

# CBCS Scheme

USN

--	--	--	--	--	--	--	--	--	--

15CS32

## Third Semester B.E. Degree Examination, June/July 2017 Analog and Digital Electronics

Time: 3 hrs.

Max. Marks: 80

**Note: Answer any FIVE full questions, choosing one full question from each module.**

### Module-1

- 1 a. Explain with help of a circuit diagram and characteristic curves working of N-channel DE MOSFET. (12 Marks)
- b. List and explain any one application of FET and its working with circuit Diagram. (04 Marks)

OR

- 2 a. Explain the performance parameters of operational amplifier. (08 Marks)
- b. Mention and explain the working of any two applications of operational amplifier. (08 Marks)

### Module-2

- 3 a. What is a logical gate? Realize  $((A + B) \cdot C)D$  using only NAND Gates. (04 Marks)
- b. Describe positive and Negative logic. List the equivalences between them. (04 Marks)
- c. Find the minimal SOP (sum of product) for the following Boolean functions using K-map
- i)  $f(a, b, c, d) = \sum m(6, 7, 9, 10, 13) + d(1, 4, 5, 11)$
- ii)  $f(a, b, c, d) = \pi M(1, 2, 3, 4, 10) + d(0, 15)$  (08 Marks)

OR

- 4 a. Using Quine -- McClusky Method simplify the following Boolean equation.  
 $f(a, b, c, d) = \sum m(0, 1, 2, 3, 10, 11, 12, 13, 14, 15)$ . (10 Marks)
- b. Define Hazard. Explain Different Types of Hazards. (06 Marks)

### Module-3

- 5 a. What is multiplexer? Design a 32 to 1 multiplexer (MUX) using two 16 to 1 MUX and one 2 to 1 MUX. (04 Marks)
- b. Show How using 3 to 8 Decoder and multi input OR gates, following Boolean Expressions can be realized simultaneously  
 $F_1(a, b, c) = \sum m(0, 4, 6)$ ,  $F_2(a, b, c) = \sum m(0, 5)$ ,  $F_3(a, b, c) = \sum m(1, 2, 3, 7)$  (05 Marks)
- c. Design 7 segment Decoder using PLA. (07 Marks)

OR

- 6 a. Implement the Boolean function expressed by SOP  $f(a, b, c, d) = \sum m(1, 2, 5, 6, 9, 12)$  using 8 : 1 MUX. (04 Marks)
- b. What is magnitude comparator? Design and explain 2 bit magnitude comparator. (08 Marks)
- c. Differentiate between combinational and sequential circuit. (04 Marks)

### Module-4

- 7 a. With a neat logic diagrams and truth table. Explain the working of JK master slave Flip-Flop along with its implementation using NAND Gates. (10 Marks)
- b. Derive the characteristic equation for SR, D and JK Flip-Flop. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg,  $42+8=50$ , will be treated as malpractice.

**OR**

- 8 a. Using Negative Edge triggered D-Flip Flop. Draw a Logic diagram of 4 bit serial in serial out (SISO) Register. Draw the waveform to shift Binary number 1010 into this register. (06 Marks)
- b. Explain with neat diagram How shift Register can be applied for serial addition. (07 Marks)
- c. Differentiate between synchronous and Asynchronous counter. (03 Marks)

**Module-5**

- 9 a. Design Asynchronous counter for the sequences  $0 \rightarrow 4 \rightarrow 1 \rightarrow 2 \rightarrow 6 \rightarrow 0 \rightarrow 4$ . Using S. R Flip-Flop. (12 Marks)
- b. With neat diagram. Explain Digital Clock. (04 Marks)

**OR**

- 10 a. Explain 2 bit simultaneous A/D converter. (10 Marks)
- b. What is Binary Ladder? Explain the Binary Ladder with Digital input of 1000. (06 Marks)

\* \* \* \* \*

USN

--	--	--	--	--	--	--	--	--	--

10CS32

Third Semester B.E. Degree Examination, June/July 2017

Electronic Circuits

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART - A

- 1 a. What is UJT? With the help of relevant diagram, explain the construction and operational principle of a UJT. (08 Marks)
- b. For the fixed biased circuit of Fig.Q1(b), determine the operating point (given that  $\beta = 100$ ,  $V_{BE} = 0.7 V$ ). Also draw the load line for the circuit.

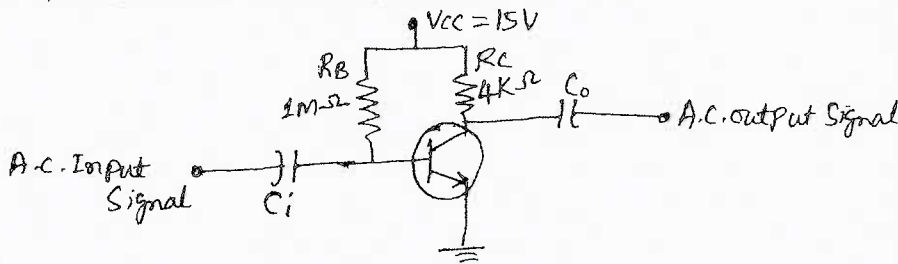


Fig.Q1(b)

(07 Marks)

- c. Explain thermal runaway as referred to transistor. (05 Marks)
- 2 a. With the help of neat diagrams, explain the construction and characteristics of N-channel depletion MOSFET. (10 Marks)
- b. Fig.Q2(b) shows a biasing configuration using DE-MOSFET, given that the saturation drain current is 8 mA and the pinch off voltage is  $-2V$ . Determine the value of the gate source voltage, drain current and drain source voltage.

