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18CS34

# Third Semester B.E. Makeup Examination, January 2020
# OBJECT ORIENTED PROGRAMMING WITH JAVA

Time: 3 Hours  Max. Marks: 100

*Instructions:* 1. *Answer any five (05) FULL questions selecting one full question from each unit.*
2. *Write appropriate comments wherever necessary.*

| | | L | CO | PO | M |
|---|---|---|---|---|---|
| | **UNIT - I** | | | | |
| a. | List and briefly describe key attributes of Object Oriented programming. | (2) | (1) | (1) | (06) |
| b. | Can a String control a switch statement? If yes, develop a suitable Java program to demonstrate the same. | (3) | (1) | (1) | (06) |
| c. | Implement a method addAtBeginning() that takes an integer array named **a** and an integer **k** as its parameters. It creates a new array whose length is one greater than array **a**'s length. It then copies k as the first element of the new array and copies **a**'s elements as remaining elements into the new array. It displays the contents of the new array and returns. | (3) | (2) | (1) | (08) |
| | **OR** | | | | |
| 3 a. | Develop a Die class with one integer instance variable called sideUp. Give it a constructor and a getSideUp() method that returns the value of sideUp and a void roll() method that changes sideUp to a random value from 1 to 6. Then create a DieDemo class with a main method that creates two Die objects, rolls them, and prints the sum of the two sides up. (Hint: Math.randon() method returns a random number between 0 and 1.) | (6) | (2) | (3) | (08) |
| b. | What is a class? Give the general form of a class. Write a suitable Java program to demonstrate, as to how classes are defined and objects are created. | (2) | (1) | (1) | (06) |
| c. | Describe the syntax of for-each loop in Java. Develop a Java program to display the sum of odd numbers in the array, using both for and for-each statements in Java. | (3) | (2) | (1) | (06) |
| | **UNIT – II** | **L** | **CO** | **PO** | **M** |
| 3 a. | Develop a recursive method to generate $k^{th}$ Fibonacci number. Write the associated drive class containing main() method to generate first n Fibonacci numbers. | (3) | (2) | (3) | (06) |
| b. | Explain the static members of a class with suitable code snippets. | (2) | (1) | (1) | (06) |
| c. | Describe the significance of the four access specifiers in Java with suitable example programs. | (2) | (1) | (1) | (08) |
| | **OR** | | | | |
| 4 a. | Develop a method reverseArray() that reverses the order of the elements in the array. Implement it in two ways:<br>i. iteratively<br>ii. recursively | (3) | (2) | (3) | (08) |
| b. | What is method overloading? What is the need for method overloading? Demonstrate method overloading with a suitable program example. | (2) | (3) | (1) | (06) |

Note: L (Level),CO (Course Outcome), PO (Programme Outcome), M (Marks)

c. Justify the following statement with suitable programming example and explanation:
An inner class has access to the members of its enclosing class. The opposite, however, is not true.

(4) (1) (1) (06)

## UNIT - III

L CO PO M

5 a. Write a java program that creates a superclass called TwoDShape which stores the width and height of a two dimensional object. It also has a subclass triangle which has a dimension as style that describes the triangle such as filled, outlined and transparent. It also computes area of triangle and displays triangle style.

(3) (3) (1) (10)

b. Write a java program that specifies an interface called Series that describes the methods used to generate a series of numbers. Series defines three methods. A method to obtain next number in the series, second method to reset the series to its starting point and last method to set the starting point.

(3) (3) (1) (10)

**OR**

6 a. Create a class called vehicle that encapsulates information about vehicles, including the number of passengers they can carry, their fuel capacity and their fuel consumption rate. Vehicle class can be considered as a starting point from which more specialized classes are developed. One type of Vehicle is Truck. Truck extends Vehicle by adding an instance variable that stores the carrying capacity. Add the Accessor methods that provide for getting and setting their values.

(3) (3) (3) (10)

b. Describe the concept of extending an interface that inherits another interface with an example. Illustrate nesting of interfaces with an example.

(2) (3) (3) (10)

## UNIT – IV

L CO PO M

7 a. What is a package? What are the advantages of using a package in Java? Explain the process of creating a package.

(2) (1) (1) (07)

b. Develop a Java program to demonstrate handling of any two exceptions in Java.

(3) (4) (1) (06)

c. An anagram is a word or phrase formed by rearranging the letters of a different word or phrase, typically using all the original letters exactly once. Develop a Java program to check whether two strings are anagrams or not.

(6) (1) (12) (07)

**OR**

8 a. What is an exception? What are the five keywords used in exception handling in Java? Explain with a suitable programming example.

(2) (4) (3) (08)

b. Develop a Java program having a method that takes a string as its parameter and returns true if all the characters in the string are the same character.

(3) (1) (1) (06)

c. What are the three different ways to refer to any class contained in a different package? Explain with suitable code snippets.

(2) (1) (1) (06)

## UNIT -V

L CO PO M

9 a. What are the two key items of Swing GUI? Explain with examples.

(2) (5) (1) (0

b. Develop the following GUI shown in FigQ9b. When "First" button is clicked, the program should display on the label called "Press a button…" the message, "Hello World!". When "Second" button is clicked, the program should display on the label called "Press a button…" the message, "Good Day!".

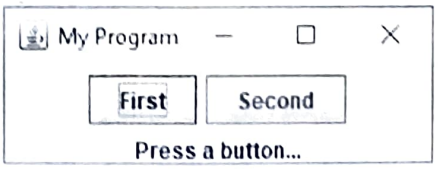


Fig.Q9b.

( 4 ) ( 5 ) ( 12 ) (08)

c. How does a JToggleButton work? Demonstrate using a Java program.

( 2 ) ( 5 ) ( 3 ) (06)

**OR**

10 a. With example, explain the following terms associated with event handling.

i. Event
ii. Event sources
iii. Event listeners

( 2 ) ( 5 ) ( 1 ) (06)

b. Develop the following GUI shown in Fig.Q10b. When the user enters name and presses "OK" button, the program should display "Welcome "followed by string contained in the text field.

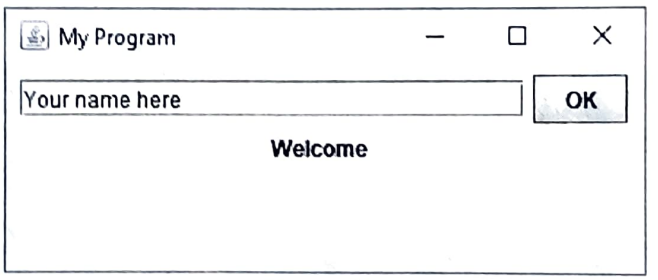


Fig.Q10b.

( 4 ) ( 5 ) ( 12 ) (08)

c. What are the different layout managers available to a Swing programmer? Describe BorderLayout and FlowLayout.

( 2 ) ( 5 ) ( 1 ) (06)

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18CS33

# Third Semester B.E. Makeup Examination, January 2020

# DIGITAL ELECTRONICS

Time: 3 Hours

Max. Marks: 100

*Instructions: 1. Answer any one question from each Unit.*

## UNIT - I

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 1 | a. | Solve the following Boolean Expression to get the reduced form and draw the logic circuit using NAND gates only. Y = B + AB' + ACD+ AC' | (3) | (1) | (1) | (06) |
| | b. | Apply K-Map reduction technique to obtain the reduced POS expression for the given Boolean function. F( A,B,C,D) = ∏M ( 0,1,5,9,13,14,15) + d( 3,4,7,10,11) | (3) | (1) | (2) | (06) |
| | c. | Solve the given Boolean function by using Quine Mc Clusky method and find the essential prime implicants. F( A,B,C,D) = ∑m ( 1,3,5,10,11,12,13,14,15) | (3) | (1) | (2) | (08) |
| | | **OR** | | | | |
| 2 | a | Realize the given Boolean expression using NAND gates and find the minterms for the same. F = AC + AB`C + ACD | (2) | (1) | (1) | (06) |
| | b | Make use of K-Map reduction technique to obtain the reduced SOP expression for the given Boolean function. F( A,B,C,D) = ∑m ( 0,1,5,9,13,14,15) + d( 3,4,7,10,11) | (3) | (1) | (2) | (06) |
| | c | Identify all the prime and essential prime implicants of the following Boolean function using Quine Mc Clusky method. F(A,B,C,D) = ∑m (2,3,6,7,8,9,13,15) | (3) | (1) | (2) | (08) |

## UNIT – II

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | a. | Define a Multiplexer. Implement the given Boolean function using 8:1 multiplexer. Consider D as MEV. F( A,B,C,D) = Σm( 0,1,3,4,5,7,9,11,13,15). | (3) | (2) | (1) | (06) |
| | b. | Design and illustrate a 1-bit magnitude comparator with a neat diagram and truth table. | (3) | (2) | (2) | (06) |
| | c. | Define Decoder. Design and explain a BCD-to-Decimal decoder. | (3) | (2) | (2) | (08) |
| | | **OR** | | | | |
| 4 | a | Design a 4-bit odd parity generator. Write any one application of the same. | (2) | (2) | (1) | (06) |
| | b | Compare Decoder and Demultiplexer., make use of suitable Decoder and multi-input OR gate to implement the following functions. F1(A,B,C) = ∑m(1,3,7) F2(A,B,C) = ∑m(2,3,5) F3= ∑m(0,1,5,7) | (2) | (2) | (2) | (06) |
| | c | How a PAL is different from PLA? Realize the following functions using PAL. Y1= A`B`C` + A`BC + A`BC + ABC` Y2 = ABC | (1) | (2) | (2) | (08) |

Note: L (Level),CO (Course Outcome), PO (Programme Outcome), M (Marks)

## UNIT – III

5 a. Explain propogation delay time. If propogation delay is 20 nano seconds what is the maximum clock frequency. Draw the circuit for PT forming circuit.

(3) (3) (1) (06)

b. Realize SR flip flop using NOR gates.

(3) (3) (2) (06)

c. Derive the characteristics equations for SR , JK flip flops with state transition diagram and write the excitation tables.

(3) (3) (2) (08)

**OR**

6 a. Explain working of (i) gated JK flip flop ( ii ) gated D flip flop.

(2) (3) (1) (06)

b. Explain working of JK master slave flip flop.

(2) (3) (1) (06)

c. Derive the characteristics equations for T , JK flip flops with state transition diagram and write the excitation tables

(3) (3) (2) (08)

## UNIT - IV

7 a. List out the applications of a shift register and with a neat logic diagram explain the working of serial adder.

(2) (3) (1) (06)

b. How to convert JK flp flop into T flip flop and explain the steps.

(1) (3) (1) (06)

c. Design a MOD-6 synchronous upcounter using JK flip flops and explain its operation with a neat logic diagram and truth table.

(3) (3) (2) (08)

**OR**

8 a. Develop the logic diagram of a 4 bit Serial In Parallel Out shift register and explain its working.

(3) (3) (2) (06)

b. Explain with a neat diagram and Truth Table 3-bit Ripple down counter using JK flip flops.

(2) (3) (1) (06)

c. Design a MOD-8 synchronous upcounter using JK flip flops and explain its operation with a neat logic diagram and truth table.

(3) (3) (1) (08)

## UNIT -V

9 a. Explain the working of 2-bit Simultaneous A/D converter.

(2) (3) (1) (06)

b. Develop verilog program for following circuits in Data flow model.
1. 4:1 Multiplexer 2. 1-bit Full Adder

(3) (4) (2) (06)

c. Explain 4-bit R-2R ladder Digital to Analog converter and find the output for the input 1001 and 1100 when V= +5 volts.

(2) (3) (1) (08)

**OR**

10 a. Explain the working of 4-bit Successive Approximation type A/D converter.

(2) (3) (1) (06)

b. Develop verilog program for following circuits in Data flow model.
1. 2:4 Decoder 2. 8:1 Multiplexer

(3) (4) (2) (06)

c. Explain 4-bit R-2R ladder DAC and find the output when DAC input is 11010 and voltage v = +5v.Also what is the voltage resolution?

(2) (3) (1) (08)

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18CS32/16CS35

# Third Semester B.E. Makeup Examination, January 2020

# DATA STRUCTURES WITH C

Time: 3 Hours

Max. Marks: 100

*Instructions: 1. Answer one full question from each of the units.*

## UNIT - I

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 1 | a. | What is Enumerated Types? Explain operations on Enumerated Types. | (2) | (1) | (1) | (08) |
| | b. | Write the output of the following program<br>#include<stdio.h><br>main()<br>{<br>int a[5]={2,4,6,8,22};<br>int *p;<br>p=&a[2];<br>printf("%d%d\n",a[0],p[-1]);<br>printf("%d%d\n",a[1],p[-2]);<br>printf("%d%d\n",a[2],p[2]);<br>} | (3) | (1) | (1) | (06) |
| | c. | What is structure? Explain different ways to declare structure. | (2) | (1) | (1) | (06) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | a. | Explain the importance of dynamic memory allocation with the help of memory allocation functions. | (2) | (1) | (1) | (08) |
| | b. | Differentiate between union and structure. | (2) | (1) | (2) | (05) |
| | c. | Write a C program to store information of 5 students using structure. | (3) | (2) | (2) | (07) |

## UNIT – II

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 3 | a. | List and explain different file handling functions. | (2) | (1) | (1) | (08) |
| | b. | List and explain basic list operations. | (2) | (1) | (1) | (06) |
| | c. | Explain head structure and data node structure of a List. | (2) | (2) | (1) | (06) |

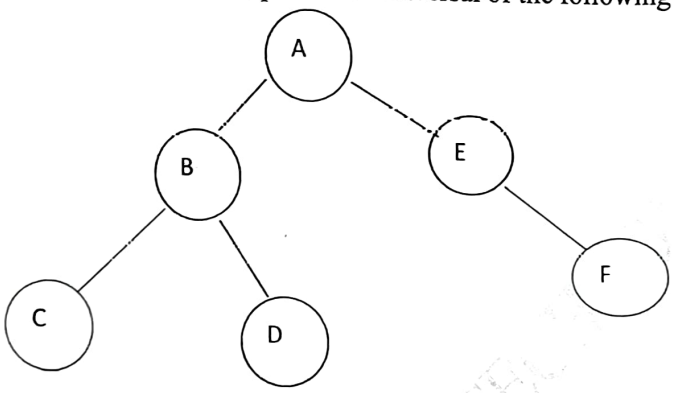
**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | a. | Write an algorithm to insert node in to the List. | (3) | (3) | (2) | (06) |
| | b. | Write an algorithm to insert element into doubly linked list. | (3) | (3) | (2) | (06) |
| | c. | Write the C function i) to create a List ii)to destroy a List() | (3) | (3) | (2) | (08) |

## UNIT – III

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 5 | a. | Write a C program to implement stack using an array. | (3) | (3) | (2) | (08) |
| | b. | Write a C program to implement queue as a linked list. | (3) | (3) | (2) | (06) |

Note: L (Level),CO (Course Outcome), PO (Programme Outcome), M (Marks)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | c. | Write a C function to evaluate the postfix expression. | (3) | (3) | (2) | (06) |
| | | **OR** | | | | |
| 6 | a. | Convert the following infix expressions to postfix form in tabular format<br>i. a+b*c-d/e*f ii.(a+ b)*(c+d-e)*f | (3) | (2) | (2) | (06) |
| | b. | Write a C program to convert an infix expression to its postfix expression. | (3) | (3) | (2) | (08) |
| | c. | Write a C program to implement queue as a circular linked list. | (3) | (3) | (2) | (06) |
| | | **UNIT – IV** | **L** | **CO** | **PO** | **M** |
| 7 | a. | What is tree? Explain attributes of the tree. | (2) | (1) | (1) | (08) |
| | b. | Write the preorder, inorder, postorder traversal of the following tree<br>  | | | | |
| | c. | Explain head structure and data node structure of a BST.0 | (3) | (2) | (1) | (06) |
| | | **OR** | (2) | (1) | (1) | (06) |
| 8 | a. | Write the algorithm to find i) smallest node in s BST ii) largest node in a binary tree. | | | | |
| | b. | Write the C function to insert node into BST. | (3) | (3) | (2) | (08) |
| | c. | What is AVL tree? List the cases that require for balancing the AVL tree.. | (3) | (3) | (2) | (06) |
| | | **UNIT –V** | (1) | (1) | (1) | (06) |
| | | | **L** | **CO** | **PO** | **M** |
| 9 | a. | Explain the properties of heap. | | | | |
| | b. | Write the algorithm to i)insert data into heap .ii) delete data from heap. | (2) | (1) | (1) | (06) |
| | c. | Write the function _reheapUp() | (3) | (3) | (2) | (08) |
| | | **OR** | (3) | (3) | (2) | (06) |
| 10 | a. | Explain the hashing methods i) direct hashing ii) modulo-division method. | | | | |
| | b. | Explain the collision resolution methods i)quadratic probe ii)linear probe | (2) | (1) | (1) | (10) |
| | | | (2) | (1) | (1) | (10) |

