ARUNACHAL PRADESH PUBLIC SERVICE COMMISSION, ITANAGAR

**SUBJECT: COMPUTER ENGINEERING**

Time: 3 hours
Full Marks: 200

**Note: Question No. 1 is compulsory and any four from the remaining seven questions. All questions carry equal marks.**

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

A. Obtain the truth table of the function:
$F = xy + xy' + y'z$

B. Write the syntax of 'while' and 'do-while' loop in C programming. State the difference in execution of the both.

C. Explain the elements of assembly language programming with an example.

D. What are the four functions a loader must perform? Write about them.

E. Write the concept of virtual memory. How is it implemented using paging?

F. What do you mean by lexical-phase error and syntactic-phase error?

G. Explain the use of DDL and DML in database. State two commands for each.

H. What is shading in computer graphics? Why is it used in computer graphics?

I. Describe 3D translation along with its equation.

J. Write about the SCSI hard disk.

K. What is TTL gate? Write the three different types of TTL output configurations.

L. Define B-tree of order n. Explain with an example.

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

A. Simplify the Boolean function using Karnaugh map:
$F = A'B'C' + B'CD' + A'BCD' + AB'C'$

B. Give the block diagram of a RAM chip and explain.

C. Write five functions of an operating system and explain them.

D. Why is lexical analysis needed? Explain the role of lexical analyzer.

E. What is functional dependency? Give a suitable example.

F. Why is 2D transformation used? Explain.

G. What is PLA? Explain with its block diagram.

H. Write about the advantages of Function Subprograms and Statement Functions in FORTRAN language?

I. What is internal sorting? Explain bubble sort technique.

J. Write the major characteristics of RISC processor.

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

A. Explain the structure of array. What is base address of an array? Write the advantages and disadvantages of array over linked list.

B. What is DMA controller? Explain the function of a DMA controller. Who will get the priority if both microprocessor and DMA try to access the main memory?

C. How are batch processing systems and time sharing systems worked? Explain.

D. What is syntax analysis? Explain top-down and bottom-up parsing.

E. Explain index sequential file organization. Write advantage and disadvantage of using this technique.

F. Discuss different graphics I/O devices used in computer system.

G. Explain swapping segmentation and paging virtual memory processes.

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

A. Implement F(A, B, C) = $\sum(1, 3, 5, 6)$ with a multiplexer. Show the diagram of multiplexer implementation, truth table and implementation table for this multiplexer.

B. Explain the structure of the CMOS memory cell.

C. What is symbol table? Why is it used? Explain.

D. Explain the function of hidden line and surface removal procedure. Give the implementation of Depth-Buffer algorithm.

E. Why file organization is important in database system? Discuss the sequential, index and hashed file organization.

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

A. Define class and object in object oriented programming. Give example. Write the different features of object oriented programming. List the differences between overloading and overriding.

B. What is cache memory? What do you mean by mapping process? Discuss the three types of mapping procedures used for organizing cache memory with example.

C. What is display adapter in computer graphics? Why it is used in a computer system? Discuss CGA, EGA and VGA display adapters.

Q. No. 6. Explain the process of deadlock? Discuss the conditions necessary for deadlock to arise. Explain deadlock prevention and detection procedures. How a process can be recovered from deadlock? Explain them with issues to be addressed. 40

Q. No. 7. What is relational database management system? How can relation among tables of a database be maintained? Give an example. Explain first, second, third, fourth and fifth normal form with example. 40

Q. No. 8. Explain the work of edge-triggered and pulse-triggered flip-flop. Design a clocked master-slave JK flip-flop. Show logic diagram, circuit diagram and timing relationship in the discussion. 40