressing modes and indirect addressing modes of 8085 microprocessor with example.
h. What do you understand about inorder, preorder and postorder traversals of elements of a binary tree? Give suitable example to print the elements for inorder, preorder and postorder traverasal.
i. Draw the logic diagram of a 2-bit demultiplexer, whose single input line is steered to one of the four output lines depending on the state of the two control lines.
j. Explain the difference between quick sort and bubble sort methods.

Q. No. 3. Attempt any 5 (five) 5 X 8 = 40

a. Implement the Boolean Expression for EX–OR gate using NAND Gates. Explain the flip-flop excitation tables for JK flip-flop.

b. What do you understand by the scope of a variable? Explain with suitable example in C language.

c. What is the difference between the strings and character arrays in C language? State the advantages of using macro over a function.

d. Explain about the different pointer types used in Pascal? Mention about the types of Loops used in Pascal language?

e. What is shift register? Draw a 4-bit bi-directional shift register using D flip-flop.

f. What are the limitations of 8085 microprocessor? List the control and status signals available in 8085 microprocessor.

g. What is vectored interrupt? List out the maskable and non maskable interrupts available in 8085 microprocessor.

Q. No. 4. Attempt any 4 (four) 4 X 10 = 40

a. Write the algorithm for the following

i. Delete a node from any position of a given linked list.

ii. Add a new node in the second last position of a given list.

b. Explain with detail about pass1 assembler algorithm with example.

c. How schottky transistors are formed and state its use? List the different versions of TTL.

d. What are the types of TTL logic family? Explain each of them briefly.

e. Write about the addressing modes of 8085 microprocessor? List various instructions that can be used to clear accumulator in 8085 micrprocessor.

Q. No. 5. Attempt any 2 (two) 2 X 20 = 40

a. Write a program in C language to implement a circular queue using linked list.

b. Write the steps of designing an asynchronous counter for any given count sequence. Design a 4-bit ring counter using D flip-flop using the above mentioned steps.

c. Explain the interrupt structure, SFR and timers of 8051 microcontroller.

Q. No. 6. Attempt any 4 (four) 4 X 10 = 40

a. Construct the tree of following expression and write down preorder, inorder and postorder traversal sequences:
((A+B)/D)A((E-F)*G)

b. Write the algorithm for insertion sort. Explain it with an example.

c. Write about the types of ROM used in a computer system.

d. Describe the concept of Doubly link-list. Write a C language program to perform delete and display nodes of doubly link list.

e. What are the different type of buses used in 8085 microprocessor? Discuss about them in detail.

Q. No. 7. Attempt any 2 (two) 2 X 20 = 40

a. What is a two pass assembler? Explain the algorithm for pass1 and pass2 of an assembler.

b. Define about B-tree. Construct a B-Tree of order 3 for the following set of Input data: 69, 19, 43, 16, 25, 40, 132, 100, 145, 7, 15, 18.

c. Explain the following machine independent macro features

i. Concatenation of macro parameters

ii. Generation unique labels

iii. Keyword macro parameters