

3RD SEM /AI & ML/ CS & E / IT/2023(W) NEW

Th-1 Computer System & Architecture

Full Marks: 80

Time- 3 Hrs

**Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks**

1. Answer **All** questions 2 x 10
 - a. Define address bus.
 - b. Define SISD & SIMD.
 - c. What is cache?
 - d. Mention what are the different types of fields that are part of an instruction?
 - e. What is the function of I/O channel?
 - f. What is the function of memory unit?
 - g. What do you mean by Interrupt?
 - h. What is the function of a register?
 - i. Define paging.
 - j. Differentiate between response time and elapsed time.
2. Answer **Any Six** Questions 6 x 5
 - a. Explain the basic parameters of bus design.
 - b. Define opcode and operand. Explain the instruction formats.
 - c. What do you mean by virtual memory? Explain.
 - d. Differentiate between RISC and CISC.
 - e. Identify the components of computer system and explain. Write the performance measure.
 - f. Define ROM. Describe the ROM integrated circuit with diagram.
 - g. Define I/O Processor. Explain the characteristics of IOP.
3. What do you mean by memory hierarchy? Describe different types of memory used. Explain their characteristics. 10
4. Define the function of control unit. What do you mean by microprogram control? How it is different from hardware control? 10
5. Identify the techniques/modes which make data transfer to and from peripherals. Explain DMA method of data transfer by a suitable diagram. 10
6. Identify the advantages of parallel processing. What is a pipeline? Draw a space time diagram to show how an instruction is executed. 10
7. Write short notes(any two) 10
 - I) Multiprocessor
 - II) Interleaved memory
 - III) Addressing mode
 - IV) Flynn's Classification

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TH-2 DATA STRUCTURE

Full Marks: 80

Time- 3 Hrs

**Answer any five Questions including Q No.1& 2
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1. Answer **All** questions 2 x 10
 - a. Define Abstract Datatype. Give two examples of Abstract Data type.
 - b. What is the need of time space trade off in algorithm design?
 - c. `char str1[]="Data";
printf("%d%d", sizeof(str1), strlen(str1));`
Considering the above instructions, determine the output of the above code?
 - d. Give an example of sparse matrix.
 - e. Define Recursion.
 - f. Write at least four applications of priority queue.
 - g. Given an expression:
 $(a+b)*(c-d)$
Convert the above expression in postfix and prefix expressions.
 - h. Design a binary tree by taking the following item:
52, 12, 56, 78, 9, 67, 10
 - i. Give examples of a Weighted and a complete graph.
 - j. What do you mean by hashing and hash function?
2. Answer **Any Six** Questions 6 x 5
 - a. Explain the allocation of memory of a 2D array in row major order with suitable example.
 - b. Write the algorithm of pop operation of stack data structure.
 - c. Analyse the advantages of circular queue over queue.
 - d. Illustrate the insert operation in a single linked list with a suitable example.
 - e. How to search an element in BST.
 - f. Explain the adjacency and path matrix of a graph by taking an example.
 - g. Discuss different file access methods.
3. Describe at least five string library functions with suitable examples. 10
4. Write a program to calculate the sum of all even numbers between 1 to 100 using array. 10
5. Discuss the insert and delete operation of queue with suitable example. 10
6. Explain bubble sort algorithm to sort the following items: 10
23, 3, 5, 78, 54, 23
7. Write short notes on (any two): 10
 - i) Operator Precedence
 - ii) Polish Notation
 - iii) Garbage Collection
 - iv) Non-linear data structure

Th-3 Digital Electronics

Full Marks: 80

Time- 3 Hrs

**Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks**

1. Answer **All** questions 2 x 10
 - a. Convert the decimal number $(78.4)_{10}$ to binary and octal number system.
 - b. Find the 1's and 2's complement of $(10010011.0101)_2$.
 - c. State Demorgan's Theorem.
 - d. Draw the logic circuit of Half Subtractor and write its truth table.
 - e. If $F(A, B, C) = \sum m(1, 5, 6)$ then write its SOP.
 - f. Write the excitation table of JK -flop flop.
 - g. List different types of shift registers.
 - h. A clock pulse of 10KHz is applied to a decade counter. Find the frequency of output wave form (assuming output is taken at the MSB).
 - i. Define resolution of a DAC.
 - j. Define Propagation Delay with reference to logic families.