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16CS34/18CS/IS35

# Third Semester B.E. Makeup Examination, January 2020

## COMPUTER ORGANIZATION / COMPUTER ORGANIZATION AND ARCHITECTURE

Time: 3 Hours Max. Marks: 100

*Instructions:*
1. *Answers must be brief and to the point.*
2. *Suitable data may be assumed, with better reasoning.*
3. *Draw diagrams, wherever necessary.*
4. *Write question number properly.*
5. *Answer any FIVE full questions choosing at least one from each unit.*

### UNIT - I

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 1 | a. | With the block diagram of connections between the processor and memory, identify typical steps of execution of an instruction. | (2) | (1) | (1) | (06) |
| | b. | Define performance of a computer. How slower memory affecting performance is overcome? Define processor clock, with a waveform. | (1) | (1) | (1) | (06) |
| | c. | Program execution time, T, is to be examined for a certain high-level language program. The program is run on a R or a C computer. The value of S in the T expression for the RISC machine is 1.2, but it is only 1.5 for the CISC machine. Both machines have the same clock rate, R. Calculate the largest allowable value for N, the number of instructions executed on the C machine, expressed as a percentage of the N value for the R machine, if time for execution on the C machine is to be no longer than that on the R machine? | (3) | (2) | (2) | (08) |

**OR**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2 | a. | Calculate overall SPEC rating, with the running time data, of reference computer and computer under test. | (3) | (1) | (2) | (05) |

| Running time in μS | Suite 1 | Suite 2 | Suite 3 | Suite 4 |
|---|---|---|---|---|
| Reference Computer | 600μS | 100 μS | 200 μS | 800 μS |
| Computer under test | 400 μS | 80 μS | 210 μS | 500 μS |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | b. | Explain Straight-line and Branching sequencing, with example - addition of n number program. | (2) | (2) | (1) | (05) |
| | c. | For all 10 addressing modes, identify examples of assembly language instructions, and list them all. | (2) | (2) | (1) | (10) |

### UNIT – II

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 3 | a. | Develop an ALP that reads one line from the keyboard, stores it in memory buffer, and echoes it back to the display, using pseudo code. | (3) | (2) | (1) | (06) |
| | b. | Summarize the sequence of events involved in handling an interrupt request from a single device. | (2) | (1) | (1) | (06) |
| | c. | Explain all three methods of handling multiple devices, with neat sketches and brief operation. | (2) | (1) | (1) | (08) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | a. | Explain the different registers used in a DMA interface. Illustrate the use of DMA controllers in a computer system. | (2) | (1) | (1) | (06) |
| | b. | Explain Centralized bus Arbitration scheme with neat sketch. | (2) | (1) | (1) | (06) |

c. Assume that two devices, A and B, having ID numbers $5_{10}$ $(0101)_2$ and $6_{10}$ $(0110)_2$, respectively. Point out which device is selected by distributed arbitration.

(4) (3) (2) (08)

## UNIT - III

L CO PO M

5 a. With the help of relevant circuit diagram for static RAM cell, explain how a Read and Write can be performed on it.

(2) (2) (1) (06)

b. Show the configuration of a ROM cell and compare the different ROM memories.

(1) (2) (1) (05)

c. Illustrate the different mapping functions of cache.

(2) (2) (1) (09)

**OR**

6 a. Build an organization of a 1K x 1 memory cell and explain its working.

(3) (2) (1) (06)

b. Explain direct memory mapping technique.

(2) (2) (1) (06)

c. Explain the internal organization of a 2M x 8 asynchronous DRAM chip.

(2) (2) (1) (08)

## UNIT - IV

L CO PO M

7 a. Solve using Booth's Algorithm, the multiplication of +15 and -8

(4) (3) (2) (08)

b. Solve using Bit – pair Algorithm, the multiplication of +13 and -6

(4) (3) (2) (08)

c. Explain n – binary Addition – Subtraction logic network.

(2) (3) (1) (04)

**OR**

8 a. Solve using Restoring Algorithm, the Divide 8 by 3

(4) (3) (2) (08)

b. Solve using Non – Restoring Algorithm, the Divide 12 by 5

(4) (3) (2) (08)

c. With neat sketch show a 4 bit carry look ahead binary adder

(1) (3) (1) (04)

## UNIT -V

L CO PO M

9 a. Explain Single – bus organization of the data path inside a process.

(2) (4) (1) (08)

b. Illustrate with a diagram, input and output gating for registers, for the expressions:

1. $R1_{out}$, $Y_{in}$
2. $R2_{out}$, SelectY, Add, $Z_{in}$
3. $Z_{out}$, $R3_{in}$

(3) (4) (1) (06)

c. Rewrite the control sequence for the instruction: Add (R3), R1

(2) (4) (1) (08)

**OR**

10 a. Explain Three – bus organization of the datapath inside a process.

(2) (4) (1) (10)

b. Sketch the organization of control unit to allow conditional branching in the micro-program.

(3) (4) (1) (10)

Libary - 10/12/2019 - 09.30 to 12.30.

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18CS32/18IS32/16CS35

3rd sem ICBCS - [redacted] 3 set

# Third Semester B.E. Semester End Examination, Dec./Jan. 2019-20

## DATA STRUCTURES WITH C

Time: 3 Hours. Max. Marks: 100

*Instructions:* 1. *Answer any five (5) questions from the following units by choosing one full question from each unit.*

### UNIT – I

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 1 | a. | Define pointers? Explain the concept of pointers to functions with an example. | (1) | (1) | (1) | (08) |
| | b. | Differentiate between structures and functions. | (1) | (1) | (1) | (06) |
| | c. | Explain the different dynamic memory allocation functions with an example for each. | (2) | (1) | (1) | (06) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | a. | Write a C program using structure to print the details of the book. Access the members of the structure using pointer to structure concept. | (3) | (1) | (1) | (10) |
| | b. | Explain the concept of pointers to functions and using this concept, write a C program to sort n integers. | (3) | (1) | (1) | (10) |

### UNIT – II

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 3 | a. | Define fread(), fseek(), fwrite(), fopen() and fclose().Write a C Program to read content from one file and copy the content into another file. | (3) | (2) | (2) | (10) |
| | b. | What are the advantages of linked list over arrays? | (1) | (2) | (2) | (05) |
| | c. | Write a C function to insert a node at frontend using doubly liked list. | (3) | (2) | (2) | (05) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | a. | Write the following C functions at the front end of the circular liked list<br>i) insert node ii) delete node | (3) | (2) | (2) | (10) |
| | b. | i) Differentiate between singly linked list and doubly linked list.<br>ii) Write a short note on List ADT. | (1) | (2) | (2) | (10) |

### UNIT - III

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 5 | a. | What is stack? Explain basic stack operations. | (2) | (1) | (1) | (06) |
| | b. | Write the C function i) to push element in to the stack<br>ii) to pop element from the stack. | (3) | (3) | (2) | (08) |
| | c. | Write a C program to reverse a given a string and check whether it is palindrome or not using stack. | (3) | (4) | (2) | (06) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 6 | a. | What is queue? Explain queue operations. | (2) | (1) | (1) | (08) |

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

b. Write the algorithm to insert element in to queue.

(3) (3) (2) (06)

c. Write the function to delete element from the queue.

(3) (3) (2) (06)

L CO PO M

## UNIT – IV

7 a. Explain in brief AVL trees.
Explain the various basic concepts of AVL trees.

(2) (2) (1) (08)

b. Define the following terms
i) height of a tree ii) depth of a tree iii) level of a tree
iv) strictly binary tree v) complete binary tree vi) Almost complete binary tree.

(1) (3) (1) (06)

c. Define Binary Search Tree (BST).Construct BST for the following list of 13 nodes.
3,4,12,14,10,5,1,8,2,7,9,11,6.

(1) (3) (2) (06)

## OR

8 a. Prove the following
i) The maximum number of nodes on level i of a binary tree=$2^i$ for i>=0.
ii) The maximum number of nodes in a binary tree of depth k=$2^k$-1.

(3) (3) (2) (10)

b. Write a C program to count the no. of nodes in a tree and also the function to count the leaves or terminal nodes in a tree.
Write a C program
i) to count the no. of nodes in a tree
ii) function to count the leaves or terminal nodes in a tree

(3) (3) (2) (10)

L CO PO M

## UNIT –V

9 a. What is heap? Construct the min heap and max heap for the following list of elements.
35 , 33, 42, 10, 14, 19, 27, 44, 26, 31.

(3) (3) (2) (08)

b. Explain the different types of hashing methods.

(2) (3) (1) (06)

c Sort the give set of elements using heap sort and construct as per the algorithm
25 67 56 32 12 96 82 44

(3) (3) (2) (06)

## OR

10 a. Write the following algorithms
i) min heap construction ii) max heap construction.

(3) (3) (2) (10)

b. What is hashing? Explain collision and its detection with an example.

(1) (3) (2) (10)

3rd sem CS

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18CS/IS33

# Third Semester B.E. Semester End Examination, Dec./Jan. 2019-20
## DIGITAL ELECTRONICS

Time: 3 Hours  Max. Marks: 100

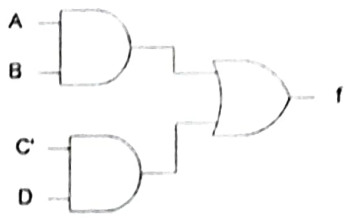
*Instructions: 1. Answer one full question from each unit.*

### UNIT - I

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 1 | a. | Solve the given Boolean function using Boolean algebra and realize using NAND gates.<br>Y = A' B C + A B C + A B C' + A B | (3) | (1) | (1) | (06) |
| | b. | Make use of K-Map reduction technique to obtain the simplified SOP expression for the given Boolean function.and realize using logic gates.<br>F (A,B,C,D) = Σm (2,3,4,5,6,7,10,11,12) | (3) | (1) | (2) | (06) |
| | c. | Apply Quine McClusky reduction technique to simplify the given Boolean expression and draw the logic circuit for the same.<br>F( A,B,C,D) = Σm( 0,1,2,3,4,5,12,13,14) + d ( 6,15) | (3) | (1) | (2) | (08) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | a. | List the minterms for the given logic circuit. | (3) | (1) | (1) | (06) |
| | b. | Make use of K-Map reduction technique to obtain the simplified POS expression for the given Boolean function and realize by using NOR gates..<br>F (A,B,C,D) = ΠM (0,1,4,5,8,12,13) | (3) | (1) | (2) | (06) |
| | c. | Apply Quine McClusky reduction technique to simplify the given Boolean expression and find essential prime implicants.<br>F( A,B,C,D) = Σm( 1,3,5,7,12,13,14,15) | (3) | (1) | (2) | (08) |




### UNIT – II

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 3 | a. | Implement the given Boolean function using 8:1 multiplexer. Consider A as MEV.<br>F( A,B,C,D) = Σm( 0,1,3,4,5,7,9,11,13,15). | (3) | (2) | (2) | (06) |
| | b. | Define decoder. Implement following functions using suitable decoder<br>$f_1$ ( A,B,C ) = Σ m( 0,1,6)<br>$f_2$ ( A,B,C ) = Σ m( 2,4,6) | (3) | (2) | (1) | (06) |
| | c. | Design 2-bit magnitude comparator with the help of neat logic diagram. Implement the same using basic gates. | (3) | (2) | (2) | (08) |

**OR**

4 a. Design as Odd parity generator circuit for 3- bit binary data.

(3) (2) (2) (06)

b. Define Mutiplexer. Explain the working of 4:1 multiplexer. Implement the given Boolean function using 4:1 multiplexer using A as MEV.
$F(A,B,C) = \Sigma m(0,2,4,7)$

(3) (2) (2) (06)

c. Differentiate between PAL and PLA. Implement the following Boolean functions using PLA.
$f_1(A,B,C) = \Sigma m(0,1,7)$
$f_2(A,B,C) = \Sigma m(4,5,7)$

(3) (2) (2) (08)

**UNIT - III**

L CO PO M

5 a. Illustrate the working of a positive edge triggered SR flip flop and draw a neat sketch of its output waveforms.

(2) (3) (1) (06)

b. Determine the characteristic equations of SR, T and D flip flops.

(5) (3) (2) (06)

c. With a neat circuit diagram explain the working of a master-slave JK flip flop and write the advantages.

(2) (3) (1) (06)

**OR**

6 a. Compare a latch and a flip flop? Construct SR latch using NAND/NOR gates.

(2) (3) (1) (06)

b. Explain the characteristics of an ideal clock and find the clock frequency for a system when the cycle time is 5ns.

(2) (3) (1) (06)

c. Derive the characteristics equations for SR, JK flip flops with state transition diagram and write the excitation tables

(2) (3) (1) (08)

**UNIT - IV**

L CO PO M

7 a. Show how SR flip flop is converted to JK flip flop.

(3) (3) (2) (06)

b. Explain with neat waveform 4 bit Johnson counter.

(2) (3) (2) (06)

c. Design MOD-6 synchronous counter using JK flip flop.Draw the logic diagram for the same.

(4) (3) (2) (08)

**OR**

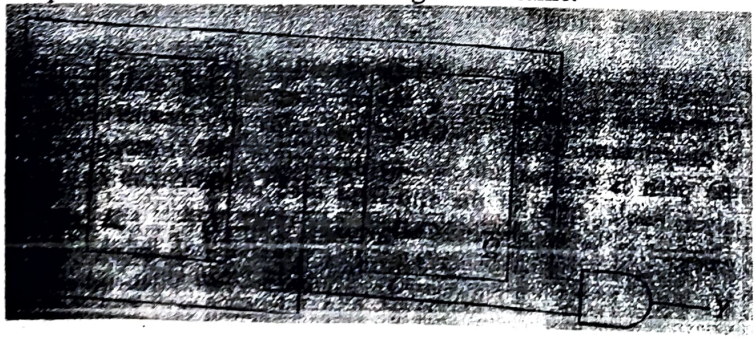
8 a. Show how JK flip flop is converted into T flip flop.

(3) (3) (2) (06)

b. Explain with neat waveform 4 bit ring counter.

(2) (3) (2) (06)

c. Analyze the given sequential circuit and draw state diagram for same.



(4) (3) (2) (08)

## UNIT -V

| | | L | CO | PO | M |
|---|---|---|---|---|---|
| a. | Explain the working of 2 bit parallel comparator(simultaneous conversion) A/D Converter with neat circuit diagram. | (2) | (3) | (2) | (06) |
| b. | Write HDL program for 4:1 multiplexer and full adder. | (3) | (4) | (2) | (06) |
| c. | With neat sketch explain the working of 4 bit R-2R binary ladder DAC. Define resolution of D/A converter. What is resolution for 8 bit DAC if V = +5V. | (2) | (3) | (1) | (08) |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| a. | Explain the working of 4 bit successive approximation ADC with neat circuit diagram. | (2) | (3) | (1) | (06) |
| b. | Explain the working of R-2R ladder DAC. Find the output voltages for the inputs 11000 and 10010 if Logic 0= 0V and 1 =+10V. | (2) | (3) | (1) | (08) |
| c. | Write HDL program for ( i )Y = ABC' + AB'C +AB ( ii ) 2:4 decode | (3) | (4) | (2) | (06) |

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18CS/IS34

# Third Semester B.E. Semester End Examination, Dec./Jan. 2019-20
# OBJECT ORIENTED PROGRAMMING WITH JAVA

Time: 3 Hours

Max. Marks: 100

*Instructions:* 1. *Answer any one full question from each UNIT.*
2. *Each full question of a UNIT carries 20 marks*

## UNIT - I

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 1 | a. | Explain the three key attributes of object oriented principles. Describe the general form of a java program. Write a java program to convert 10 gallons to liters and display the result. There are approximately 3.7854 liters in a gallon. | (2) | (1) | (1) | (10) |
| | b. | Explain methods of String class that operate on strings. Write a java program to display twelve names, stored in a one-dimensional array, in a tabular form that has 3 rows and 4 columns. | (2) | (2) | (3) | (10) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | a. | Describe the creation of a two dimensional array. Write a java program to sort elements of an array num[ ]={99, -10, 100123, 18, -978, 5623, 463, -9, 287, 49} using Bubble sort and print the sorted array. | (2) | (1) | (3) | (10) |
| | b. | Describe for-each style for-loop with an example. Write a Java program to perform multiplication of two matrices. | (2) | (2) | (1) | (10) |

## UNIT – II

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 3 | a. | Illustrate the use of java's access modifiers private and public. Define a class Myclass, alpha is a private data member and beta is public data member in Myclass. It includes accessor methods to get and set member alpha. The program initializes both the members and display messages appropriately. | (2) | (2) | (1) | (08) |
| | b. | Write a java program that illustrates passing of objects to methods, it defines a class called Cuboid that stores the three dimensions namely width, breadth and height. Write a method, computeVolume that accepts object of this class and returns the volume. In the DemoClass, instantiate object of this class, invoke the method and display the result. | (3) | (2) | (3) | (06) |
| | c. | Demonstrate method overloading in a FunClass, in which a method fun( ) is overloaded four times. First version takes no parameters, the second takes one integer parameter, the third takes two integer parameters and fourth takes two double parameters. Each method prints appropriate messages. | (3) | (2) | (1) | (06) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | a. | Illustrate a class that encapsulates information about a vehicle, it stores 3 attributes about a vehicle namely, the number of passengers, its fuel capacity and its average fuel consumption in miles per gallon(mpg). Use parameterized constructor to initialize 2 vehicles. Add a method computeRange that returns distance covered by the vehicle. Print the values of two vehicles and also the distance travelled. | (2) | (2) | (1) | (10) |
| | b. | Describe the use of this keyword. Write a java program that defines a Class Power that stores, base and exponent of the term $a^n$. Add a parameterized constructor that initializes a and n using this pointer. Also add a method computePower that iteratively computes $a^n$. | (3) | (2) | (3) | (10) |

Note: L (Level),CO (Course Outcome), PO (Programme Outcome), M (Marks)

## UNIT - III

L CO PO M

5 a. In a class hierarchy, in what order are the constructors executed? Explain with a programming example.