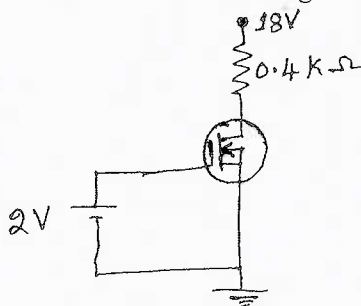


Fig.Q2(b)

(05 Marks)

- c. Explain the operation of CMOS inverter. (05 Marks)
- 3 a. Define the following terms:
  - i) Responsivity
  - ii) Noise equivalent power (NEP)
  - iii) Detectivity and Dee star
  - iv) Quantum efficiency
  - v) Response time
 (05 Marks)
- b. What is a photo transistor? Draw the schematic symbol of a photo transistor. Explain its V-I characteristics. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- c. A photodiode has a noise current of 1 fA, responsivity figure of 0.5 A/W, active area of  $1 \text{ mm}^2$  and rise time of 3.5 ns. Determine its:
- NEP
  - Detectivity
  - $D^*$
  - Quantum efficiency at 850 nm. (05 Marks)
- d. What are opto couplers? Explain the important characteristic parameters of opto couplers. (05 Marks)
- 4 a. Draw the generalized h-parameter model of a transistor based amplifier and derive the expression for:
- Current gain
  - Input impedance
  - Voltage gain
  - Output admittance (10 Marks)
- b. With neat figure, explain the operation of Darlington Amplifier. (05 Marks)
- c. What are cascade amplifiers? What are the advantages of cascade amplifiers? (05 Marks)

### PART – B

- 5 a. Explain classification of large signal amplifiers as class A, class B, class C and class AB amplifiers. (04 Marks)
- b. What are the advantages of negative feedback? (04 Marks)
- c. Derive the relevant expressions to prove that input resistance increases and output resistance reduces in case of a voltage series feedback. (08 Marks)
- d. The total harmonic distortion of an amplifier reduces from 10% to 1% on introduction of 10% negative feedback. Determine the open loop and closed loop gain values. (04 Marks)
- 6 a. Explain the Barkhausen criterion as referred to oscillators. (05 Marks)
- b. With a neat diagram, explain the operation of voltage controlled Hartley oscillator. (07 Marks)
- c. With a neat circuit and relevant waveforms, explain the operation of monostable multi-vibrator using IC 555 timer. (08 Marks)
- 7 a. Name the constituent parts of a basic linearly regulated power supply. Briefly describe the function of each of the constituent parts. (03 Marks)
- b. Define: i) Load regulation; ii) Line regulation, iii) Ripple rejection factor with reference to regulated power supplies. (04 Marks)
- c. With neat figure, explain the working of a Buck Regulator. (08 Marks)
- d. Refer to the three terminal regulator circuit of Fig.Q7(d). Determine: (i) Load current, (ii) Current through LM7812, (iii) Current through external transistor, (iv) Power dissipated in LM7812. Take  $V_{BE(Q_1)} = 0.7 \text{ V}$ .

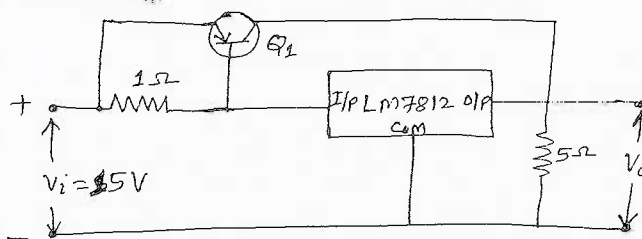


Fig.Q7(d) (05 Marks)

- 8 a. Define the following: i) CMRR, ii) PSRR, iii) Slew rate, iv) Band width, v) Open loop gain of an op-amp. (05 Marks)
- b. With a neat figure, explain the operation of a peak detector. (07 Marks)
- c. With a neat figure and relevant waveforms, explain the working of relaxation oscillator circuit using op-amp. (08 Marks)

\* \* \* \* \*

# CBCS Scheme

USN

--	--	--	--	--	--	--	--	--	--

15CS33

**Third Semester B.E. Degree Examination, June/July 2017**

## **Data Structure and Applications**

Time: 3 hrs.