2. Answer **Any Six** Questions 6 x 5
 - a. Design a 4-bit binary to gray convertor.
 - b. Implement all the logic gates (NOT,OR,AND,NOR,XOR,XNOR) using NAND gate.
 - c. With neat logic diagram explain the function of 4: 1 Multiplexer.
 - d. With neat logic diagram and truth table explain the working of full adder.
 - e. Differentiate between combinational and sequential logic circuits.(any 5)
 - f. Describe the working of a 5-bit Ring Counter.
 - g. Draw CMOS logic circuit of two input (a) NAND gate 2.5
(b) NOR gate 2.5

3.
 - a) Minimize the following Boolean function using K-map 7
 $F(A,B,C,D) = \sum m(0,1,2,4,5,6,8,11,12) + d(9,13)$
 - b) Implement the minimized expression obtained above with NAND gates only. 3

4. Design a 3-bit magnitude comparator circuit whose outputs are $A > B$, $A = B$, $A < B$, where A and B are two 3-bit numbers. 10

5. Convert a T flip flop to (a) D flip flop 5
(b) JK flip flop 5

6.
 - a) Design 4-bit asynchronous up counter and explain its working. 6
 - b) Draw the output wave forms of each flip-flop 4

7. Explain the working of a counter type analog to digital convertor (ADC). 10

TH-4 OBJECT ORIENTED METHODOLOGY

Full Marks: 80

Time- 3 Hrs

Answer any five Questions including Q No.1& 2
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1. Answer **All** questions 2 x 10
 - a. List at least two differences between Object Oriented Programming approach and Procedure Oriented Programming approach.
 - b. What do you mean by encapsulation?
 - c. Define JVM.
 - d. Write a statement to declare an integer variable in java.
 - e. What do you mean by primitive data type.
 - f. Define class and object.
 - g. Differentiate between access specifier and access modifier.
 - h. List at least two advantages of inheritance.
 - i. What do you mean by run time Polymorphism?
 - j. Write the syntax to create a package.
2. Answer **Any Six** Questions 6 x 5
 - a. Explain all the concepts of object oriented programming.
 - b. Discuss the execution model of Java.
 - c. Illustrate static member and static member function in java.
 - d. Explain the ways of parameter passing in function through examples.
 - e. Compare between function overloading and function overriding.
 - f. Write a java program to print the sum of all the numbers present in an array.
 - g. How an exception is handled in java.
3. Answer **Any Three** Questions
3. Design a Student class in java that include name, branch, sem, contact_no as data members and take methods to initialize the data members and display them. 10
4. Define Inheritance. Describe all the types of inheritance. 10
5. What is an instance of a class? Describe the function of constructor with a programming example? 10
6. Discuss the operations of all the categories of operators in java with example. 10
7. Write short notes on: 10
 - a) Type casting
 - b) Multi-level inheritance
 - c) String Buffer
 - d) Finally statement

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Th-5 Environmental Studies

Full Marks: 80

Time- 3 Hrs

Answer any five Questions including Q No.1& 2
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1. Answer **All** questions 2 x 10
 - a. Write down two effects of deforestation.
 - b. Differentiate between renewable and non-renewable energy sources.
 - c. Write down two effects of modern agriculture methods on environment.
 - d. Define decomposers in eco system.
 - e. What are the types of biodiversity?
 - f. Define ozone layer depletion.
 - g. Write down two causes of air pollution in urban areas.
 - h. What is endangered species?
 - i. Explain 3'R's in waste management.
 - j. What are the various objectives of family welfare programme?

2. Answer **Any Six** Questions 6 x 5
 - a. Discuss how urbanisation affects environment.
 - b. Give a brief description of man wild life conflict.
 - c. What are the methods protecting soil from erosion.
 - d. Define rainwater harvesting? State main objective of rain water harvesting?
 - e. Discuss how marine pollution affects aquatic animals.
 - f. Write down the role of an individual protecting environment.
 - g. Write about the disaster management procedures during cyclone.

Answer Any Three Questions

3. Define dam. Discuss the environmental and social impacts during construction of dam. 10
4. Define bio diversity and explain about bio geographical classifications in India. 10
5. Describe pond eco-system. 10
6. Write down the cause, effect and control of water pollution. 10
7. Write short notes on 10
 - a. Value of education
 - b. Solid waste management