(2) (3) (1) (06)

b. Create a class named 'Rectangle' with two data members 'length' and 'breadth' and two methods to print the area and perimeter of the rectangle respectively. Its constructor having parameters for length and breadth is used to initialize length and breadth of the rectangle. Let class Box inherit the 'Rectangle' class with its constructor having a parameter for its side (suppose s) calling the constructor of its parent class as 'super(s,s)'. Print the area and perimeter of a rectangle and a square.

(3) (3) (12) (06)

c. What is an interface? What are the differences between a class and an interface? How do you create an interface? Explain with an example.

(2) (1) (1) (08)

**OR**

6 a. What is method overriding? What is the need for method overriding? Demonstrate method overriding with a suitable program example.

(3) (3) (1) (06)

b. Develop a Java program to implement the following inheritance hierarchy: The Employee class has name, address, basic as the instance variables. Given the basic salary, components of his/her gross salary are: Dearness allowance – 75% of basic salary, HRA – 7.5% of basic salary. A deduction of 10% of basic is deducted from gross salary as Income Tax to compute the net salary. Programmer class inherits from Employee class. The Programmer class has bonus as instance variable. The bonus is added to gross salary depending upon the skills and experience as per the following criteria.

| | Skill | | |
|---|---|---|---|
| Experience | Java | Python | C++ |
| 1-5 years | 10% of basic | 15% of basic | 8% of basic |
| 6-10 years | 15% of basic | 20% of basic | 10% of basic |
| >10 years | 20 % of basic | 25 % of basic | 15 % of basic |

(3) (3) (12) (08)

c. What is an abstract class? What are the rules applicable to abstract classes? How can you use a reference of an abstract class to achieve run-time polymorphism? Explain with an example program.

(2) (3) (3) (06)

## UNIT - IV

L CO PO M

7 a. Describe defining a package. Write a java program that illustrates use of package. It includes a class Book with dimensions title, author and pubDate. It initializes book objects and prints the content of atleast 5 books.

(2) (4) (1) (10)

b. Write a java program to illustrate exception handling that handles the array index out of bound. Describe several commonly used methods defined by Throwable.

(3) (4) (1) (10)

**OR**

8 a. Describe importing of the packages with an example. List java's standard packages with description. What is static import, explain with an example.

(2) (4) (1) (10)

b. Describe with an example throwing of an exception for a user defined exception. Explain string comparison using any five methods provided by String class.

(2) (4) (1) (10)

## UNIT -V

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 9 | a. | Create a swing application that demonstrates several key features of swing. | (3) | (5) | (3) | (10) |
| | b. | List all Event classes and corresponding event listener. Describe the cause for generation of each event. | (2) | (5) | (1) | (10) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 10 | a. | Write a java program that demonstrates icon based JButtons. It displays traffic light icons inside buttons. | (3) | (5) | (3) | (10) |
| | b. | Write a java program to illustrate the use of checkboxes. User can select supported operating systems Windows, Linux and Mac os. It displays appropriate messages for the selection made by the user. | (3) | (5) | (3) | (10) |

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18CS/IS35/16CS34

# Third Semester B.E. Semester End Examination, Dec./Jan. 2019-20
# COMPUTER ORGANIZATION / COMPUTER ORGANIZATION AND ARCHITECTURE

Time: 3 Hours

Max. Marks: 100

*Instructions:* 1. *Answer any FIVE full questions choosing at least one from each unit.*
2. *All questions carry equal marks*

## UNIT - I

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 1 | a. | With a neat diagram show connection between memory & the processor. Also explain the typical operational steps in executing an instruction. | (2) | (1) | (1) | (06) |
| | b. | Explain the basic performance equation and SPEC rating. | (2) | (1) | (1) | (06) |
| | c. | Explain the addressing modes giving its i) Assembler syntax ii) EA calculation with an example in each case. | (2) | (2) | (1) | (08) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | a. | What is straight line sequencing ? Explain with example. | (2) | (1) | (1) | (06) |
| | b. | Discuss about byte addressability, Big-endian and Little-endian assignment. | (2) | (2) | (1) | (06) |
| | c. | Explain the different methods to measure performance of a Computer system. | (2) | (2) | (1) | (08) |

## UNIT – II

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 3 | a. | What is an interrupt? With example illustrate the concept of interrupts. | (2) | (2) | (1) | (06) |
| | b. | With a neat block diagram explain Daisy Chain Interrupt Priority Scheme for handling simultaneous requests. | (2) | (2) | (1) | (06) |
| | c. | What is DMA? Why is bus Arbitration required? Explain with a neat block diagram Distributed bus arbitration approach. | (2) | (2) | (1) | (08) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | a. | What is an interrupt? Explain with a diagram, how interrupt request from several I/O devices can be communicated to a processor through a single INTR line. | (2) | (2) | (1) | (06) |
| | b. | Discuss different ways to enable and disable interrupts in a system. | (2) | (2) | (1) | (06) |
| | c. | What is DMA? Explain in brief simple arrangement for a centralized bus arbitration approach. | (2) | (2) | (1) | (08) |

## UNIT - III

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 5 | a. | Discuss internal organization of memory chip: 1K x 1 semiconductor RAM chip, with a block diagram. | (2) | (4) | (1) | (08) |
| | b. | Explain different memories in ROM family, with diagrams and key points. | (2) | (1) | (1) | (06) |
| | c. | Distinguish Speed, Size and Cost of Memory, in a computer, using memory hierarchy. | (2) | (1) | (1) | (06) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 6 | a. | Explain, with neat diagram, Direct Mapping, for a cache consisting of 128 blocks of 16 words each, for a total of 20148 (2K) words. Assume that the main memory is addressable by 16 - bits address. Calculate Tag, Block and Word bits for the same. | (2) | (3) | (1) | (10) |

b. Describe, with neat diagram, Associative Mapping, for a cache consisting of 128 blocks of 16 words each, for a total of 20148 (2K) words. Assume that the main memory is addressable by 16 - bits address. Calculate Tag, and Word bits for the same.

(2) (3) (1) (10)

| L | CO | PO | M |
|---|---|---|---|

## UNIT – IV

7 a. Make use of a block diagram to explain the sequential binary multiplier.

(3) (3) (4) (06)

b. Explain with diagram n bit ripple-carry adder.

(2) (3) (4) (06)

c. Build the circuit arrangement for binary division. Solve the given binary numbers 1000 % 0011 using non-restoring division.

(3) (3) (4) (08)

**OR**

8 a. How do you design FAST ADDERS? Explain a 4 bit carry look ahead adder.

(2) (3) (4) (06)

b. Apply Booth's algorithm to multiply the numbers -13 and +11.

(3) (3) (4) (06)

c. Build the circuit arrangement for binary division. Solve the given binary numbers 1000 % 0011 using restoring division algorithm.

(3) (3) (4) (0?)

| L | CO | PO | M |
|---|---|---|---|

## UNIT –V

9 a. With a neat sketch of single bus organization of the data path inside a processor, explain the three steps to be performed by the processor to execute an instruction

(2) (4) (4) (10)

b. Write the control sequence for the instruction MOVE (R1), R2.

(1) (4) (4) (10)

**OR**

10 a. Write and explain the control sequences for execution of an unconditional branch instruction.

(2) (4) (4) (10)

b. With a block diagram explain hardwired control.

(2) (4) (4) (10)



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16CS/IS34

# Third Semester B.E. Fast Track Semester End Examination, July/August 2019
## COMPUTER ORGANIZATION AND ARCHITECTURE

Time: 3 Hours

Max. Marks: 100

*Instructions:* 1. *Each Question carry 20 Marks*
2. *UNIT II and UNIT V are compulsory.*
3. *Answer three full questions from the remaining units*

### UNIT - I

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 1 | a. | Explain with diagram, the communication between processor and the memory. Write sequence of steps for memory read and write operations. | (1) | (1) | (2) | (08) |
| | b. | Discuss how single bus structure is used to connect different components of computer system. Explain different types of buses. | (1) | (1) | (2) | (06) |
| | c. | Discuss the Basic Performance Equation. Explain the parameters which affect the performance of computer system. | (1) | (1) | (2) | (06) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | a. | What is byte addressability? Write Big Endian and Little Endian address assignments for 2A,2B,4C,4D,5E,EF | (3) | (2) | (1) | (08) |
| | b. | What is an addressing mode? Explain addressing modes with syntax and an example. | (2) | (2) | (1) | (12) |

### UNIT – II (compulsory)

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 3 | a. | What is an Interrupt? Discuss with diagram Interrupt priority schemes. | (2) | (2) | (1) | (10) |
| | b. | Discuss with diagram the two approaches to bus arbitration. | (2) | (2) | (1) | (10) |

### UNIT - III

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | a. | Explain with diagram, the internal organization of 2M X 8 dynamic memory chip whose cells are organized as 4K X 4K array. | (3) | (2) | (1) | (12) |
| | b. | Draw and Explain the memory hierarchy of a computer system. Discuss the parameters speed, size and cost w.r.t. memory hierarchy. | (2) | (2) | (1) | (08) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | a. | Consider a cache consisting of 128 blocks of 16 words each, and main memory consists of 4K blocks of 16 words each. Apply set associative mapped cache with four blocks per set and generate Main memory address. Draw the diagram to show the mapping. | (3) | (3) | (1) | (10) |
| | b. | Explain Hit Rate and Miss Penalty. Assume that 30% of the instructions in a typical program perform a read or a write operation. It takes 17 clock cycles to load the data from main memory in case of cache miss and 1 clock cycle if it is available in cache. Given that the hit rate in the cache are 0.95 for instructions and 0.9 for data. Estimate average access time experienced by the processor. | (4) | (3) | (1) | (10) |

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

## UNIT - IV

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 6 | a. | Explain how Booth's algorithm is used to multiply two signed numbers. Discuss its best case, average case and worst case multiplier. | (2) | (3) | (1) | (10) |
| | b. | Explain with diagram IEEE floating point representation for single precision and double precision numbers | (2) | (3) | (1) | (10) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 7 | a. | Compute (24) *(-8), applying bit pair recoding algorithm. | (4) | (3) | (1) | (10) |
| | b. | Draw and explain circuit arrangement for restoring binary division. | (3) | (3) | (1) | (10) |

## UNIT – V (compulsory)

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 8 | a. | Explain the stages of pipeline. Show with the diagram pipelined and non-pipelined concept and discuss their performance. | (2) | (4) | (2) | (12) |
| | b. | Explain with an example dependencies in pipelined processor. | (2) | (4) | (1) | (08) |

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16CS32/CS32/16IS32

# Third Semester B.E. Fast Track Semester End Examination, July/August 2019
# LOGIC DESIGN AND APPLICATIONS

Time: 3 Hours  Max. Marks: 100

*Instructions:* 1. *Answer any FIVE full questions.*
2. *UNIT I and III are compulsory.*
3. *Assume any missing data suitably.*



## UNIT – I (COMPULSORY)

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 1 | a. | Apply K-Map reduction technique to obtain the reduced SOP expression for the given Boolean function. $F(A,B,C,D) = \Sigma m(2,5,7,8,13,15) + \Sigma d(0,10)$ | (3) | (1) | (1) | (06) |
| | b. | Solve the given Boolean function to obtain reduced expression using QuineMcClusky reduction technique. $F(A,B,C,D) = \Sigma m(1,3,5,7,9,11,13,15) + d(0,2,8,10)$ | (3) | (1) | (1) | (08) |
| | c. | Make use of K-Map reduction technique to obtain the reduced SOP expression for the given Boolean function. $F(A,B,C,D) = \Sigma m(0,5,6,7,8,10) + \Sigma d(2,4,8,14)$ | (3) | (1) | (1) | (06) |

## UNIT – II

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | a. | Define Multiplexer. Implement the given Boolean function using 4:1 Multiplexer with A as MEV. $F(A,B,C) = \Sigma m(0,1,3,5,7)$ | (1, 3) | (2) | (1) | (06) |
| | b. | Show how the suitable decoder and multi input OR gate are used to realize the following Boolean Expressions. $F1(A,B,C) = \Sigma m(1,3,5,7)$ $F2(A,B,C) = \Sigma m(0,1,3)$ $F3(A,B,C) = \Sigma m(2,4,6)$ | (3) | (2) | (1) | (08) |
| | c. | Use PLA to realize the following Boolean expressions. $X(A,B,C) = \Sigma m(0,2,5)$ $Y(A,B,C) = \Sigma m(5,6,7)$ $Z(A,B,C) = \Sigma m(2,3)$ | (3) | (2) | (1) | (06) |

| L | CO | PO | M |
|---|---|---|---|

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | a. | Use 8:1 multiplexer to realize the following Boolean function. $F(A,B,C,D) = \Sigma m(0,2,3,5,7,8,10)$ | (3) | (2) | (1) | (06) |
| | b. | Design 1-bit Magnitude comparator and draw the logic diagram for the same. | (3) | (2) | (2) | (08) |
| | c. | Develop the truth table for 8:1 multiplexer. Realize 8:1 multiplexer using 2:1 multiplexers only. | (3) | (2) | (1) | (06) |

Note: L (Level),CO (Course Outcome), PO (Programme Outcome), M (Marks)

## UNIT – III (COMPULSORY)

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 4 | a. | Explain the working of JK flip-flop using NAND/ NOR realization. | (2) | (2) | (1) | (06) |
| | b. | Prepare the characteristic equation for JK and SR flip-flops. | (3) | (2) | (2) | (08) |
| | c. | Define excitation table. Write the excitation table of SR, JK, T and D flip-flops. | (1, 2) | (2) | (1) | (06) |

## UNIT - IV

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 5 | a. | Explain the working of 3-bit asynchronous UP counter using T flip-flop. | (2) | (3) | (1) | (06) |
| | b. | Design a 4-bit Ring counter and explain its working with neat waveforms. | (3,2) | (3) | (2) | (08) |
| | c. | Show how to convert JK flip flop to T flip-flop. | (3) | (3) | (2) | (06) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 6 | a. | Explain with a neat diagram, the working of 4-bit SISO right shift register. | (2) | (2) | (1) | (06) |
| | b. | Design a 3-bit synchronous UP counter using T flip-flop. | (3) | (3) | (2) | (08) |
| | c. | Design a 4-bit Johnson counter and explain its working with neat waveforms. | (2,3) | (3) | (2) | (06) |

## UNIT -V

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 7 | a. | Explain with a neat diagram, the working of 4-bit R-2R binary ladder Digital to Analog Converter (DAC). | (2) | (3) | (1) | (06) |
| | b. | Explain with a neat diagram the working of counter type ADC. | (2) | (3) | (1) | (08) |
| | c. | Calculate the following for the counter type ADC driven by 500-kHz clock.<br>i. The maximum conversion time<br>ii. The maximum conversion rate. | (3) | (3) | (2) | (06) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 8 | a. | Define Accuracy and Resolution (two ways) of DAC. Compute the Resolution (two ways) of 8-bit DAC. Assume full scale output voltage $V_{OFS}$= + 10.2V | (1,3) | (3) | (2) | (06) |
| | b. | Explain with a neat diagram, the working of Successive Approximation type Analog to Digital Converter (ADC). | (2) | (3) | (1) | (08) |
| | c. | Calculate the following for 5-bit resistive divider DAC:<br>i. The weight assigned to the LSB.<br>ii. The weight assigned to the second and third LSB.<br>iii. The change in the output voltage due to a change in the LSB, second LSB and third LSB.<br>iv. The output voltage for a digital input of 10101. Assume 0=0V and 1=+10v. | (3) | (3) | (2) | (06) |

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16CS35/CS35/16IS35/IS35

# Third Semester B.E. Fast Track Semester End Examination, July/August 2019
## DATA STRUCTURES USING C

Time: 3 Hours

Max. Marks: 100

*Instructions:* 1. *Answer 5 full questions.*
2. *Unit –III and Unit – V are compulsory*
3. *Draw the diagrams where ever necessary*



### UNIT – I

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 1 | a. | Define pointer? With examples, explain pointer declaration, pointer initialization and use of pointer in allocating a block of memory dynamically. | (1) | (1) | (1) | (10) |
| | b. | Explain the different dynamic memory allocation functions with an example. | (2) | (1) | (1) | (10) |

### OR

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | a. | What is structure? Give the three different ways of defining structure and declaring variables and method of accessing the members of structures using a student structure with roll no, name and marks in 3 subjects as members of structure as example. | (1) | (1) | (1) | (10) |
| | b. | What is the output of the following program given below and also differentiate between Structure and Union | | | | |

```
#include <stdio.h>
int main()
{
    int var =10;
    int *p;
    p= &var;

    printf ( "Address of var is: %p", &var);
    printf ( "\nAddress of var is: %p", p);

    printf ( "\nValue of var is: %d", var);
    printf ( "\nValue of var is: %d", *p);
    printf ( "\nValue of var is: %d", *( &var));

    /* Note I have used %p for p's value as it represents an address*/
    printf( "\nValue of pointer p is: %p", p);
    printf ( "\nAddress of pointer p is: %p", &p);

    return 0;
}
```

(2) (1) (1) (10)

### UNIT – II

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 3 | a. | Define stack .Implement push and pop functions for stack using arrays. Write down the differences between stack and queue. | (2) | (2) | (2) | (10) |
| | b. | Convert the following infix expressions into postfix form in tabular format.<br>**a) ((A+(B-C)*D)^E+F)**<br>**b) (A+(B-C)*D)** | (2) | (2) | (2) | (05) |
| | c. | Evaluate the following postfix expressions: (a) **AB+CDE-*/** ( b) **ABC-D*+E$F+.**<br>Where **A=1, B=2, C=3, D=4, E=5, F=1.** | (2) | (2) | (2) | (05) |

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

**OR**

4 a. Write a C program to simulate the working of linear queue. Provide the following operations: i)insert ii)delete iii)display

(3) (3) (2) (10)

b. Write a C program to perform the following operations on circular queue.
i) Insert an element into the queue ii) delete an element from the queue iii) display the elements in a circular queue.