Max. Marks: 80

*Note: Answer FIVE full questions, choosing one full question from each module.*

### Module-1

- 1 a. Write a C program with an appropriate structure definition and variable declaration to read and display information about 5 employees using nested structures. Consider the following fields like Ename, Empid, DOJ (Date, Month, Year) and Salary (Basic, DA, HRA). (08 Marks)
- b. Give ADT of sparse matrix and show with a suitable example sparse matrix representation storing as triples. Give a sample transpose function to transpose sparse matrix. (08 Marks)

**OR**

- 2 a. What is a polynomial? What is the degree of the polynomial? Write a function to add two polynomials. (08 Marks)
- b. List and explain the functions supported by C for dynamic memory allocation. (04 Marks)
- c. Write a C program to concatenate Fname and Lname of a person without using any library function. (04 Marks)

### Module-2

- 3 a. Define stack and write the ADT of stack. Implement push and pop functions for stack using arrays with StackFull and StackEmpty conditions. (08 Marks)
- b. What is an input restricted double ended queue? Implement the same with the supporting functions. (08 Marks)

**OR**

- 4 a. Write the postfix form of the following expression using stack:  
 i)  $(a + b) * d + e / (f + a * d) + c$                       ii)  $((a/(b - c + d)) * (e - a) * c)$  (04 Marks)
- b. Write a function to evaluate a postfix expression and trace the same for the expression  $a/b/c - d e * + a c *$  where  $a = 6, b = 3, c = 1, d = 2, e = 4$ . (06 Marks)
- c. Explain with a suitable example, how would you implement circular queue using dynamically allocated arrays. (06 Marks)

### Module-3

- 5 a. Give the node structure to create a linked list of integers and write C functions to perform the following:  
 i) Create a three node list with data 10, 20 and 30.  
 ii) Insert a node with the data value 15 in between the nodes having the data values 10 and 20.  
 iii) Delete the node whose data is 20.  
 iv) Display the resulting singly linked list. (10 Marks)
- b. Write a node structure for linked representation of polynomial. Explain the algorithm to add two polynomials represented using linked list. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Write C functions to perform the following:
- Reversing a singly linked list.
  - Concatenating singly linked list.
  - Finding the length of the list.
- (06 Marks)
- b. List out the difference between the doubly linked list and singly linked list. Illustrate with example the following operations on a doubly linked list:
- Inserting a node at the beginning.
  - Inserting at the intermediate position.
  - Deletion of a node with a given value.
  - Search a key element.
- (10 Marks)

**Module-4**

- 7 a. Define binary trees. Explain the following with example:
- Complete binary tree
  - Skewed binary tree
  - Almost complete binary tree
  - Degree of a binary tree.
- (09 Marks)
- b. For the given data, draw a binary search tree and show the array and linked representation of the same 100, 85, 45, 55, 110, 20, 70, 65.
- (07 Marks)

OR

- 8 a. Draw a binary tree for the following expression  $3 + 4 * (7 - 6) / 4 + 3$ . Traverse the above generated tree using inorder, preorder and postorder. Also write a function in C for each one.
- (09 Marks)
- b. What is the advantage of threaded binary tree over binary tree? Explain the construction of threaded binary tree for 10, 20, 30, 40, 50.
- (07 Marks)

**Module-5**

- 9 a. Define graph. Write the difference between graph and trees. For the given graph, show the adjacency matrix and adjacency list representation of the graph. [Refer Fig.Q9(a)]

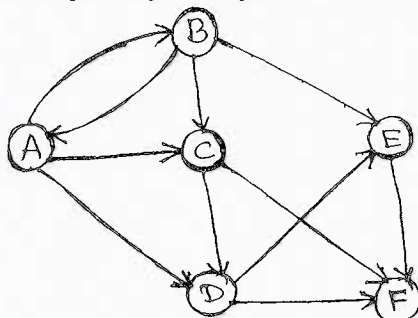


Fig.Q9(a)

(08 Marks)

- b. What are the methods used for traversing a graph? Explain any one with example.
- (08 Marks)

OR

- 10 a. Write a C function for insertion sort. Sort the following list using insertion sort: 50, 30, 10, 70, 40, 20, 60.
- (08 Marks)
- b. What is collision? What are the methods to resolve collision? Explain linear probing with an example.
- (08 Marks)

\* \* \* \* \*



# CBCS Scheme

USN

--	--	--	--	--	--	--	--	--	--

15CS33

## Third Semester B.E. Degree Examination, June/July 2017 Data Structure and Applications

Time: 3 hrs.

Max. Marks: 80

*Note: Answer FIVE full questions, choosing one full question from each module.*

### Module-1

- 1 a. Write a C program with an appropriate structure definition and variable declaration to read and display information about 5 employees using nested structures. Consider the following fields like Ename, Empid, DOJ (Date, Month, Year) and Salary (Basic, DA, HRA). (08 Marks)
- b. Give ADT of sparse matrix and show with a suitable example sparse matrix representation storing as triples. Give a sample transpose function to transpose sparse matrix. (08 Marks)

OR

- 2 a. What is a polynomial? What is the degree of the polynomial? Write a function to add two polynomials. (08 Marks)
- b. List and explain the functions supported by C for dynamic memory allocation. (04 Marks)
- c. Write a C program to concatenate Fname and Lname of a person without using any library function. (04 Marks)

### Module-2

- 3 a. Define stack and write the ADT of stack. Implement push and pop functions for stack using arrays with StackFull and StackEmpty conditions. (08 Marks)
- b. What is an input restricted double ended queue? Implement the same with the supporting functions. (08 Marks)

OR

- 4 a. Write the postfix form of the following expression using stack:  
i)  $(a + b) * d + e / (f + a * d) + c$       ii)  $((a/(b - c + d)) * (e - a) * c)$  (04 Marks)
- b. Write a function to evaluate a postfix expression and trace the same for the expression  $a b/c - d e * + a c *$  where  $a = 6, b = 3, c = 1, d = 2, e = 4$ . (06 Marks)
- c. Explain with a suitable example, how would you implement circular queue using dynamically allocated arrays. (06 Marks)

### Module-3

- 5 a. Give the node structure to create a linked list of integers and write C functions to perform the following:  
i) Create a three node list with data 10, 20 and 30.  
ii) Insert a node with the data value 15 in between the nodes having the data values 10 and 20.  
iii) Delete the node whose data is 20.  
iv) Display the resulting singly linked list. (10 Marks)
- b. Write a node structure for linked representation of polynomial. Explain the algorithm to add two polynomials represented using linked list. (06 Marks)

Important Note: 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg.  $42+8=50$ , will be treated as malpractice.

