ARUNACHAL PRADESH PUBLIC SERVICE COMMISSION, ITANAGAR.

SUB: COMPUTER APPLICATION

Time- 3 hours

Full Marks :200

Question no.1 is compulsory and any four from the remaining seven questions.

Q.NO.1. Attempt any 10 (ten).   10 x 4 = 40

(a) Explain the main differences between a combinational circuit and a sequential circuit .

(b) Draw the basic flip-flop circuit with NOR gates and analyses it's operation.

(c) What are the advantages and disadvantages of top down software testing.

(d) What is an object? Explain encapsulation and Data hiding.

(e) Show that any Boolean function can be expressed as a product of maxterms.

(f) Distinguish between the binary search tree property and the heap property.

(g) Define stack? Discuss various operations of stack.

(h)Explain the term scalling and reflexion.

(i) Implement the following function with NOR gates:

$F= A(B+CD) +BC'$

(j) What are the principles for achieving good quality software.

(k)Define verification and validation.

(l) Write notes on software crisis.

Q.N0.2. Attempt any 8 (eights).   8 x 5 = 40

(a) How a file system can be mounted? Explain with an example.

(b) Show the logical construction of a 4x3 IC RAM.

(c) Subtract 39 from 26 using 2's complement method.

(d) What is the formal definition of a regular expression and describe it's each component.

(e) What is the main concept of a functional model?

(f)Write notes on Cache Memory.

(g) How you can sort the following set of integers by using a binary search tree? Explain?
5,2,1,13,4,20,22,15,6,40.

(h)How and why is memory hierarchy useful? Explain.

(i) Explain the different types of web pages.

(j) Describe the steps involved in request response process in internet communication.

Q.NO.3. Attempt any 5 (five).   5 x 8 = 40

(a)Define the term " software reliability"?

(b) Discuss the selection criteria for a life cycle process model in software development.

(c)Solve the recurrences: $T(n)=8 T(n/4) + n\sqrt{n}$. You can assume $T(n)= 1$ for n smaller than some constant.

(d) Write notes on Decoder and Multiplexer.

(e) What is the difference between canonical and standard forms of a Boolean function?

(f) Why are dead-lock situations occur in a system? Explain process states with a diagram?

(g)Explain single and multiple inheritance with an appropriate example.

Q,NO,4. Attempt any 4 (four).   4 x 10 = 40

(a)Design a DFA to accept the following Language. L= {W/W has both an even number of 0's and an even number of 1's.
(b) What is algorithm? Mention the desirable properties of an algorithm.
(c) An array contains the elements 25,17,31,13,2. If the numbers are sorted , using the insertion sort show the intermediate content of the array.
(d) Explain with an example the different types of data manipulation instructions?
(e) Develop an algorithm to search an element using binary search method.

Q.NO.5. Attempt any 2 (two).   2 x 20 = 40

(a) A frame 1101011011 is to be sent across and the generator polynomial is x^4+x+1. What is the transmitted form? What is the difference between TCP and UDP? Explain how PPP protocol works in a dial up internet connection.
(b) What is the difference between total specialization and partial specialization and how is each reflected in an ER diagram? What is information preservation and why is it important? Give example of types of business rules that are not reflected in a presentation layer ER diagram?
(c) What is the main difference between a counter and a register? Design a counter with the following binary sequence using appropriate flip-flops: Sequence: 0,4,2,16 and repeat. Write down the universal properties of NANG and NOR gates.
Implement the following function using NOR gates . X=((A'B'C') +(D+E))'.

Q.NO.6.   Let G_1 and G_2 be the following grammars.   40

    G_1: S→aABb G_2:S→AABB

        A→Aa/a   A→AA/a

        B→bB/b   B→BB/b.

For each variable X, show that the right –hand side of every X rule of G_1 is derivable from the corresponding variable X using the rules of G_2 Use this to conclude that L(G_1) is a subset of L(G_2). Prove that L(G1)=L(G_2).Give five examples of regular expression and regular language.

Q.NO.7.   What is the difference between structure charts and structured flow charts? Explain giving suitable examples and supporting diagrams? What are software design patterns? Differentiate between design pattern and frame works.   40

Q.NO.8.   Prepare an event trace diagram for an ATM scenario. Why do we want to use OMT technology? What are the phases in OMT methodology? Compare and contrast GO-BACK-N ARQ protocol with selective =repeat ARQ. What is demand paging? When does a page fault occur? Explain the different steps in handling page fault.   40