(3) (3) (3) (10)

## UNIT – III (compulsory)

L CO PO M

5 a. Implement stack as a linked list.

(3) (3) (3) (10)

b. Write a C function to a) insert a new node after the first node. b) to concatenate two singly linked list

(3) (3) (3) (10)

## UNIT - IV

L CO PO M

6 a. Differentiate between singly linked list and doubly linked list.

(1) (3) (1) (04)

b. Define Binary search tree and Construct the binary search tree for the following input.

14,5,6,2,18,20,16,18, 1,21

(2) (4) (1) (08)

c. Write the C functions to traverse the tree in inorder, preorder and post order traversals.

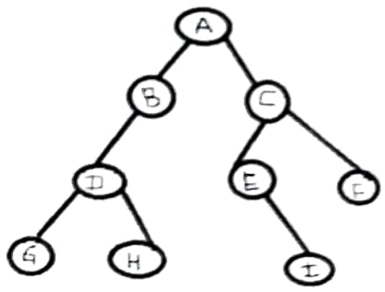
(3) (4) (3) (08)

**OR**

7 a. Define the following: a)Strictly binary tree b)Complete binary trees c) Binary search trees d)Skewed tree e) binary tree

(1) (4) (2) (05)

b. Given the following graph ,write inorder,preorder and postorder traversals.




(2) (4) (2) (05)

c. Construct min heap and max heap for the following list: For Input → 35 ,33, 42, 10, 14, 19, 27 ,44, 26 31

(2) (4) (2) (10)

## UNIT –V (compulsory)

L CO PO M

8 a. What is an adjacency list and adjacency matrix? Explain with examples.

(2) (4) (2) (10)

b. What is graph traversal? Explain different graph traversal techniques

(2) (4) (2) (10)

SN | | | | | | | | | | |

CS36 / iS36

# Third Semester B.E. Makeup Examination, May/June 2018-19

# OOP WITH JAVA

Time: 3 Hours

Max. Marks: 100

*Instructions:*
1. *Units II and III are compulsory.*
2. *Answer any one full question from remaining each UNITS.*
3. *Write Java program, where ever necessary.*
4. *Assume suitable data, if necessary.*

## UNIT – I

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 1 | a. | Infer a class and an object in Java with example. | (2) | (2) | (2) | (06) |
| | b. | Paraphrase terms associated with Java:<br>i) Multithreaded<br>ii) Architecture Neutral. | (2) | (1) | (1) | (08) |
| | c. | List and discuss three principles of Object Oriented Programming. | (2) | (1) | (1) | (06) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| | a. | Explain Java program's format or skeleton, with an example. | (2) | (1) | (1) | (10) |
| | b. | Explain buzzwords of Java, JVM and byte code, briefly. | (2) | (1) | (1) | (10) |

## UNIT – II (Compulsory)

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 3 | a. | How you add a Method to the Box Class, explain with Java program. | (2) | (2) | (1) | (06) |
| | b. | Write a Java program to demonstrate Parameterized Constructors. | (2) | (2) | (1) | (08) |
| | c. | With Java code, review the General Form of a Class. | (2) | (2) | (1) | (06) |

## UNIT – III (Compulsory)

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 4 | a. | Illustrate with a Java program using the ArrayList Class and LinkedList Class. | (2) | (3) | (2) | (08) |
| | b. | Interpret Nested and Inner Classes using Java program. | (2) | (3) | (2) | (06) |
| | c. | Describe Recursion in Java. Write an example. | (2) | (3) | (2) | (06) |

## UNIT - IV

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 5 | a. | What is polymorphism, explain with simple Java program. | (2) | (4) | (2) | (08) |
| | b. | Define method overriding, with a java program. | (2) | (4) | (2) | (06) |
| | c. | With respect to Java, review benefits of inheritance and costs of inheritance. | (2) | (4) | (1) | (06) |

**OR**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 6 | a. | Define following. in Java context :i)Base class object, ii)subclass, iii)subtype, iv)substitutability | (2) | (4) | (1) | (06) |
| | b. | Illustrate Hierarchical abstractions using a program written in Java. | (3) | (4) | (2) | (06) |
| | c. | Compare the forms of inheritance, using samples of Java. | (2) | (4) | (2) | (08) |

**UNIT - V**

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 7 | a. | Define super keyword in Java. Demonstrate the usage of super keyword. | (2) | (3) | (1) | (10) |
| | b. | Define exceptions. Illustrate Division by Zero run time error using a Java program. | (3) | (4) | (1) | (10) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 8 | a. | Explain the following keywords briefly:<br>(a) try<br>(b) catch<br>(c) finally<br>(d) throw<br>(e) throws | (2) | (3) | (1) | (10) |
| | b. | Illustrate exception handling in Java, with a program. | (2) | (3) | (1) | (10) |

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CS34/16IS/CS34

**Third Semester B.E. Makeup Examination, January 2019**

# COMPUTER ORGANIZATION AND ARCHITECTURE

Time: 3 Hours

Max. Marks: 100

*Instructions:*
1. *Accurate answers expected.*
2. *Unit I & Unit II are compulsory. Answer one full question from the remaining units*
3. *Data, if necessary, may be assumed.*
4. *Diagrams, when required, may be drawn.*

## UNIT - I

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 1 | a. | Interpret Basic Operational concepts showing connections between the processor and memory with a neat block diagram. | (2) | (1) | (1) | (06) |
| | b. | Perform the following operations on the 5 bit signed numbers using 2's complement representation system. Analyze whether an overflow occurs. (i)(-10) + (-13) (ii)(-10) - (+4) (iii)(+7) - (-15) (iv)(+8) + (+10) | (4) | (1) | (1) | (08) |
| | c. | Define addressing mode and explain any four addressing modes with a suitable example. | (1,2) | (2) | (1) | (06) |

## UNIT – II

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 2 | a. | Analyze with a program that reads a line from the keyboard, stores in memory buffer, and echoes it back to the display. | (4) | (4) | (1) | (06) |
| | b. | Examine all three methods of handling multiple devices, with neat sketches and function. | (4) | (2) | (1) | (06) |
| | c. | Illustrate distributed bus arbitration, assume two devices, A and B, with ID's $5_{10}$ and $6_{10}$ ($0101_2$ and $0110_2$) for the sake of explanation. | (2) | (2) | (2) | (08) |

## UNIT - III

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 3 | a. | Explain the internal organization of a memory chip for 1Kx1 memory chip, using decoder and multiplexer. | (2) | (3) | (1) | (10) |
| | b. | With internal organization diagram of a 2Mx8 dynamic memory chip, explain asynchronous DRAM's. | (2) | (3) | (1) | (10) |

**OR**

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 4 | a. | What is Cache? Explain any two cache mapping functions with neat sketches. | (1,2) | (3) | (1) | (10) |
| | b. | Summarize the memory hierarchy with respect to speed, size and cost. | (2) | (3) | (1) | (06) |
| | c. | Briefly summarize the different types of Read Only Memory (ROM). | (2) | (3) | (1) | (04) |

## UNIT - IV

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 5 | a. | Explain with block diagram: ADDER/SUBTRACTOR circuit. Explain how subtraction is achieved with an example. | (2) | (2) | (1) | (06) |
| | b. | Explain sequential circuit multiplication, using a suitable block diagram | (2) | (2) | (1) | (06) |

Note: L (Level),CO (Course Outcome), PO (Programme Outcome), M (Marks)

c. Solve for Quotient and Reminder, using Restoring Division Algorithm: 14 divide by 3.

(3) (4) (2) (08)

**OR**

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 6 | a. | Define Bit-stage cell. Using Bit-stage cell explain a 4-bit binary Carry-Look-Ahead adder. | (2) | (1) | (1) | (06) |
| | b. | Explain the non-restoring division algorithm Perform the division of number 8 by 3 (8÷3) using the same. | (2) | (2) | (1) | (08) |
| | c. | Solve for the product using Booth's Algorithm. (+15) x (-9) | (3) | (4) | (2) | (06) |

**UNIT -V**

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 7 | a. | Define computer Architecture. Illustrate seven dimensions of an ISA. | (1,2) | (4) | (1) | (10) |
| | b. | Explain the following in brief (i) Amdahl's Law (ii) Dependability | (2) | (4) | (1) | (10) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 8 | a. | Demonstrate the working of a classic five stage pipeline for a RISC processor. | (2) | (4) | (2) | (10) |
| | b. | Explain data hazards and methods to minimize data hazards with examples. | (2) | (4) | (2) | (10) |

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CS32/16CS/IS32

Third Semester B.E. Semester End Examination, Dec/Jan 2018-19

# LOGIC DESIGN AND APPLICATIONS

Time: 3 Hours

Max. Marks: 100

*Instructions:* *1. Unit I and III are compulsory.*
*2. Answer one full question from remaining units.*

## UNIT - I

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 1 | a. | Write the truth table for fig 1. And realize the same using NOR universal gate. | | | | |

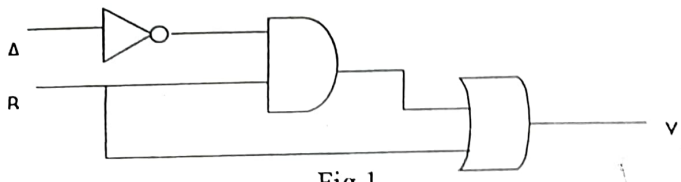


Fig.1.

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | (3) | (1) | (1) | (04) |
| | b. | Using K-map reduction technique, simplify the given expression and realize the circuit using basic gates. $F(w,x,y,z) = \sum m(0,2,4,6,8,10,12,14)+d(1,3,15)$ | (3) | (1) | (2) | (08) |
| | c. | Apply Quine McClusky reduction method to simplify the given expression $F(w, x, y, z) = \sum m(1,3,5,7,9,11,13,15)+d(0,2)$ | (3) | (1) | (2) | (08) |

## UNIT – II

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 2 | a. | Define a Demultiplexer and explain the working of a 1:4 Demultiplexer with a neat circuit diagram and truthtable. | (2) | (2) | (1) | (06) |
| | b. | Illustrate and design an odd parity generator for 3 bit binary data with a neat diagram. | (3) | (2) | (2) | (06) |
| | c. | Distinguish between a Decoder and a Demultiplexer and realize the following Boolean functions using 3:8 Decoder and OR gates. $F1(A,B,C) = \sum m(1,2,4,7)$ $F2(A,B,C) = \sum m(0,3,5,6)$ | (3) | (2) | (1) | (08) |

**OR**

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 3 | a. | Design a 2 bit Magnitude comparator with a truth table and a neat logic diagram. | (3) | (2) | (1,4) | (08) |
| | b. | With a neat circuit diagram illustrate the working of a Full adder and write the Boolean expressions for the outputs. | (2) | (2) | (2) | (06) |
| | c. | Make use of PLA to implement the following Boolean functions. $F1(A,B,C) = \sum m(4,5,7)$ $F2(A,B,C) = \sum m(3,5,7)$ | (3) | (2) | (1) | (06) |

## UNIT - III

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | a. | Realize the SR flip flop using NAND gates. Explain its working with help of truth table. | (3) | (3) | (1) | (06) |
| | b. | Explain working of (i) gated JK flip flop (ii) gated D flip flop | (2) | (3) | (1) | (06) |
| | c. | Derive the characteristic equations for SR , JK flip flops with state transition diagram and write the excitation tables. | (3) | (3) | (2) | (08) |

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

## UNIT - IV

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 5 | a. | Analyze the given sequential circuit and write the state analysis table and state transition diagram shown in fig 5a. | | | | |

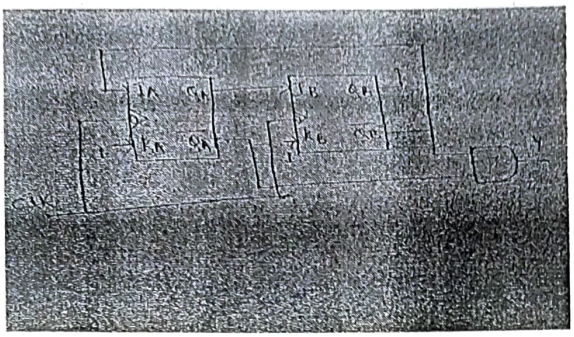

Fig 5a

(4) (3) (2) (06)

b. Explain with neat waveform Johnson counter.

(2) (3) (1) (06)

c. Design a MOD-5 synchronous counter using JK flip flop. Draw the logic diagram for the same.

(3) (3) (2) (08)

**OR**

6 a. Show how SR flip flop is converted to JK flip flop.

(2) (3) (2) (06)

b. With a neat diagram and waveform explain MOD 8 (3-bit) asynchronous counter using JK flip flops.

(2) (3) (1) (06)

c. Explain SISO and PISO types of shift registers with neat diagrams.

(2) (3) (1) (08)

## UNIT -V

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 7 | a. | With neat sketch explain the working of 4 bit R-2R binary ladder DAC. | | | | |

(2) (3) (1) (06)

b. Determine the output voltages for the inputs 11000 and 10010 if Logic 0=0V and 1=+10V.

(2) (3) (2) (06)

c. Explain the working of successive approximation ADC with neat circuit diagram.

(2) (3) (1) (08)

**OR**

8 a. Explain the working of 2 bit parallel comparator A/D Converter with neat circuit diagram.

(2) (3) (1) (08)

b. With neat sketch explain the working of 4 bit R-2R binary ladder DAC.

(2) (3) (1) (08)

c Define resolution of D/A converter. What is resolution for 8 bit DAC if V=+5V.