OR

- 6 a. Write C functions to perform the following:
- Reversing a singly linked list.
  - Concatenating singly linked list.
  - Finding the length of the list. (06 Marks)
- b. List out the difference between the doubly linked list and singly linked list. Illustrate with example the following operations on a doubly linked list:
- Inserting a node at the beginning.
  - Inserting at the intermediate position.
  - Deletion of a node with a given value.
  - Search a key element. (10 Marks)

**Module-4**

- 7 a. Define binary trees. Explain the following with example:
- Complete binary tree
  - Skewed binary tree
  - Almost complete binary tree
  - Degree of a binary tree. (09 Marks)
- b. For the given data, draw a binary search tree and show the array and linked representation of the same 100, 85, 45, 55, 110, 20, 70, 65. (07 Marks)

OR

- 8 a. Draw a binary tree for the following expression  $3 + 4 * (7 - 6) / 4 + 3$ . Traverse the above generated tree using inorder, preorder and postorder. Also write a function in C for each one. (09 Marks)
- b. What is the advantage of threaded binary tree over binary tree? Explain the construction of threaded binary tree for 10, 20, 30, 40, 50. (07 Marks)

**Module-5**

- 9 a. Define graph. Write the difference between graph and trees. For the given graph, show the adjacency matrix and adjacency list representation of the graph. [Refer Fig.Q9(a)]

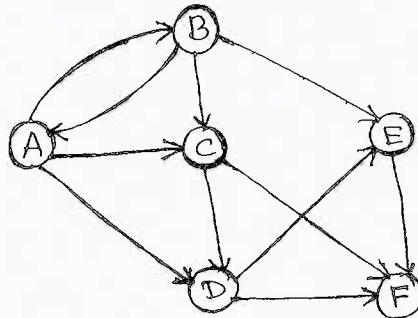


Fig.Q9(a)

- b. What are the methods used for traversing a graph? Explain any one with example. (08 Marks)

OR

- 10 a. Write a C function for insertion sort. Sort the following list using insertion sort: 50, 30, 10, 70, 40, 20, 60. (08 Marks)
- b. What is collision? What are the methods to resolve collision? Explain linear probing with an example. (08 Marks)

\* \* \* \* \*



# CBCS Scheme

5

USN

--	--	--	--	--	--	--	--	--	--

15CS34

Third Semester B.E. Degree Examination, June/July 2017

## Computer Organization

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

### Module-1

- 1 a. With a neat block diagram discuss the basic operational concept of a computer. (06 Marks)  
b. Explain the methods to improve the performance of computer. (04 Marks)  
c. Explain Big-Endian, little Endian and assignment byte addressability. (06 Marks)

OR

- 2 a. What are addressing modes? Explain the different 4 types addressing modes with example. (08 Marks)  
b. Write the use of Rotate and shift instruction with example. (04 Marks)  
c. What is stack and queue? Write the line of code to implement the same. (04 Marks)

### Module-2

- 3 a. Define bus arbitration? Explain detail any one approach of bus arbitration. (08 Marks)  
b. What are priority interrupts? Explain any one interrupt priority scheme. (04 Marks)  
c. Write a note on register in DMA interface. (04 Marks)

OR

- 4 a. With a block diagram explain how the printer interfaced to processor. (08 Marks)  
b. Explain the following with respect to U.S.B  
i) U.S.B Architecture  
ii) U.S.B protocols. (08 Marks)

### Module-3

- 5 a. Define :  
i) Memory Latency  
ii) Memory bandwidth  
iii) Hit-rate  
iv) Miss-penalty. (04 Marks)  
b. With a neat diagram explain the internal organization of a 2M×8 dynamic memory chip. (06 Marks)  
c. Explain Associative mapping technique and set Associative mapping technique. (06 Marks)

OR

- 6 a. What is virtual memory? With a diagram explain how virtual memory address is translated. (08 Marks)  
b. Write a note on :  
i) Magnetic tape system  
ii) Flash memory. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

**Module-4**

- 7 a. Perform following operations on the 5-bit signed numbers using 2's complement representation system. Also indicate whether overflow has occurred.  
i)  $(-9) + (-7)$  ii)  $(+7) - (-8)$ . (04 Marks)
- b. Explain with a neat block diagram, 4 bit carry lookahead adder. (05 Marks)
- c. Explain the concept of carry save addition for the multiplication operation,  $M \times Q = P$  for 4-bit operands with diagram and suitable example. (07 Marks)