(1) (3) (1) (04)

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16CS/IS35

# Third Semester B.E. Semester End Examination, DEC/JAN 2018-19

# DATA STRUCTURES USING C

Time: 3 Hours

Max. Marks: 100

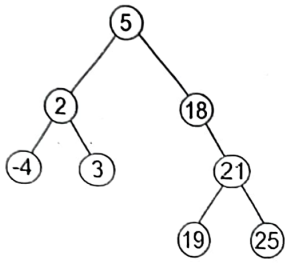
*Instructions:*
1. *UNIT I and UNIT II are compulsory.*
2. *Answer any one full question from remaining units.*
3. *Write assumptions for the programs if any.*
4. *Write comments and sample input/output where ever required.*

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| | | **UNIT - I** | | | | |
| 1 | a. | Illustrate the use of pointer to pointer with program example. | (2) | (2) | (3) | (05) |
| | b. | List out the differences between Structures and Unions | (2) | (3) | (1) | (06) |
| | c. | Write a C program to read and print the student records.Name, USN,sem,marks of 3 subjects are read from the user. Calculate the average and print the result with appropriate headings. Calculate for `n` number of students. Use appropriate data structure. | (3) | (1) | (3) | (09) |
| | | **UNIT – II** | L | CO | PO | M |
| 2 | a. | Differentiate between stack and queue. | (2) | (1) | (1) | (04) |
| | b. | What are the limitations of linear queue? Give alternate approach to overcome these limitations of linear queue with the help of code for insert and delete operations. | (2) | (2) | (2) | (06) |
| | c. | i. Convert the following infix expression to its postfix forms, show the conversion steps using tabulation method ((A+B)/C-((D*(E-F))/G))*Y<br>ii. Evaluate the following postfix expression, show the evaluation steps using tabulation method and also write a final value of expression. 6 8 4 * 3 + 6 / - 9 + 3 - 4 + | (3) | (1) | (2) | (10) |
| | | **UNIT - III** | L | CO | PO | M |
| 3 | a. | Write a C function for the following –<br>(i) Insert a node at the front end of the singly linked list.<br>(ii) Delete a node from the rear end of the singly linked list.<br>(iii) Display the contents of the singly linked list | (3) | (1) | (2) | (09) |
| | b. | Explain the following with help of C code and example diagram-<br>(i) Concatenate two singly linked lists.<br>(ii) Reverse the given list without creating new node. | (3) | (2) | (2) | (06) |
| | c. | Write a C code for the following operation on circular singly linked list-<br>(i) Insert a node at the front end.<br>(ii) Deletion of a node at the rear end. | (3) | (2) | (2) | (05) |
| | | **OR** | | | | |
| 4 | a. | List out the differences between singly linked list and doubly linked list. | (2) | (3) | (1) | (03) |
| | b. | Illustrate the following using Doubly Linked list with C-Code.<br>(i) Insert a node at front end.<br>(ii) Insert a node at rear end.<br>(iii) Delete a node from rear end.<br>(iv) Delete a node from front end. | (2) | (2) | (3) | (08) |

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

c. Consider a scenario where singly linked list contains the nodes **10,15,25,30,45,50.** Insert node with data **12** at the front end. Insert node with data **55** at the front end. Delete a node from the rear end. Explain the insertion and deletion process step by step using appropriate code and diagram. (3) (1) (3) (09)

## UNIT - IV

| | | L | CO | PO | M |
|---|---|---|---|---|---|
| 5 | a. Write a function in C to insert a node at proper position in a sorted list of integer numbers in ascending order implemented using doubly linked list. | (3) | (2) | (3) | (06) |
| | b. Write recursive functions for tree traversals and trace the functions using following tree:   | (3) | (4) | (3) | (08) |
| | c. What is heap? Construct a max heap for the following set of numbers and show all the steps of construction: **56,34,78,44,22,38,74,89,100,99,200.** | (3) | (4) | (3) | (06) |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 6 | a. Prove the following properties of Binary Tree:<br>i. The maximum number of nodes on level "i"of a binary tree is $2^{i-1}$, $i \geq 1$.<br>ii. The maximum number of nodes in a binary tree of depth "k" is $2^k-1$, $k \geq 1$. | (3) | (4) | (1) | (06) |
| | b. How binary tree can be stored in array? Explain with the help of example. | (2) | (4) | (1) | (06) |
| | c. Write a function in C to insert a node in a binary search tree and trace the function for the following set of inputs **56,34,78,44,22,38,74,89,100,99,200.** | (3) | (3) | (3) | (08) |

## UNIT -V

| | | L | CO | PO | M |
|---|---|---|---|---|---|
| 7 | a. Define Graph. With example discuss how the graph is represented using adjacency matrix. | (2) | (3) | (3) | (08) |
| | b. Write a C function which illustrates Depth First Search Concept. | (2) | (3) | (3) | (06) |
| | c. Define spanning tree. Explain in detail with simple example. | (2) | (1) | (1) | (06) |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 8 | a. Write a C program which illustrates Breadth First Concept. | (2) | (3) | (3) | (08) |
| | b. Explain in detail DFS with example. | (3) | (2) | (2) | (06) |
| | c. What is minimum cost spanning tree? Explain in detail with simple example. | (2) | (4) | (2) | (06) |

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16CS/IS32

# Third Semester B.E. Makeup Examination, January 2019

# LOGIC DESIGN AND APPLICATIONS

Time: 3 Hours

Max. Marks: 100

*Instructions:* 1. *Unit I and Unit III are compulsory*
2. *Answer One complete question from remaining UNITS*
3. *Assume missing data if any*

## UNIT - I

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 1 | a. | Simplify the following Boolean Expression and draw the logic circuit using NAND gates only. Assume inverted input is available. $Y = A + A'B + AB$ | (3) | (1) | (1) | (06) |
| | b. | Apply K-Map reduction technique to obtain the reduced SOP expression for the given Boolean function. $F(A,B,C,D) = \sum m(0,1,5,9,13,14,15) + d(3,4,7,10,11)$ | (3) | (1) | (2) | (06) |
| | c. | Solve the given Boolean function by using Quine Mc Clusky method and find all the essential prime implicants. $F(A,B,C,D) = \sum m(0,1,2,3,10,11,12,13,14,15)$ | (3) | (1) | (2) | (08) |

## UNIT – II

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 2 | a. | Design a suitable decoder for the given SOP functions $F1(A,B,C) = \sum m(0,1,4,5)$ $F2(A,B,C) = \sum m(2,5,7)$ $F3(A,B,C) = AB + A'B'$ | (3) | (2) | (2) | (06) |
| | b. | Design 1 bit magnitude comparator | (3) | (2) | (2) | (08) |
| | c. | Define demultiplexer. Explain the working of 1 to 4 demultiplexer with neat circuit diagram. | (2) | (2) | (2) | (06) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | a. | Differentiate between PAL and PLA. Realize full adder using suitable size PAL. | (3) | (2) | (2) | (06) |
| | b. | Explain the working of parity generator and parity checker with suitable examples. | (2) | (2) | (2) | (06) |
| | c. | Design the following circuits using basic logic gates (i) Full adder circuit (ii) Half Subtracter circuit | (3) | (2) | (1) | (08) |

## UNIT – III

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 4 | a. | Define system clock, explain the characteristics of an ideal clock. | (1,2) | (2) | (1) | (06) |
| | b. | Explain the working of a JK flip flop with a neat circuit diagram.. | (2) | (2) | (1,4) | (06) |
| | c. | Derive the characteristic equations for JK, SR, T and D flip flops and draw state transition diagrams for each. | (3) | (2) | (1,4) | (08) |

## UNIT - IV

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 5 | a. | Differentiate between synchronous and asynchronous counters. Construct a 4 bit ripple counter using JK flip flops and show the timing diagram. | (3) | (3) | (2) | (10) |
| | b. | Design a circuit for mod 7 synchronous up counter using JK flip flop | (3) | (3) | (2) | (10) |

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

**OR**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 6 | a. | Explain the working of (i) SISO (ii) PIPO with waveform. | (2) | (3) | (1) | (06) |
| | b. | Explain the working of (i) Jhonsons counter (ii) Serial Adder | (2) | (3) | (1) | (08) |
| | c | Convert SR flip flop into D flip flop. | (3) | (3) | (2) | (06) |

**UNIT -V**

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 7 | a. | Define Resolution and Accuracy of Digital to Analog converter. What is the Resolution of 10 bit for ladder type DAC? What is voltage resolution if full scale output is +5volts? | (1) | (3) | (1,4 ) | (06) |
| | b. | Explain 4-bit R-2R ladder Digital to Analog converter. | (2) | (3) | (1,4 ) | (06) |
| | c. | With a neat diagram explain 2-bit parallel comparator type Analog to digital converter. How many comparators are required for 4-bit ADC? | (2,1) | (3) | (1,4 ) | (08) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 8 | a. | Explain 2-bit Simultaneous A/D converter with a neat block diagram. | (2) | (3) | (1) | (06) |
| | b. | Explain the working of Successive Approximation ADC and find out the conversion time of a 12-bit Successive Approximation A/D converter using 1 MHZ clock. | (1,2) | (4) | (1,4) | (06) |
| | c. | Explain 3-bit R-2R ladder DAC. What is the output for 5-bit DAC when input is 11000 and voltage v = +5v. | (2) | (3) | (1,4 ) | (08) |

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CS34/16CS/IS34

# Third Semester B.E. Semester End Examination, Dec/Jan 2018-19
# COMPUTER ORGANIZATION AND ARCHITECTURE

Time: 3 Hours

Max. Marks: 100

*Instructions:* 1. *UNIT-I and UNIT-II are compulsory*
2. *Answer any one full question from remaining units*

## UNIT - I

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 1 | a. | With the block diagram showing connection between the processor and memory, explain the functions of MAR and MDR. | (2) | (1) | (1) | (06) |
| | b. | List first 8 generic addressing modes, brief about - name of address mode-syntax-addressing functioncontaining effective address (EA), for each one. | (1) | (2) | (1) | (06) |
| | c. | For two computers R and C, with same execution time (T) and clock rate (R), solve for largest allowable value of number of instructions (N), if the effective value of basic steps (S) is 1.2 for computer R and 1.5 for computer C. Given that number of instructions (N) for computer R is 10. | (3) | (3) | (2) | (08) |

## UNIT – II

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 2 | a. | With neat sketches explain a method for handling interrupts from multiple devices | (2) | (2 ) | (1) | (10) |
| | b. | What is DMA? Explain in brief the simple arrangement for a centralized bus arbitration approach. | (1,2) | (2) | (1) | (10) |

## UNIT - III

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 3 | a. | Explain Synchronous DRAM with a block diagram. | (2) | (2) | (1) | (06) |
| | b. | Compare precisely ROM family: PROM, EPROM, EEPROM, Flash Memory, Flash Cards, Flash Drives | (2) | (1) | (1) | (06) |
| | c. | Assume you have 32 bit addresses, 32 KB of cache, 64 byte lines and 4 way set associative. Demonstrate with a block diagram. | (2) | (4) | (2) | (08) |

## OR

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | a. | Illustrate organization of 1K x 1 memory chip for semiconductor RAM. | (2) | (4) | (2) | (06) |
| | b. | Compare the parameters: Speed, Size and Cost of memory hierarchy. | (2) | (1) | (1) | (06) |
| | c. | Explain Direct mapped cache for 128 blocks of 16 words each, a total of 2048(2K) words with 16 – bit address bus. | (2) | (4) | (2) | (08) |

## UNIT - IV

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 5 | a. | Explain the design of 4-bit Carry Look Ahead adder. | (2) | (3) | (2) | (08) |
| | b. | Multiply (+14) and (-6) using Booth's algorithm. | (3) | (3) | (2) | (07) |
| | c. | Perform the division of number 8 by 3 (8÷3) using restoring division method. | (3) | (3) | (2) | (05) |

Note: L (Level),CO (Course Outcome), PO (Programme Outcome), M (Marks)

OR

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 6 | a. | Explain sequential circuit binary multiplier with an example. | (2) | (3) | (2) | (10) |
| | b. | Explain the non-restoring division algorithm Perform the division of number 8 by 3 (8÷3) using.the same. | (2) | (3) | (2) | (10) |

## UNIT -V

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 7 | a. | Explain the following with respect to classes of parallelism and parallel architecture:<br>a. Types of parallelism in applications<br>b. Major ways of parallelism.<br>c. Categories of data-level parallelism. | (2) | (2) | (1) | (10) |
| | b. | Interpret computer performance, with respect to<br>a. Measuring with three kinds of benchmarks<br>b. Reporting performance results<br>c. Summarizing performance results | (2) | (2) | (1) | (10) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 8 | a. | Explain seven dimensions of an ISA. | (2) | (2) | (1) | (10) |
| | b. | Exemplify,<br>a. data hazard with an example<br>b. how it is minimized by forwarding (or bypassing or short circuiting) | (2) | (2) | (1) | (10) |

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16CS/IS35

# Third Semester B.E. Makeup Examination, January 2019

# DATA STRUCTURES USING C

Time: 3 Hours

Max. Marks: 100

*Instructions:*
1. *UNIT-I and UNIT-II are compulsory.*
2. *Answer any one question from remaining units.*
3. *Write comments in the program wherever necessary.*
4. *Draw necessary diagrams wherever necessary.*

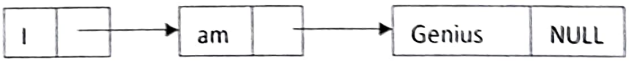
## UNIT - I

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 1 | a. | What is pointer in C? Explain the concept of Null pointer and dangling pointer? | (2) | (2) | (1) | (06) |
| | b. | What is structure in C? How it is different from union? Exemplify different ways of declaring structures and unions in C. | (1) | (1) | (1) | (06) |
| | c. | Consider an application in which data related to set of "N" people applying for ration card is captured in an array of structures which includes name, age, aadhar number and annual income. Write a function in C which receives this array as argument and return the memory address of the structure containing information of a person whose annual income is minimum among all people. | (3) | (2) | (3) | (08) |

## UNIT – II

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 2 | a. | Explain the conceptof stack using dynamic arrays. Write C function for Push and Pop operations for the same.. | (2) | (2) | (1) | (06) |
| | b. | Convert the following infix expression to postfix expression form using tabular method<br>(i) (A + B – (C*(A+B)/D))<br>(ii) ((2+3)*5)-(8/2) | (3) | (1) | (1) | (08) |
| | c. | Write C functions for the various operations that are performed on the stack. | (2) | (1) | (3) | (06) |

## UNIT - III

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 3 | a. | Discuss the disadvantages of arrays. How they are overcome using linked list? | (2) | (2) | (1) | (06) |
| | b. | Write a function in C to find duplicate nodes in a linked list and delete them assuming the linked list is already created, it has minimum of 2 nodes and the nodes are arranged in ascending order. | (3) | (2) | (3) | (06) |
| | c. | Write a function in C to reverse the linked list which contains string as information. Display contents of the list after reverse operation.<br>Example :  <br>Output: Genius am I | (3) | (2) | (3) | (08) |

**OR**

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 4 | a. | Insertion and deletion operations on linked list are efficient compared to arrays. Justify the above statement. | (2) | (2) | (2) | (04) |
| | b. | Explain how polynomials are stored using linked list. With the help of example show the addition of two polynomials using linked list. | (2) | (2) | (2) | (08) |

c. Write a functions in C to perform following operation with singly linked list:
   i. Insert a node at front
   ii. Insert a node at rear
   iii. Delete a node with specific key element.
   iv. Display the contents of list.

(3) (2) (3) (08)

## UNIT – IV

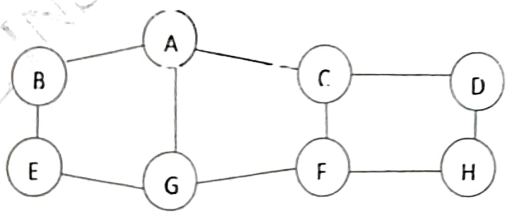
| | | L | CO | PO | M |
|---|---|---|---|---|---|
| 5 | a. Write a C functions for different tree traversal techniques. | (3) | (1) | (3) | (09) |
| | b. Construct a Binary search tree for the following data explaining each step-<br>(i) 100,50,60,125,69,110,101,59,68<br>(ii) 210,56,200,220,226,229,98,75,80 | (2) | (3) | (2) | (06) |
| | c. What are heaps? Build a max heap for the following set of numbers 75,90,30,25,50,95.<br>Show all intermediate steps for the heap construction. | (3) | (4) | (1) | (05) |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 6 | a. Explain the following terms with respect to binary tree with example-<br>(i) Siblings (ii) Ancestors (iii) Level (iv) Leaf node (v) Root (vi) Degree. | (2) | (1) | (3) | (06) |
| | b. Construct the Binary search tree for the given traversals<br>INORDER-WSXQYTZPURV<br>PREORDER-PQSWXTYZRUV | (2) | (3) | (2) | (06) |
| | c. Explain min-heap in detail with example. | (3) | (2) | (2) | (08) |

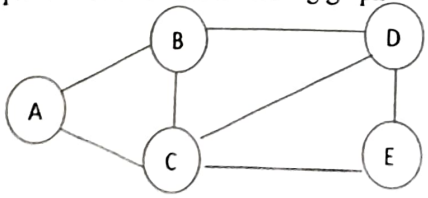
## UNIT –V

| | | L | CO | PO | M |
|---|---|---|---|---|---|
| 7 | a. Explain any two methods of representation of graph with example | (2) | (4) | (1) | (06) |
| | b. Write BSF algorithm and trace the same for one input graph. | (2) | (4) | (3) | (06) |
| | c. Traverse the graph given below using DFS technique. Assume A as a source node. | (3) | (4) | (2) | (08) |

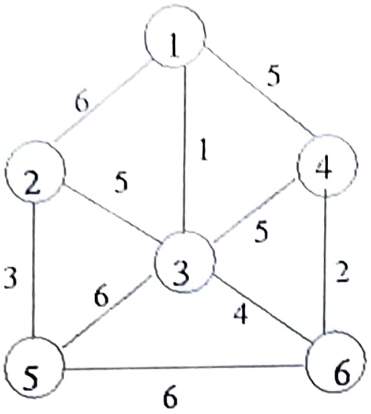



**OR**

| | | | | | |
|---|---|---|---|---|---|
| 8 | a. What is spanning tree? Discuss with example and also give its applications. | (2) | (3) | (1) | (06) |
| | b. Give adjacency list representation for the following graph | (3) | (4) | (2) | (06) |



c. Find the minimum cost spanning tree for the following graph:




(3) (3) (3) (08)

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16MAT31/MAT31

# Third Semester B.E. Makeup Examination, January 2019

# STATISTICAL-NUMERICAL-FOURIER TECHNIQUES / ENGINEERING MATHEMATICS - III

Time: 3 Hours

Max. Marks: 100

*Instructions:* 1. *UNIT III and V are compulsory.*
2. *Answer any one question from remaining each unit.*