**OR**

- 8 a. Multiply the following signed 2's complement numbers using Booth's algorithm  
multiplicand =  $(010111)_2$ , multiplier =  $(110110)_2$ . (05 Marks)
- b. Perform division operation on the following unsigned numbers using the restoring method.  
Dividend =  $(10101)_2$  Divisor =  $(00100)_2$ , (05 Marks)
- c. With a neat diagram, explain the floating point addition/subtraction unit. (06 Marks)

**Module-5**

- 9 a. Draw and explain multiple bus organization of CPU. And write the control sequence for the instruction Add R4, R5, R6 for the multiple bus organization. (08 Marks)
- b. Explain with neat diagram, micro-programmed control method for design of control unit and write the micro-routine for the instruction Branch < 0. (08 Marks)

**OR**

- 10 a. With block diagram, explain the working of microwave oven in an embedded system. (08 Marks)
- b. With block diagram, explain parallel I/O interface. (08 Marks)

\* \* \* \* \*

USN

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

10CS35

**Third Semester B.E. Degree Examination, June/July 2017**

**Data Structures with C**

Time: 3 hrs.

Max. Marks:100

*Note: Answer FIVE full questions, selecting at least TWO questions from each part.*

**PART – A**

- 1
  - a. List and define the criteria's that an algorithm must satisfy. Write an algorithm and its C code for selection sort. (08 Marks)
  - b. Define dynamic memory allocation. What are the benefits of dynamic memory allocation? Explain the memory allocation functions with example. (07 Marks)
  - c. Find the space complexity and time complexity for the following function. Assume 32-bit machine.
 

```
float rsum (float list [ ], int n)
{
    if (n)
        return rsum (list, n - 1) + list[n - 1];
    return 0;
}
```

(05 Marks)
- 2
  - a. Develop a structure to represent the planets in the solar system. Each planet has fields for the planet's name, its distance from sun, and the number of moons it has. Initialize items in each of the fields for the planets: Earth and Venus. (04 Marks)
  - b. Write a C program to add two polynomials. (10 Marks)
  - c. Give the ADT of sparse matrix. Write a function to transpose a sparsematrix. (06 Marks)
- 3
  - a. Define queue. List and define the different types of queues. Write the implementation of primitive operations of linear queue. (08 Marks)
  - b. Write a C program to evaluate a given postfix expression. (08 Marks)
  - c. Convert the following infix expression into postfix and prefix expression:  
 $(a + b) * d + e / (f + a * d) + c$  (04 Marks)
- 4
  - a. Write a C program to implement a stack using linked list. (06 Marks)
  - b. Write a function for inverting a simply linked list and a function for finding the length of a circular linked list. (06 Marks)
  - c. Give a node structure for sparse matrices. Write the linked representation for the following sparse matrix.
 

$$\begin{bmatrix} 2 & 0 & 0 & 0 \\ 4 & 0 & 0 & 3 \\ 0 & 0 & 0 & 0 \\ 8 & 0 & 0 & 1 \\ 0 & 0 & 6 & 0 \end{bmatrix}$$

(08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg.  $42+8=50$ , will be treated as malpractice.

PART – B

- 5 a. List and explain the different types of representation of trees with an example. (06 Marks)  
b. Write the C implementation of inorder, preorder and postorder traversals. Illustrate with an example. (08 Marks)  
c. Suppose that we have the following key values 7, 16, 49, 82, 5, 31, 6, 2, 44. Write out the max heap and min heap after each value is inserted into the heap. (06 Marks)
- 6 a. With an example, explain selection trees. (06 Marks)  
b. With an example explain weighting rule for union and collapsing rule for find operation. (08 Marks)  
c. Construct a binary search tree by using the following inorder and preorder traversals.  
Inorder : BCAEDGHI  
Preorder : ABCDEFGHI (06 Marks)
- 7 a. Briefly explain the height-biased leftiest trees and weight-biased leftiest trees with example. (08 Marks)  
b. What is binomial heap? Explain the steps involved in the deletion of min element from a binomial heap. (08 Marks)  
c. List and define the different types of pairing heaps. Explain meld operation of pairing heaps with an example. (04 Marks)
- 8 a. What is an AVL tree? Write the algorithm to insert an item into AVL tree. Explain LR rotation with an example. (10 Marks)  
b. Write short notes on the following:  
i) Red-black trees  
ii) Splay trees (10 Marks)

\* \* \* \* \*

# CBCS Scheme

USN

--	--	--	--	--	--	--	--	--	--

15CS36

Third Semester B.E. Degree Examination, June/July 2017

## Discrete Mathematical Structures

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

### Module-1

- 1 a. Define the following with an example for each
- Proposition
  - Tautology
  - Contradiction
  - Dual of statement. (06 Marks)
- b. Establish the validity of the following argument using rules of inference. If the band could not play rock music or the refreshments were not served on time, then the new year party could have been cancelled and Alica would have been angry. If the party were cancelled, then refunds would have to be made. No refunds were made, therefore the band could play rock music. (05 Marks)
- c. Determine the truth value of the following statements if the universe comprises all nonzero integers :
- $\exists x \exists y [xy = 2]$
  - $\exists x \forall y [xy = 2]$
  - $\forall x \exists y [xy = 2]$
  - $\exists x \exists y [(3x + y = 8) \wedge (2x - y) = 7]$
  - $\exists x \exists y [(4x + 2y = 3) \wedge (x - y = 1)]$  (05 Marks)