## UNIT - I

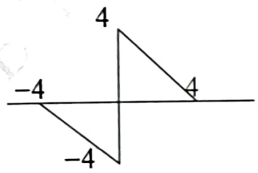
| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 1 | a. | Use Regula falsi method to extract the root of the equation $x + ln(x) - 2 = 0$ up to 4 decimals. | (2) | (1) | (1) | (6) |
| | b. | Apply Newton Raphson method to obtain the root of the equation $x - \text{cosec}\, x = 0$ upto three decimals | (2) | (1) | (2) | (7) |
| | c. | Illustrate fixed point iteration method to find the positive root of the equation $x^3 + x - 1 = 0$ upto three decimals. | (2) | (1) | (1) | (7) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | a. | Use Taylors series method up to $5^{th}$ derivative term to obtain y (0.1) for the differential equation $\frac{dy}{dx} = xy + 1$, $y(0) = 1$. | (2) | (1) | (2) | (6) |
| | b. | Apply Euler's modified formula to solve the differential equation $\frac{dy}{dx} = 2(1 + y^2)$, $y(0) = 0$ at h = 0.05 in 2 steps. | (3) | (1) | (1) | (7) |
| | c. | Illustrate Runge Kutta fourth order method to solve $\frac{dy}{dx} = \frac{4x}{y - xy}$, $y(0) = 3$, at $x = 0.2$. | (2) | (1) | (1) | (7) |

## UNIT – II

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 3 | a. | Construct Fourier series for the function $\begin{cases} x, & 0 \le x \le \pi \\ 2\pi - x, & \pi \le x \le 2\pi \end{cases}$ | (3) | (2) | (1) | (6) |
| | b. | Test whether the function given below is even or odd or neither even nor odd. Find its Fourier series | (2) | (2) | (1) | (7) |
| | c. | Represent the following functions in Fourier series up to first harmonic. | (2) | (2) | (1) | (7) |




| x | 0 | 2 | 4 | 6 | 8 | 10 | 12 |
|---|---|---|---|---|---|---|---|
| Y | 9.0 | 18.2 | 24.4 | 27.8 | 27.5 | 22.0 | 9.0 |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | a. | Construct Fourier series for the function $f(x) = e^{-x}$, $-l \le x \le l$ | (3) | (2) | (1) | (6) |
| | b. | Transform the given function $f(x) = (x - 1)^2$, $0 < x < 1$ into half-range Fourier cosine series. | (2) | (2) | (1) | (7) |

Note: L (Level),CO (Course Outcome), PO (Programme Outcome), M (Marks)

c. Represent the following function in Fourier sine series up to second term.

| θ | 0 | π/6 | 2π/6 | 3π/6 | 4π/6 | 5π/6 |
|---|---|---|---|---|---|---|
| T | 0 | 5.2224 | 8.097 | 7.850 | 5.499 | 2.626 |

(2) (2) (1) (7)

L CO PO M

## UNIT - III

5 a. Evaluate Fourier transform of the function $f(x) = 1 - |x|\ , -1 \leq x \leq 1$. Hence deduce the value of $\int_0^\infty \frac{sin^2 t}{t^2}\, dt$

(2) (3) (1) (6)

b. Solve the integral equation $\int_0^\infty f(\theta) \cos \alpha\theta\, d\theta = \begin{cases} 1-\alpha, & 0 \leq \alpha \leq 1 \\ 0, & \alpha > 1 \end{cases}$

(2) (3) (1) (7)

c. Evaluate Fourier Sine Transform of the function $f(x) = \frac{x}{1+x^2}$

(2) (3) (1) (7)

L CO PO M

## UNIT - IV

6 a. If the following represents valid p.d.f. then calculate *k*, mean and standard deviation given

| x | -2 | -1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|
| p(x) | 0.1 | k | 0.2 | 2k | 0.3 | k |

(2) (4) (1) (6)

b. Demonstrate that mean and variance of Poisson distribution are equal.

(2) (4) (1) (7)

c. Under the normal distribution the mean weight of 500 students during a medical examination was found to be 50 kgs and S.D weight 6 kgs. Find the number of students having weight.
(i) Between 40 kgs & 50 kgs (ii) more than 60 kgs given Ø(1.67) = 0.4525

(2) (4) (1) (7)

**OR**

7 a. If the following represents valid p.d.f. then calculate *k*, $p(1 < x < 2)$ , $p(x \leq 1)$ , $p(x > 1)$ , mean & variance . $f(x) = \begin{cases} kx^2, & 0 < x < 3 \\ 0, & otherwise \end{cases}$

(2) (4) (2) (6)

b. Fit a Binomial distribution for the following data and compare the theoretical frequencies with the actual once.

| x | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| p(x) | 2 | 14 | 20 | 34 | 22 | 8 |

(2) (4) (1) (7)

c. If the conversation on telephone is an Exponential variate with mean 3 min, calculate the probability that (i) conversation lasts for more than 1 min. (ii) conversation lasts between 1 and 2 min.

(2) (4) (1) (7)

L CO PO M

## UNIT -V

8 a. The joint distribution of two random variables X and Y are given by

| X \ Y | 2 | 3 | 4 |
|---|---|---|---|
| 1 | 0.06 | 0.15 | 0.09 |
| 2 | 0.14 | 0.35 | 0.21 |

Determine the individual distributions of X and Y. Also verify whether X and Y are stochastically independent.

(2) (5) (1) (6)

b. A man's smoking habits are as follows. If he smokes filter cigarettes one week, he switches to non filter cigarettes the next week with probability 0.2.On the other hand if he smokes non filter cigarettes one week there is a probability of 0.7 that he will smoke non filter cigarettes the next week as well. In the long run how often does he smoke filter cigarettes?

(2) (5) (2) (7)

e. Define a stochastic matrix. Find unit fixed probability vector for the stochastic matrix P.

$$P=\begin{bmatrix} 0 & \frac{1}{2} & \frac{1}{2} \\ \frac{1}{3} & \frac{2}{3} & 0 \\ 0 & 1 & 0 \end{bmatrix}$$

**(2) (5) (1) (7)**

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16DIPMAT31

**Third Semester B.E. Makeup Examination, January 2019**

# CALCULUS, FOURIER ANALYSIS AND LINEAR ALGEBRA

**Time: 3 Hours** **Max. Marks: 100**

*Instructions:* 1. *Questions from Unit II and Unit III are COMPULSORY.*
2. *Answer any ONE FULL question from each of the other units.*
3. *Max. Marks will be scaled to 50 marks for SGPA and CGPA calculations.*

## UNIT - I

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 1 | a. | Find the Taylor's series of $f(x) = 2x^3 + 7x^2 + x - 6$ in the powers of $(x-1)$ upto fourth degree term. | (1) | (1) | (1) | (06) |
| | b. | For $u = e^{ax-by}\sin(ax+by)$, demonstrate that $b\frac{\partial u}{\partial x} - a\frac{\partial u}{\partial y} = 2abu$. | (1) | (1) | (1) | (07) |
| | c. | If $u = f(x-y, y-z, z-x)$, prove that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$. | (1) | (1) | (1) | (07) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | a. | Show that the curves $r = (1+\cos\theta), r = (1-\cos\theta)$ cut orthogonally | (1) | (1) | (1) | (06) |
| | b. | If $z = xy + yz + zx, x = at, y = 4at, z = 2at$ find the total derivative $\frac{dz}{dt}$. Express final answer in terms of $t$. | (1) | (1) | (1) | (07) |
| | c. | If $u = e^{xyz}$ then verify that $\frac{\partial^2 u}{\partial x \partial y} = \frac{\partial^2 u}{\partial y \partial x}$. | (1) | (1) | (1) | (07) |

## UNIT – II

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 3 | a. | **Solve** $\cos^2 x\frac{dy}{dx} + y = \tan x$. | (1) | (2) | (1) | (06) |
| | b. | Construct the orthogonal trajectory of the family of curves $r^n = a\sin(n\theta)$. | (2) | (2) | (1) | (07) |
| | c. | Solve $(D^2 - 6D + 9)y = 6e^{3x} + 7e^{-2x} - \log 2$ | (1) | (2) | (1) | (07) |

## UNIT - III

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 4 | a. | Obtain Fourier Series of $f(x) = x^2$ *in* $(0,2\pi)$. | (1) | (3) | (1) | (06) |
| | b. | Apply harmonic analysis to find Fourier Series up to first harmonic and also find the amplitude of first harmonic for the data: | | | | |

| $x$ | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| y | 4 | 8 | 15 | 7 | 6 | 2 |

(2) (3) (1) (07)

| | | | | | | |
|---|---|---|---|---|---|---|
| | c. | Find the Fourier cosine transform of $f(x) = \begin{cases} 1; & 0 \le x \le 2 \\ 0; & x \ge 2 \end{cases}$ | (1) | (3) | (1) | (07) |

## UNIT - IV

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 5 | a. | Apply Regula – Falsi method to find a real root of the equation $\cos x = 3x - 1$, correct upto three decimal places. | (1) | (4) | (1) | (06) |

Note: L (Level),CO (Course Outcome), PO (Programme Outcome), M (Marks)

b. Use Taylors's series method to obtain the approximate value of $y$ at $x = 0.2$ for the differential equation $\frac{dy}{dx} = 2y + e^{3x}, y(0) = 0$ to find $y(0.2)$. Perform three iterations. (1) (4) (1) (07)

c. Apply Euler's Modified method to solve $y' = x + y$, $y(0) = 1$ at $y(0.4)$, take h = 0.2. (1) (4) (1) (07)

**OR**

6 a. Apply Newton - Raphson method to find a real root of the equation $x^3 - 3x + 4 = 0$, correct to three decimal places. (1) (4) (1) (06)

b. Apply fixed point iteration method to solve $sin(x) = e^{-x}$ by performing three iterations. (1) (4) (1) (07)

c. Apply Runge - Kutta method of fourth order to solve $\frac{dy}{dx} = 3x + y^2$, $y(1) = 1.2$ at $x = 1.1$. Execute three iterations. (1) (4) (1) (07)

L CO PO M

**UNIT -V**

7 a Find the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{bmatrix}$ by matrix operations. (1) (5) (1) (06)

b. Solve by Gauss – Jordan method the simultaneous linear equations
$2x - 3y + z = -1$, $x + 4y + 5z = 24$, $3x - 4y + z = -2$ (1) (5) (1) (07)

c. Use Rayleigh's method to find dominant eigenvalue and corresponding eigenvector of the matrix $\begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$. Taking initial vector as $X^{(0)} = [1, \quad 1, \quad -1]^T$. Perform five iterations. (1) (5) (1) (07)

**OR**

8 a. For what value of $\lambda$ the rank of the matrix $\begin{bmatrix} 1 & 2 & 1 \\ 1 & 3 & 4 \\ 3 & 6 & \lambda \end{bmatrix}$ will be equal to TWO. Use elementary transformations to establish. (1) (5) (1) (06)

b. Solve by Gauss – Seidel method the linear simultaneous equations

$2x + y + 6z = 9$, $8x + 3y + 2z = 13$, $x + 5y + z = 7$ (1) (5) (1) (07)

c. Find all the eigenvalues and the eigenvectors of the matrix $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$. (1) (5) (1) (07)

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16MAT31/MAT31

# Third Semester B.E. Semester End Examination, Dec/Jan 2018-19
# STATISTICAL-NUMERICAL-FOURIER TECHNIQUES / ENGINEERING MATHEMATICS - III

Time: 3 Hours

Max. Marks: 100

*Instructions:* 1. *Units III and V are compulsory.*
2. *Answer any one full question from remaining units.*

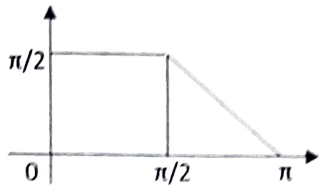
## UNIT - I

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 1 | a. | Compute the real root of the equation $x\log_{10}x-1.2=0$ by the method of false position. Carry out three iterations. | (2) | (1) | (1) | (07) |
| | b. | Using Runge-Kutta method of fourth order, find $y(0.2)$ for the equation $\frac{dy}{dx}=\frac{y-x}{y+x}$ with $y(0)=1$ taking $h=0.2$. | (1) | (1) | (1) | (07) |
| | c. | Find a real root of the equation $x^3+x+1=0$ by fixed point iteration method. | (1) | (1) | (1) | (06) |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | a. | Find a real root of the equation $xe^x-\cos x=0$ applying Newton-Raphson's method correct to four decimal places. | (1) | (1) | (1) | (07) |
| | b. | Use modified Euler's method to solve $\frac{dy}{dx}=x+\lvert y\rvert$ in the range $0\le x\le 0.4$ by taking $h=0.2$ given that $y(0)=1$ initially. | (2) | (1) | (1) | (07) |
| | c. | Employ Taylor's series method to find $y$ at $x=0.1$ and $0.2$ correct to three places of decimal in step size of 0.1 for the linear differential equation $\frac{dy}{dx}-2y=3e^x$ with $y(0)=0$. | (1) | (1) | (1) | (06) |

## UNIT – II

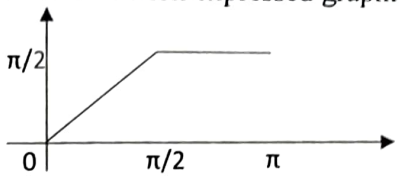
| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| 3 | a. | Obtain Fourier expansion of $f(x)=\begin{cases}-\pi & -\pi<x<0\\ x & 0<x<\pi\end{cases}$. Hence deduce that $\sum\frac{1}{(2n-1)^2}=\frac{\pi^2}{8}$ | (2) | (2) | (1) | (07) |
| | b. | Find the Fourier cosine series of the function which is expressed graphically as follows   | (2) | (2) | (1) | (07) |
| | c. | Obtain the Fourier series up to second harmonics to the following data. <br> x : 0 1 2 3 4 5 <br> y : 4 8 15 7 6 2 | (1) | (2) | (1) | (06) |

**OR**

4 **a.** Draw the graph of the function $f(x)=\begin{cases}\pi x & 0\le x\le 1\\ \pi(2-x) & 1\le x\le 2\end{cases}$ also find the Fourier expansion of $f(x)$

**(2) ( 2 ) (1) (07)**

**b.** Find half range sine series of the function expressed graphically




**(2) (2 ) (1) (07)**

c. Obtain the constant term and first three coefficients in the fourier cosine series of y using the following table

| x: | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| y: | 4 | 8 | 15 | 7 | 6 | 2 |

**(1) ( 2 ) (1) (06)**

**UNIT - III** **L CO PO M**

5 a. Find the Fourier transform of $f(x)=\begin{cases}1-|x| & in\ |x|<1\\ 0 & otherwise\end{cases}$. Hence evaluate $\int_0^\infty \frac{\sin^2 x}{x^2}dx$.

**(2) (3 ) (1 ) (07)**

b. Find Fourier sine transform of $e^{-|x|}$. Hence evaluate $\int_0^\infty \frac{x\sin mx}{1+x^2}dx$.

**(1) ( 3 ) (1) (07)**

c. Find $f(x)$ given that $F_c\{f(x)\}=\frac{1}{1+s^2}$.

**(2) ( 3 ) ( 1) (06)**

**UNIT – IV** **L CO PO M**

6 a. A random variable X has following probability function for various values of x

| x: | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| y: | 0 | k | 2k | 2k | 3k | $k^2$ | $2k^2$ | $7k^2+k$ |

(i) Find k (ii) Evaluate $p(x<6)$, $p(x\ge 6)$ and $p(3<x\le 6)$. Also find mean.

**(1) ( 4 ) ( 1 ) (07)**

b. Derive mean and standard deviation of binomial distribution.

**(2) (4) (1) (07)**

c. The marks of 1000 students in an examination follow normal distribution with mean 70 and standard deviation 5. Find the number of students whose marks will be (i) less than 65 (ii) more than 75 (iii) between 65 and 75.

**(2) (4) (1 ) (06)**

**OR**

7 a. Verify whether the function $p(x)=\begin{cases}6x(1-x) & ,0\le x\le 1\\ 0 & ,otherwise\end{cases}$

(i) is a probability density function or not and (ii) Also determine mean and standard deviation.

**(1) ( 4 ) ( 1 ) (07)**

b. While forming 36-digit binary numbers a malfunctioning digital computer is found to form a digit incorrectly about 1 times in 1000. Assuming the errors in forming different digits to be independent, find the probability of having (i) zero, (ii) one, (iii) more than one and (iv) less than five incorrect digits in a given 36-digit number.

**(2) (4) (1) (07)**

c. Obtain the equation of the normal probability curve that may be fitted to the following data:

| Variable (x) : | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|
| Frequency (f) : | 3 | 6 | 9 | 13 | 8 | 5 | 4 |

**(4) (4) (1) (06)**
**L CO PO M**

## UNIT-V

8 a. A joint probability distribution is given by the following table

| X \ Y | – 8 | 2 | 4 |
|---|---|---|---|
| 1 | 0.1 | 0.2 | 0.2 |
| 3 | 0.3 | 0.1 | 0.1 |

Find the marginal distribution of X and Y and Cov(X, Y). Are they independent?

**(2) (5) ( 1) (07)**

b. Assume that a computer system is in one of three states: busy, idle or undergoing repair denoted by states 0, 1, 2 respectively. It is found that the system approximately behaves like a Markov chain with the transition probability matrix $P = \begin{bmatrix} 0.6 & 0.2 & 0.2 \\ 0.1 & 0.8 & 0.1 \\ 0.6 & 0.0 & 0.4 \end{bmatrix}$. Prove that the chain is irreducible, and determine the steady state probability vector.