### OR

- 2 a. Find the possible truth values for p, q and r if
- $p \rightarrow (q \vee r)$  - FALSE
  - $p \wedge (q \rightarrow r)$  - TRUE. (05 Marks)
- b. Show that  $(p \wedge (p \rightarrow q)) \rightarrow q$  is independent of its components. (06 Marks)
- c. Give a direct proof for each of the following :
- For all integers k and  $\ell$ , if k and  $\ell$  are both even, then  $k + \ell$  is even
  - For all integers k and  $\ell$ , if k and  $\ell$  are both even, then  $k * \ell$  is even. (05 Marks)

### Module-2

- 3 a. Prove by mathematical induction, for every positive integer 8 divides  $5^n + 2 \cdot 3^{n-1} + 1$ . (06 Marks)
- b. Assuming PASCAL language is case insensitive, an identifier consists of a single letter followed by upto seven symbols which may be letters or digits (26 letters, 10 digits). There are 36 reserved words. How many distinct identifiers are possible in this version of PASCAL? (05 Marks)
- c. Find the coefficient of  $a^2b^3c^2d^5$  in the expansion of  $(a + 2b - 3c + 2d + 5)^{16}$ . (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg,  $42+8 = 50$ , will be treated as malpractice.

OR

- 4 a. Prove that  $4n < (n^2 - 7)$  for all positive integers  $n \geq 6$ . (05 Marks)
- b. Lucas numbers are defined recursively as  $L_0 = 2$ ,  $L_1 = 1$  and  $L_n = L_{n-1} + L_{n-2}$  for  $n \geq 2$ . If  $F_i^s$  are fibonacci numbers and  $L_i^s$  are the Lucas numbers, prove that  $L_n = F_{n-1} + F_{n+1}$  for all positive integers  $n$ . (05 Marks)
- c. Find the number of distinct terms in the expansion of  $(w + x + y + z)^{12}$ . (06 Marks)

**Module-3**

- 5 a. Let  $A = \{a, b, c, d\}$  and  $B = \{1, 2, 3, 4, 5, 6\}$ .
- i) How many functions are there from  $A$  to  $B$ ? How many of these are one-to-one? How many are onto?
- ii) How many functions are there from  $B$  to  $A$ ? How many of these are one-to-one? How many are onto? (06 Marks)
- b. Prove that if  $f: A \rightarrow B$ ,  $g: B \rightarrow C$  are invertible functions, then  $g \circ f: A \rightarrow C$  is invertible and  $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$ . (06 Marks)
- c. For the Hasse diagram, given in Fig. Q5(c), write i) maximal ii) minimal iii) greatest and iv) least element (s). (04 Marks)

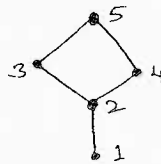


Fig. Q5(c)

OR

- 6 a. Let  $f, g: \mathbb{Z}^+ \rightarrow \mathbb{Z}^+$ , where for all  $x \in \mathbb{Z}^+$ ,  $f(x) = x + 1$  and  $g(x) = \max\{1, x - 1\}$ .
- i) What is the range of  $f$ ?
- ii) Is  $f$  a onto function?
- iii) Is  $f$  one-to-one?
- iv) What is the range of  $g$ ?
- v) Is  $g$  an onto function? (05 Marks)
- b. If  $f: A \rightarrow B$  and  $B_1, B_2 \subseteq B$ , then prove the following :
- i)  $f^{-1}(B_1 \cap B_2) = f^{-1}(B_1) \cap f^{-1}(B_2)$
- ii)  $f^{-1}(B_1 \cup B_2) = f^{-1}(B_1) \cup f^{-1}(B_2)$
- iii)  $f^{-1}(\overline{B_1}) = \overline{f^{-1}(B_1)}$  (06 Marks)
- c. Let  $A = \{1, 2, 3, 4\}$ ,  $R = \{(1, 3), (1, 1), (3, 1), (1, 2), (3, 3), (4, 4)\}$  be the relation on  $A$ . Determine whether the relation  $R$  is reflexive, irreflexive, symmetric, antisymmetric or transitive. (05 Marks)

**Module-4**

- 7 a. Determine the number of positive integers  $n$  where  $1 \leq n \leq 100$  and  $n$  is not divisible by 2, 3 or 5. (05 Marks)
- b. Describe the expansion formula for rook polynomials. Find the rook polynomial for  $3 \times 3$  board using the expansion formula. (05 Marks)
- c. Solve the recurrence relation  $b_n = bD_{n-1} - b^2D_{n-2}$ ,  $n \geq 3$  given  $D_1 = b > 0$  and  $D_2 = 0$ . (06 Marks)



OR

- 8 a. In how many ways can we arrange the letters in the CORRESPONDENTS so that :
- There is no pair of consecutive identical letters?
  - There are exactly two pairs of consecutive identical letters
  - There are atleast 3 pairs of consecutive identical letters
- (06 Marks)
- b. Find the recurrence relation and the initial conditions for the sequence 0, 2, 6, 12, 20, 30, 42, . . . . . Hence find the general term of the sequence. (05 Marks)
- c. Find the general solution of the equation  $S(k) + 3S(k - 1) - 4S(k - 2) = 4^k$ . (05 Marks)