**(2) ( 5 ) ( 1) (07)**

c. Define i) State classification of Markov chain. (ii) covariance and correlation of X and Y.

**(1) (5 ) (1) (06)**

Library - 12/12/2018 - 09.30am to 12.30pm.

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16DIPMAT31

# Third Semester B.E., Semester End Examination, Dec/Jan 2018-19

# CALCULUS, FOURIER SERIES AND LINEAR ALGEBRA

Time: 3 Hours

Max. Marks: 100

*Instructions: 1. UNIT II & III ARE COMPULSORY*

| | | | L | CO | PO | M |
|---|---|---|---|---|---|---|
| | | **UNIT - I** | | | | |
| 1 | a. | Using Taylor's series, express $2x^3 + 7x^2 + x - 6$ in powers of (x-1) upto fourth degree term. | 1 | 1 | 1 | (06) |
| | b. | Find the angle between polar curves $r = a(1 + \cos\theta)$ and $r = b(1 - \cos\theta)$. | 2 | 1 | 1 | (07) |
| | c. | If $u = f(x - y, y - z, z - x)$ , then prove that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$. | 2 | 1 | 1 | (07) |
| | | **OR** | | | | |
| 2 | a. | Using Maclaurin's series, expand *sinx* upto the term containing $x^4$. | 1 | 1 | 1 | (06) |
| | b. | Find first and second partial derivatives of $z = \log(x^2 + y^2)$. | 1 | 1 | 1 | (07) |
| | c. | Find the total derivative of $u = xy + yz + zx$ at x = at, y = 4at and z = 2at, find $\frac{du}{dt}$. | 1 | 1 | 1 | (07) |
| | | **UNIT – II** | | | | |
| 3 | a. | Solve $cos^2x\frac{dy}{dx} + y = tanx$ . | 1 | 2 | 1 | (06) |
| | b. | Find the orthogonal trajectories of the family of parabolas $y^2 = 4ax$. | 2 | 2 | 1 | (07) |
| | c. | Solve $y'' - 2y' + 10y = 0$, given y(0) = 4, $y'(0) = 1$. | 2 | 2 | 1 | (07) |
| | | **UNIT - III** | | | | |
| 4 | a. | Obtain Fourier series for $f(x) = x^2$ in the interval $0 < x < 2\pi$. | 1 | 3 | 1 | (06) |
| | b. | Compute the first two harmonics of the Fourier series of f(x) given in the following table: | | | | |

| x: | 0 | $\pi/3$ | $2\pi/3$ | $\pi$ | $4\pi/3$ | $5\pi/3$ | $2\pi$ |
|---|---|---|---|---|---|---|---|
| f(x): | 1.0 | 1.4 | 1.9 | 1.7 | 1.5 | 1.2 | 1.0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | c. | Find the Fourier sine transform of $e^{-\|x\|}$. | 2 | 3 | 1 | (07) |
| | | **UNIT - IV** | | | | |
| 5 | a. | Use Regula – falsi method to find the real root of the equation $xe^x = \cos x$, correct to three decimal places. | 2 | 3 | 1 | (07) |
| | b. | Employ Taylor's series method to obtain approximate value of y at x=0.2 for the differential equation $\frac{dy}{dx} = x^2y - 1$. | 1 | 4 | 1 | (06) |
| | c. | Use Runge-Kutta method to find y(0.1), given $\frac{dy}{dx} = x + y^2$, y(0)=1. | 2 | 4 | 1 | (07) |

Note: L (Level),CO (Course Outcome), PO (Programme Outcome), M (Marks)

**OR**

6 a. Obtain value of $\sqrt{N}$, using Newton-Raphson method and hence evaluate $\sqrt{28}$.

| | | | |
|---|---|---|---|
| **1** | **4** | **1** | **(06)** |

b. Solve $sinx = e^{-x}$, using fixed point iteration method.

| | | | |
|---|---|---|---|
| **2** | **4** | **1** | **(07)** |

c. Using modified Euler's method find an approximate value of y when x=0.2 and x=0.4, given that $\frac{dy}{dx} = \log(x + y)$, y(0)=2.

| | | | |
|---|---|---|---|
| **2** | **4** | **1** | **(07)** |

**UNIT -V**

7 a. Determine the rank of the matrix $\begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$ by elementary transformations.

| | | | |
|---|---|---|---|
| **1** | **5** | **1** | **(06)** |

b. Solve the equations $2x - 3y + z = -1$, x+4y+5z = 25, 3x-4y+z = 2 by Gauss-Jordan method.

| | | | |
|---|---|---|---|
| **2** | **5** | **1** | **(07)** |

c. Obtain numerically largest eigenvalue and the corresponding eigenvector of the matrix $\begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ by power method . Taking the initial vector$[1 \quad 0 \quad 0]^T$. Carryout five iterations.

| | | | |
|---|---|---|---|
| **2** | **5** | **1** | **(07)** |

**OR**

8 a. For what value of $\lambda$ the rank of the matrix $\begin{bmatrix} 1 & 2 & 1 \\ 1 & 3 & 4 \\ 3 & 6 & \lambda \end{bmatrix}$ will be equal to TWO. Use elementary transformations.

| | | | |
|---|---|---|---|
| **2** | **5** | **1** | **(06)** |

b. Solve by Gauss – Seidel method the linear simultaneous equations $10x + y + z = 12; 2x + 10y + z = 13; 2x + 2y + 10z = 104$.

| | | | |
|---|---|---|---|
| **2** | **5** | **1** | **(07)** |

c. Find all the eigenvalues and eigenvectors of the matrix $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.

| | | | |
|---|---|---|---|
| **2** | **5** | **1** | **(07)** |

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CS/IS32/16CS/IS32

# Third Semester B.E. Semester End Examination, Dec/Jan 2017-18

# LOGIC DESIGN AND APPLICATIONS

Time: 3 Hours

Max. Marks: 100

*Instructions:* 1. *Unit I and Unit III are compulsory*
2. *Answer one full question from remaining Units*

## UNIT – I

1. a. Realize the following expression using basic gates and universal NOR gate. **04 M**
**Y(A,B,C)= AB + C'**
( Level [3], CO [1], PO [1] )

b. Simplify the given Boolean function in the SOP form using K-Map reduction technique and realize using NAND gates only. **08 M**
**(W,X,Y,Z)=∑m(1,2,4,5,8,9,10,12,13) +d(0,3,6,7,15)**
( Level [3], CO [1], PO [2] )

c. Apply Quine McClusky reduction technique to simplify the given Boolean expression. **08 M**
**F(A,B,C,D) = ∑m (1,4,6,9,10,11,14,15) + d(0,3)**
( Level [3], CO [1], PO [2] )

## UNIT – II

2. a. Define Multiplexer and De-multiplexer. Show how 4:1 multiplexer can be obtained using only 2:1 multiplexer. **06 M**
( Level [1,3], CO [2], PO [1] )

b. Show how suitable decoder and multi input OR gates can be used to realize the following Boolean expressions simultaneously. **08 M**
**F1(A,B,C)=AB+A'C'**
**F2(A,B,C) = BC**
**F3(A,B,C) = ∑m (1,4,6,7)**
( Level [3], CO [2], PO [2] )

c. Design 4-bit parity generator using *XOR* gates. **06 M**
( Level [3], CO [2 ], PO [2])

**OR**

a. Explain the working of (i)Decimal to BCD encoder (ii) 1 to 10 Decoder **08 M**
( Level [2], CO [2], PO [2] )

b. Design a 2 bit magnitude comparator. **08 M**
( Level [3], CO [2], PO [2] )

c. List and explain the differences between PLA and PAL. **04 M**
( Level [1, 2], CO [2], PO [2] )

## UNIT - III

3. a. Obtain the characteristic equation, state transition diagram and Excitation table for JK and D flip flops. **08 M**
( Level [3], CO [3], PO [2] )

b. Explain the working of positive edge triggered RS flip flop with waveforms. **06 M**
( Level [2], CO [3], PO [2] )

c. Explain the working of JK Master Slave flip flop and realize the same using NAND gates only. **06 M**
( Level [2,3], CO [3], PO [2] )

## UNIT – IV

5 a. Convert the following with neat sketch: **08 M**
i. SR flip flop to JK flip flop
ii. JK flip flop to T flip flop
iii. JK flip flop to D flip flop
( Level [3], CO [3], PO [2] )

b. List the differences between Serial and Parallel counters. Design a 4 bit asynchronous UP counter using JK flip flop and represent the output with waveforms. **06 M**
( Level [1,3], CO [3], PO [2] )

c. Explain the working of 4 bit Serial In Serial Out (SISO) shift register with suitable waveforms. 06 M
( Level [2], CO [3], PO [2] )

**OR**

6 a. Construct Mod-6 synchronous up counter. Realize the same using D flip flop only. **10 M**
( Level [3], CO [3], PO [ 2] )

b. Explain the working of 4 bit Johnson counter with it's state table. **05 M**
( Level [2], CO [3], PO [2] )

c. Design a serial adder using shift registers to perform addition of two 8-bit numbers. **05 M**
( Level [3], CO [3], PO [2] )

**UNIT – V**

7 a. Define Accuracy and Resolution. With neat sketch explain the working of 4 bit R -2R binary ladder. Determine the output voltages caused by each bit in a 6 bit ladder if the input levels are 0= 0V and 1=+15V. **10 M**
(Level [1,2], CO [3], PO [2] )

b. List and Explain the different types of HDL models. **10 M**
(Level [1,2,], CO [4], PO [4] )

**OR**

8 a. With a neat diagram explain successive approximation type ADC. The counter type ADC is 8 bits and driven by 500KHz clock. Find maximum conversion time and average conversion time. **10 M**
( Level [2,3], CO [3], PO [2] )

b. Develop HDL code for **10 M**
(i) 4 to 1 multiplexer
(ii) Adder
( Level [3], CO [4], PO [4] )

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16CS32 / CS32 / 16IS32 / IS32

## Third Semester B.E. Makeup Examination, January 2018

# LOGIC DESIGN AND APPLICATIONS

**Time: 3 Hours** **Max. Marks: 100**

*Instructions:* 1. *UNIT I and III are compulsory.*
2. *Answer one full question from remaining Units*

### UNIT – I

1 a. Apply K-Map reduction technique to obtain the reduced SOP expression for the given Boolean function and realize using basic gates. **06 M**

$F(A,B,C,D) = \Sigma m(0,2,4,6,8,9,14,15) + d(1,11)$

( Level[3], CO[1], PO[1] )

b. For a given expression Y=ABC' + BC'+A'B', write the truth table, find the min terms, and draw the circuit using basic gates. **06 M**

( Level[3], CO[1], PO[1] )

c. Solve the given Boolean function to obtain reduced expression using Quine McClusky reduction technique. **08 M**

$F(A,B,C,D) = \Sigma m(0,2,3,4,6) + d(1)$

( Level[3], CO[1], PO[1] )

### UNIT – II

2 a. Explain 4:1 Multiplexer and implement the given Boolean function using suitable Multiplexer $F(A,B,C) = \Sigma m(0,1,4,6,7)$ **06 M**

( Level[2, 3], CO[2], PO[1] )

b. Define Decoder. Design a suitable decoder for the given SOP functions. **06 M**

$F1(A,B,C) = \Sigma m(0,1,4,6,7)$ , $F2(A,B,C) = AB+A'B$

( Level[1, 3], CO[ 2], PO[1] )

c. Differentiate between PAL and PLA. Make use of PLA to implement the following Boolean functions. **08 M**

F1= ABC'D'+ AB'CD+AB'C'D+ABCD

F2= A'B'CD+AB'C'D+ABC'D+ABCD

( Level[2,3], CO[2], PO[1] )

**OR**

3 a. With neat sketch explain Decimal to Binary Encoder. **06 M**

( Level[2], CO[2], PO[1] )

b. Draw the logic diagram of 8:1 Multiplexer. Implement 8:1 Multiplexer using 4:1 Multiplexer. **06 M**

( Level[1,3], CO[2], PO[1,4] )

c. Design 2-bit Magnitude comparator and draw the logic diagram for the same. **08 M**

( Level[3], CO[2],PO [1,4] )

### UNIT – III

4 a. What is clock? List out the properties of Clock. Find the frequency of the clock if T=0.2ms **06 M**

( Level[1,3], CO[2], PO[1,4] )

b. Explain the basic SR Latch using NAND/NOR gate realization. Explain the working of clocked SR flip flop. **06 M**

( Level[2], CO[2], PO[1,4] )

c. Derive the characteristic equation for JK and SR flip flop. Draw the state transition diagram and write the excitation table for both. **08 M**

( Level[3], CO[2], PO[1,4] )

## UNIT – IV

5 a. Design MOD-5 synchronous counter using JK flip flop and draw the logic circuit for the same. **06 M**

( Level[3], CO[3], PO[1] )

b. Explain the working of 3-bit asynchronous UP counter and draw the waveform for the same. **06 M**

( Level[2], CO[3], PO[ 1,4] )

c. Analyze the given sequential circuit in the figure below. **08 M**

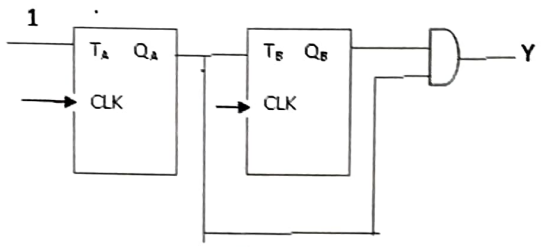


Figure. 5.c Sequential Circuit

( Level[4], CO[3], PO[1,4] )

**OR**

6 a. Explain the working of master slave JK flip flop. Design the same using NAND gates only. **06 M**

( Level[3],CO[3],PO[1,4] )

b. Convert SR flip flop into JK flip flop. **06 M**

( Level[3], CO[3], PO[1,4] )

c. Explain with a neat diagram and waveform the following. **08 M**
i) Serial in Parallel out (SIPO) register.
ii) Johnson Counter

( Level[2], CO[3], PO[1] )

## UNIT –V

7 a. Explain 4-bit R-2R binary ladder Digital to Analog Converter (DAC). What is the output of DAC when binary input is 1100? Given V=10 volts. **06 M**

( Level[2], CO[3], PO[1,4] )

b. Develop the HDL code for the following. **06 M**
i) 4:1 Multiplexer
ii) Full Adder.

( Level[3], CO[4], PO[ 1,4] )

c. Explain with a neat diagram the working of Successive Approximation type ADC. The Counter type ADC is 10-bit and driven by 500kHz clock. Find the maximum conversion time and average conversion time. **08 M**

( Level[1, 2], CO[3], PO[1,4] )

**OR**

8 a. Explain 3-bit resistive divider network DAC. For 5 bit resistive divider, determine the weight of LSB and output when binary input is 11001. **06 M**

( Level[2,3], CO[3], PO[1,4] )

b. Develop the HDL code for the following. **06 M**
i) 2:1 Multiplexer.
ii) SR flip flop

( Level[3], CO[4], PO[1,4] )

c. Explain 2-bit parallel comparator type ADC. How many comparators are required for 3-bit ADC? Find the conversion time for 8 bit Successive Approximation type ADC. **08 M**

( Level[1, 2], CO[3], PO[1] )

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CS/IS/34/16CS/IS34

# Third Semester B.E. Semester End Examination, Dec/Jan 2017-18
# COMPUTER ORGANIZATION AND ARCHITECTURE

Time: 3 Hours  Max. Marks: 100

*Instructions:*
1. *Unit I and IV are COMPULSORY.*
2. *Answer ANY one full question from remaining each units.*
3. *Suitable data can be assumed giving justification.*
4. *Accuracy does matter.*

## UNIT - I

1 a. Interpret Basic Operational Concepts showing connections between the processor and memory with a neat block diagram. **06 M**
( Level [ 2 ], CO [ 1 ], PO [ 1 ] )

b. Convert the following pairs of decimal numbers to 5bit signed 2's complement binary numbers & add them. Analyze whether an overflow occurs. **08 M**
i)+16 & +2 ii) -4 & +6 iii) -15 & +11 iv) -10 & -8.
( Level [ 4 ], CO [ 2 ], PO [ 2 ] )

c. Contrast straight-line sequencing and branching, with a program to add 10 numbers. **06 M**
( Level [ 4 ], CO [ 2 ], PO [ 1 ] )

## UNIT – II

2 a. Find Effective Addresses (EA) in all the Addressing Modes. **08 M**
( Level [ 1 ], CO [ 3 ], PO [ 2 ] )

b. Interpret, with a neat sketch, Distributed Arbitration. **06 M**
( Level [ 2 ], CO [ 3 ], PO [ 1 ] )

c. Contrast Synchronous and Asynchronous Buses with the help of relevant timing waveforms. **06 M**
( Level [ 2 ], CO [ 3 ], PO [ 1 ] )