Module-5

- 9 a. Define the following with an example
- Simple graph
  - Regular graph
  - Subgraph
  - Maximal subgraph
  - Induced subgraph.
- (05 Marks)
- b. Show that there exists no simple graphs corresponding to the following degree sequences
- 0, 2, 2, 3, 4
  - 1, 1, 2, 3
  - 2, 3, 3, 4, 5, 6
  - 2, 2, 4, 6.
- (04 Marks)
- c. Let  $T = (V, E)$  be a complete  $m$ -ary tree with  $|V| = n$ . If  $T$  has  $\ell$  leaves and  $i$  internal vertices, then prove the following :
- $n = m \cdot i + 1$
  - $\ell = (m - 1)i + 1$
  - $i = \frac{(\ell - 1)}{(m - 1)} = \frac{(n - 1)}{m}$
- (07 Marks)

OR

- 10 a. In the graph shown in Fig. Q10(a). Determine
- a walk from  $b$  to  $d$  that is not a trail
  - $b - d$  trail that is not a path
  - a path from  $b$  to  $d$
  - a closed walk from  $b$  to  $b$  that is not a circuit
  - a circuit from  $b$  to  $b$  that is not a cycle
  - a cycle from  $b$  to  $b$
- (06 Marks)

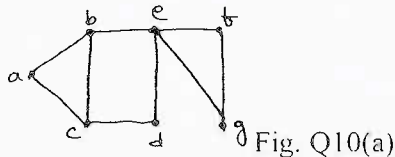


Fig. Q10(a)

- b. Determine the order  $|V|$  of the graph  $G = (V, E)$  in the following cases
- $G$  is cubic graph with 9 edges
  - $G$  is regular with 15 edges
  - $G$  has 10 edges with 2 vertices of degree 4 and all other of degree 3.
- (06 Marks)
- c. Obtain the optimal prefix code for the string ROAD IS GOOD. (04 Marks)

\*\*\*\*\*

USN

--	--	--	--	--	--	--	--	--	--

10CS36

**Third Semester B.E. Degree Examination, June/July 2017**  
**Object Oriented Programming with C++**

Time: 3 hrs.

Max. Marks:100

**Note:** 1. Answer FIVE full questions, selecting at least TWO questions from each part.  
 2. Programs must be neatly documented.

**PART – A**

- 1 a. What is reference variable? Explain with an example and write a program to swap values of two variables using reference variable. (05 Marks)
- b. Describe function overloading and write a program using overloaded function area to find area of circle, triangle and rectangle. (05 Marks)
- c. What is an inline function? What is the advantage of having a function inline? Write a C++ program to find maximum of three integers using inline function maximum ( ). (05 Marks)
- d. Illustrate with an examples, different data types supported by C++ language. (05 Marks)
- 2 a. What is data hiding? Write a C++ program to create a class complex, to add given two complex numbers and use following member functions, readData( ), dispData( ) and computeData( ). (05 Marks)
- b. What are constructor and destructor? Can you overload constructor and destructor? Justify. (08 Marks)
- c. What are static members of a class? Illustrate with an example and write a program to count the number of object created. (07 Marks)
- 3 a. What is friend function? Explain. Write a C++ program using Bridge friend function small( ) to find smallest of two numbers. (06 Marks)
- b. What is generic function and template instantiation? Write a C++ program using generic function swap( ) to exchange values of two integers, doubles and characters, and prints the values before and after swapping. (07 Marks)
- c. What is operator overloading? Why it is required? Write a C++ program to overload the operators '+' to add two complex numbers, '<<' to display complex numbers and '>>' to read complex numbers, using friend functions. (07 Marks)
- 4 a. What is inheritance? Explain the differences between the access specifier flags / visibility modes. (06 Marks)
- b. Explain single inheritance and multiple inheritance with the suitable diagram and syntaxes. (08 Marks)
- c. Write a C++ program to create a class called CSE (Name and USN) and using inheritance crate derived classes, UG (fee, stipend) and PG (fee, stipend) from it. (06 Marks)

**PART – B**

- 5 a. Explain constructor and destructor functions and how to pass arguments to constructors along with multilevel inheritance. (10 Marks)
- b. What is virtual base class? Explain with the suitable diagram and program. (10 Marks)
- 6 a. What is runtime polymorphism? How to achieve it? With the suitable example program explain the same. (10 Marks)
- b. Explain pure virtual function and abstract class with the suitable program. (10 Marks)
- 7 a. Explain input output manipulator with the suitable example. (10 Marks)
- b. Explain file operations with examples. (10 Marks)
- 8 a. What is an exception? Explain exception handling options with an example. (10 Marks)
- b. What is STL? What STL consists of? Explain in detail vector class. (10 Marks)

\* \* \* \* \*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

# CBCS Scheme

USN

--	--	--	--	--	--	--	--	--	--

15CS42

## Fourth Semester B.E. Degree Examination, June/July 2017 Software Engineering

Time: 3 hrs.