**OR**

3 a. Multiple Devices are connected to the processor. Distinguish the three approaches to handle such a situation, using interrupts, with diagrams, if any. **08 M**
( Level [ 4 ], CO [ 3 ], PO [ 1 ] )

b. Plan a program that reads one line from the keyboard, stores it in memory buffer, and echoes it to the display, with comment lines. **06 M**
( Level [ 3 ], CO [ 3 ], PO [ 1 ] )

c. Interpret, with a neat sketch, Centralized Arbitration. **06 M**
( Level [ 2 ], CO [ 3 ], PO [ 1 ] )

## UNIT – III

4 a. With internal organization diagram of a 2M x 8 dynamic memory chip, explain asynchronous DRAMs. **08 M**
( Level [ 2 ], CO [ 3 ], PO [ 2 ] )

b. Explain Set-associative-mapped cache with two blocks per set, with neat sketch. Assume bits for tag 5, set 6 and word 4. **06 M**
( Level [ 2 ], CO [ 3 ], PO [ 2 ] )

c. Summarize the memory hierarchy with respect speed, size and cost. **06 M**
( Level [ 2 ], CO [ 1 ], PO [ 1 ] )

**OR**

5 a. Explain the internal organization of a memory chip for 1K x 1 memory chip, using decoder and multiplexer **08 M**
( Level [ 2 ], CO [ 2 ], PO [ 1 ] )

b. Explain Read Write operations with respect to Static Memories, with diagrams of a SRAM cell. **06 M**
( Level [ 2 ], CO [ 2 ], PO [ 1 ] )

c. Explain a Read Only Memory (ROM) cell. Summarize its four types. 06 M
( Level [ 2 ], CO [ 2 ], PO [ 1 ] )

## UNIT – IV

6 a. Demonstrate Booth's Algorithm for signed multiplication of $+15_{10}$& $-15_{10}$. 06 M
( Level [ 4 ], CO [ 4 ], PO [ 2 ] )

b. Evaluate product, using fast multiplication algorithm - bit-pair algorithm / method, of $14_{10}$ and $11_{10}$ 06 M
( Level [ 5 ], CO [ 4 ], PO [ 2 ] )

c. Illustrate how you calculate quotient and remainder when $10_{10}$ is divided by $02_{10}$, applying Restoring Division algorithm. 08 M
( Level [ 2 ], CO [ 4 ], PO [ 2 ] )

## UNIT - V

7 a. Define Computer Architecture. Outline seven dimensions of an ISA. 08 M
( Level [ 2 ], CO [ 1 ], PO [ 1 ] )

b. Explain the following in Brief i) Amdahl's Law ii) Dependability. 06 M
( Level [ 2 ], CO [ 1 ], PO [ 1 ] )

c. Explain Measuring, Reporting and Summarizing performance of a computer architecture. 06 M
( Level [ 2 ], CO [ 2 ], PO [ 2 ] )

**OR**

8 a. Demonstrate the working of a classic five stage pipeline for a RISC processor. 10 M
( Level [ 2 ], CO [ 4 ], PO [ 2 ] )

b. Explain data hazards and methods to minimize data hazards with examples. 10 M
( Level [ 2 ], CO [ 4 ], PO [ 2 ] )

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16CS34 / CS34 /16IS34 / IS34

# Third Semester B.E. Makeup Examination, January 2018

# COMPUTER ORGANIZATION AND ARCHITECTURE

Time: 3 Hours

Max. Marks: 100

*Instructions:*
1. *Unit I & IV are compulsory.*
2. *Answer any five full Questions.*
3. *Suitable data can be assumed giving justification.*
4. *Accuracy does matter.*

## UNIT - I

1 a. With a neat diagram show the connection between memory & processor and explain typical operational steps in executing an instruction. **08 M**

( Level [2], CO [1], PO [1] )

b. Convert the following pairs of decimal no's to 5 bit signed 2's complement binary numbers & add them. Analyze whether an overflow/underflow occurs. **06 M**

i) 7 & 13 ii) -5 & 7 iii) -14 & 11 iv) -10 & -13

( Level [4], CO [2], PO [2] )

c. Define Addressing Mode and explain any four addressing modes with a suitable example. **06 M**

( Level [ 1,2], CO [1], PO [1] )

## UNIT – II

2 a. What is an interrupt? With a neat block diagram explain Daisy Chain Interrupt Priority Scheme for handling simultaneous requests. **10 M**

( Level [1,2 ], CO [2], PO [2] )

b. What is DMA? Explain in brief simple arrangement for a centralized bus arbitration approach. **10 M**

( Level [1,2 ], CO [1], PO [1] )

**OR**

3 a. Explain the following in brief: **10 M**

i)Program controlled I/O ii) Enabling & Disabling Interrupts

( Level [2], CO [2], PO [1] )

b. Make use of a neat sketch to explain the timing diagram of Synchronous Bus for input operation **10 M**

( Level [3], CO [2], PO [2] )

## UNIT – III

4 a. Make use of a relevant circuit diagram for static RAM cell and explain how a Read and Write operations can be performed on it. **10 M**

( Level [3], CO [2], PO [1] )

b. Make use of a suitable example and Explain Set Associative Mapping technique **10 M**

( Level [3], CO [2], PO [2] )

**OR**

5 a. Explain the following: i) PROM ii) EPROM **05 M**

( Level [2], CO [1], PO [1] )

b. Distinguish between i) SRAM ii) DRAM **05 M**

( Level [4], CO [3], PO [2] )

c. With a suitable example. Explain Direct Mapping cache memory technique. **10 M**

( Level [2], CO [2], PO [1] )

## UNIT – IV

6 a. Give the steps of Booth's Algorithm. Evaluate the product by multiplying the following pairs of 4 bit signed 2's complement numbers using the same. **07 M**

M= +14 & Q= -10

( Level [5], CO [2], PO [2] )

b. Solve usingRestoring integer Division method, the following example: 8 ÷ 3 — 08 M
( Level [2,3], CO [2], PO [2] )

c. Explain FOUR bit Carry Look Ahead Adder. — 05 M
( Level [2], CO [2], PO [1] )

## UNIT –V

7 a. Define Computer Architecture. Illustrate seven dimensions of an ISA. — 10 M
( Level [1,2], CO [1], PO [1] )

b. Explain the following in brief i) Amdahl's law ii) Dependability — 10 M
( Level [2], CO [2], PO [1] )

**OR**

8 a. What is Pipelining? List Pipeline hazards & explain any one in detail. — 10 M
( Level [1], CO [1], PO [1] )

b. Explain the following in brief i) Measuring ii) Quantitative principles of Computer Design — 10 M
( Level [2], CO [2], PO [2] )

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CS/IS35/16CS/IS35

# Third Semester B.E. Semester End Examination, Dec/Jan 2017-18

# DATA STRUCTURES USING C

Time: 3 Hours

Max. Marks: 100

*Instructions:*
1. *UNIT-I and UNIT- II are Compulsory.*
2. *Answer any one question from remaining units.*
3. *Write comments in the programs where ever necessary.*
4. *Write sample input/output for the program where ever necessary.*

## UNIT - I

1 a. Define the word data structures and discuss its importance for computer science. **04 M**
( Level [2], CO [3], PO [1] )

b. Write a C program to demonstrate the use of stack for a CD/DVD case of capacity 10 such that, we should not insert more than 10 discs, should not remove disc from empty case and display no. of discs at any point of time. **10 M**
( Level [3], CO [3], PO [1] )

c. Demonstrate along with code snippets insertion and deletion operation of circular queue using arrays. **06 M**
( Level [2], CO [3], PO [1] )

## UNIT – II

2 a. Differentiate between arrays and linked lists. Write a function to create a linked list by adding nodes at rear of list. **08 M**
( Level[ 4 ], CO[ 2 ], PO[ 8 ] )

b. Write functions for the following: **06 M**
i. to reverse the list
ii. to display odd and even node elements on two different lines.
( Level[ 3 ], CO[ 2 ], PO[ 12 ] )

c. Discuss how the polynomials are represented using circular linked list? With example and block diagram explain addition of two polynomials using the circular list. **06 M**
( Level[ 3 ], CO[ 2 ], PO[ 2 ] )

## UNIT III

3 a. Illustrate the working of Doubly linked list for insertion and deletion of element from a given position in the program **10 M**
( Level [2], CO [2], PO [3] )

b. Explain with code the working of inorder, preorder and post order traversals in binary trees. Illustrate with examples. **10 M**
( Level [2], CO [3], PO [1,3] )

**OR**

4 a. Demonstrate with a sample code the method of inserting an element into a binary search tree. **10 M**
( Level [2], CO [3], PO [3] )

b. Build a max heap and min heap for set of numbers 10,8,6,7,12,14 **10 M**
( Level [3], CO [4], PO [1] )

## UNIT IV

5 a. What is AVL tree? Explain with example. **06 M**
( Level[ 2 ], CO[ 3 ], PO[ 2 ] )

b. Illustrate how collision occurs and explain any two methods to resolve it. **10 M**
( Level[ 2 ], CO[ 4 ], PO[ 2 ] )

c. Explain open addressing method for overflow handling. **04 M**
( Level[ 2 ], CO[ 4 ], PO[ 12 ] )

**OR**

6 a. Discuss any two hash functions. **06 M**

( Level[ 2 ], CO[ 4 ], PO[ 8 ] )

b. Compare quadratic probing and pseudo random collision resolution methods. **06 M**

( Level[ 4 ], CO[ 4 ], PO[ 2 ] )

c. Explain liner probing method of overflow handling with the help of example. **08 M**

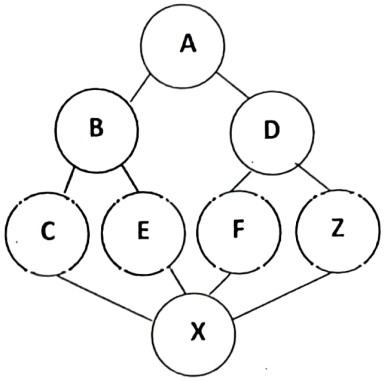
( Level[ 2 ], CO[ 4 ], PO[ 2 ] )

## UNIT - V

7 a. Define graph. With example discuss how the graph is represented using Adjacency Matrix **06 M**

( Level[ 2 ],CO[ 4 ],PO[ 8 ] )

b. Draw an adjacency list for a given graph: **06 M**




( Level[ 2 ], CO[ 4 ], PO[ 8 ] )

c. Write recursive function for depth first search operation on graph. **08 M**

( Level[ 3 ], CO[ 4 ], PO[ 12 ] )

**OR**

8 a. What is spanning tree? Explain with example **06 M**

( Level[ 2 ],CO[ 4 ],PO[ 12 ] )

b. Draw Depth-first and breadth-first spanning trees for the graph given in 7b. **06 M**

( Level[ 2 ], CO[ 4 ], PO[ 12 ] )

c. Write function for breadth first search operation on graph. **08 M**

( Level[ 3 ], CO[ 4 ], PO[ 12 ] )

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16MAT31 / MAT31

# Third Semester B.E. Semester End Examination, Dec/Jan 2017-18

# STATISTICAL-NUMERICAL-FOURIER TECHNIQUES / ENGINEERING MATHEMATICS-III)

Time: 3 Hours

Max. Marks: 100

***Instructions:*** *1. UNIT III and V are compulsory.*
*2. Answer any one question from remaining each unit.*

## UNIT - I

1 a. Use Regula falsi method to extract the root of the equation $2x - \log_{10} x = 7$ upto 3 decimals. **06 M**
( Level [2], CO [1], PO [1] )

b. Apply Newton-Raphson's method to obtain the non-zero root of the equation $f(x) = xe^x - \cos x = 0$ upto 3 decimals. **07 M**
( Level [2], CO [1], PO [2] )

c. Illustrate fixed point iteration method to find the root of the equation $x = \frac{1}{2} + \sin x$ upto 3 decimals. **07 M**
( Level [2], CO [1], PO [1] )

**OR**

2 a. Use Taylor's series method up to 5th derivative term to obtain y (0.3) for the differential equation $\frac{dy}{dx} = x + y^2$, $y(0) = 1$. **06 M**
( Level [2], CO [1], PO [2] )

b. Apply Euler's modified method to solve the differential equation $\frac{dy}{dx} = x^2 - y^2$, $y(0) = 1$ at $x = 0.4$ in 2 steps. **07 M**
( Level [3], CO [1], PO [1] )

c. Illustrate Runge-Kutta's fourth order method to solve $\frac{dy}{dx} = e^x + y$, $y(0) = 0$ at $x = 0.1$ in 1 step. **07 M**
( Level [2 ], CO [1 ], PO [1] )

## UNIT – II

3 a. Construct Fourier series for the function $f(x) = 2\pi x$, $0 \le x \le 2$ **06 M**
( Level [3], CO [2], PO [1] )

b. Transform the function $f(x) = \begin{cases} x^2, 0 < x < \frac{\pi}{2} \\ x, \frac{\pi}{2} < x < \pi \end{cases}$ into half-range sine series. **07 M**
( Level [2], CO [2], PO [2] )

c. Represent the following function in Fourier series up to first harmonic. **07 M**

| t sec | 0 | T/6 | T/3 | T/2 | 2T/3 | 5T/6 | T |
|---|---|---|---|---|---|---|---|
| A amp | 1.98 | 1.3 | 1.05 | 1.3 | –0.88 | –0.25 | 1.98 |

( Level [2 ], CO [2], PO [1] )

**OR**

4 a. Construct Fourier series for the function $f(t) = 1 - t^2$, $-1 \le t \le 1$. **06 M**
( Level [3], CO [2], PO [2] )

b. Transform the function $f(x) = x \cos x$, $0 \le x \le 2$ into half- range Fourier cosine series. **07 M**
( Level [2], CO [2], PO [1] )

c. Represent the following function in Fourier cosine series up to second term. **07 M**

| x | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| y | 2 | 8 | 12 | 10 | 9 | 6 |

( Level [2], CO [2], PO [2 ] )

## UNIT – III

5 a. Evaluate Fourier Transform of the function $f(t) = a^2 - t^2$, $-a \le t \le a$. Hence deduce the **06 M**

value of $\int_0^{\infty} \frac{t\cos t - \sin t}{t^3} dt$

( Level [2], CO [3 , PO [2] )

b. Solve the integral equation $\int_0^{\infty} f(x)\sin(tx)\,dx = \begin{cases} 1, & 0 \le t \le 1 \\ 2, & 1 < t \le 2 \\ 0, & t \ge 2. \end{cases}$ **07 M**

( Level [2], CO [3], PO [1] )

c. Evaluate Fourier Cosine Transform of the function **07 M**

$$f(x) = \begin{cases} \cos x, & 0 < x < a \\ 0, & x \ge a. \end{cases}$$

( Level [2 ], CO [3 ], PO [2 ] )

## UNIT IV

6 a. If the following represents valid p.d.f. then calculate $k$, Mean and Standard deviation given **06 M**

| X | 0.5 | 1.5 | 2.5 | 3.5 | 4.5 |
|---|---|---|---|---|---|
| P(X) | $2k$ | $k$ | $4k$ | $k$ | $2k$ |

Level [2], CO [4], PO [1] )

b. Demonstrate that mean and variance of Binomial distribution are $np$ and $npq$ respectively. **07 M**

( Level [2], CO [4], PO [1] )

c. Under the Normal distribution 31% are below 35 and 9 % are above 60, identify the mean and Standard deviation of the distribution. Given A(z =0.5) = 0.19 and A(z =1.4) = 0.42. **07 M**

( Level [2], CO [4], PO [1] )

**OR**

7 a. If the following represents a valid p.d.f. then calculate $k$, P (0 < x <3), P( x > 2) given **06 M**

$$p(x) = \begin{cases} \frac{kx^2}{1+x}, 1 < x < 5 \\ 0 \quad , \text{elsewhere} \end{cases}$$

( Level [2], CO [ 4], PO [2 ] )

b. If the conversation on telephone is a Poisson variate with mean 4 mins.,then calculate the probability that **07 M**

(i) conversation lasts for more than 1 min.

(ii) conversation lasts between 2 and 3 mins.

( Level [2], CO [4], PO [1] )

c. The Mean of an Exponential distribution is 8,then identify $E(x^2)$, P(1< x < 4), P(x > 5). **07 M**

( Level [2], CO [5], PO [2] )

## UNIT –V

8 a. The joint distribution of two random variables X and Y are given by **06 M**

| X \ Y | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 1 | 0.06 | 0.05 | .09 | 0.2 |
| 2 | 0.14 | 0.15 | 0.21 | 0.1 |

Determine the individual distributions of X and Y. Also verify whether X and Y are stochastically independent.

( Level [2],CO [5], PO[1] )

b. A software engineer goes to his work place every day by motor bike or car. He never goes by same mode on two successive days; but if he goes by car on a day then he is equally likely to go by bike or car on the next day. Represent the transition matrix of his mode of transport. If he uses car on the first day of the week, find the probability that (i)bike is used (ii) car is used, on the fifth day. **07 M**

( Level [2],CO[5], PO[2] )

c. Define a stochastic matrix. Find unit fixed probability vector for the stochastic matrix P. **07 M**

$$P = \begin{bmatrix} 0 & 1 & 0 \\ \frac{1}{8} & \frac{1}{2} & \frac{3}{8} \\ 0 & \frac{1}{2} & \frac{1}{2} \end{bmatrix}$$

( Level [2], CO [5], PO [1] )