Max. Marks: 80

**Note: Answer any FIVE full questions, choosing  
ONE full question from each module.**

### Module-1

- 1 a. What are the fundamental activities of software engineering? (04 Marks)
- b. With neat diagram, explain the water-fall model of software development process. (06 Marks)
- c. With a diagram, explain the rational unified process. (06 Marks)

**OR**

- 2 a. What is requirement specification? Explain various ways of writing system requirements. (06 Marks)
- b. Why the understanding of requirements from stake holders is difficult task? Explain. (05 Marks)
- c. Explain the different checks to be carried out during requirement validation process. (05 Marks)

### Module-2

- 3 a. Draw a context model for patient information system. How the interactions are modeled? (06 Marks)
- b. Explain the terms class diagram, generalization and aggregation. (06 Marks)
- c. What is model Driven engineering? State the three types of abstract system models produced. (04 Marks)

**OR**

- 4 a. What are the things to be done for a design of object oriented system? How the objects are identified? (05 Marks)
- b. What is design pattern? Explain four elements of design pattern. (06 Marks)
- c. What is software reuse? State the general models of open source licenses. (05 Marks)

### Module-3

- 5 a. State the two goals and three levels of granularity of software testing process. (05 Marks)
- b. What is test driven development? State the benefits of test driven developments. (05 Marks)
- c. Explain the six stages of acceptance testing process. (06 Marks)

**OR**

- 6 a. With neat diagram, show the software evolution process and explain the 'Lehman's Law' concern to system change. (10 Marks)
- b. What is software maintenance? State the activities of re-engineering process. (06 Marks)

**Module-4**

- 7 a. Explain the factors to be considered for approval of change. (05 Marks)  
b. Explain the features provided by version management systems. (05 Marks)  
c. What is configuration management? State the four activities of configuration management. (06 Marks)

**OR**

- 8 a. What is system building? State the features available in the system building tools. (10 Marks)  
b. Explain the factors to be considered for release planning of system. (06 Marks)

**Module-5**

- 9 a. Explain the ways of coping with change and reduction of rework cost. (06 Marks)  
b. Explain the practices involved in the extreme programming. (10 Marks)

**OR**

- 10 a. State the principles of agile methods. (05 Marks)  
b. How the agile methods are scaled? State the coping of agile methods for large system engineering. (05 Marks)  
c. Write a note on pair programming. (06 Marks)

\* \* \* \* \*

# CBCS Scheme

USN

--	--	--	--	--	--	--	--	--	--

15CS43

## Fourth Semester B.E. Degree Examination, June/July 2017 Design and Analysis of Algorithms

Time: 3 hrs.

Max. Marks: 80

*Note: Answer FIVE full questions, choosing one full question from each module.*

### Module-1

- 1 a. Define algorithm. Explain asymptotic notations, Big O, big Omega, big theta notations. (08 Marks)  
b. Explain general plan of mathematical analysis of nonrecursive algorithms with example. (08 Marks)

OR

- 2 a. Define time and space complexity. Explain important problem types. (08 Marks)  
b. Illustrate mathematical analysis of recursive algorithm for towers of hanoi. (08 Marks)

### Module-2

- 3 a. Explain concept of divide and conquer. Write merge sort algorithm. (08 Marks)  
b. Write a recursive algorithm for binary search and also bring out its efficiency. (08 Marks)

OR

- 4 a. Illustrate the tracing of quick sort algorithm for the following set of numbers: 25, 10, 72, 18, 40, 11, 64, 58, 32, 9 (08 Marks)  
b. List out the advantages and disadvantages of divide and conquer method and illustrate the topological sorting for the following graph.

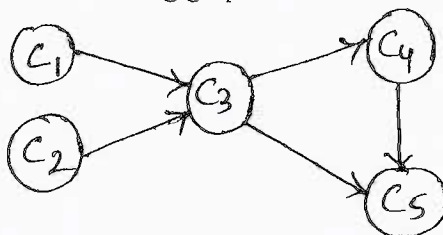


Fig.Q4(b)

(08 Marks)

### Module-3

- 5 a. Explain Greedy criterion. Write a Prim's algorithm to find minimum cost spanning tree. (08 Marks)  
b. Sort the given list of numbers using heap sort: 2, 9, 7, 6, 5, 8. (08 Marks)

OR

- 6 a. Write an algorithm to find single source shortest path. (08 Marks)  
b. Construct a Huffman tree and resulting code word for the following:

Character	A	B	C	D	-
Probability	0.35	0.1	0.2	0.2	0.15

Encode the words DAD and ADD.

(08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

**Module-4**

- 7 a. Explain the concept of dynamic programming, with example. (08 Marks)  
 b. Trace the following graph using Warshall's algorithm.

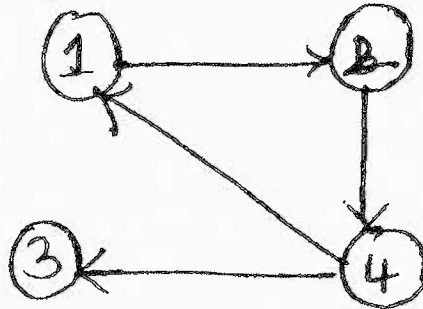


Fig.Q7(b)

(08 Marks)

**OR**

- 8 a. Explain Multistage graphs with example. Write multistage graph algorithm to forward approach. (08 Marks)  
 b. Solve the following instance of Knapsack problem using dynamic programming. Knapsack capacity is 5.

Item	Weight	Value
1	2	\$12
2	1	\$10
3	3	\$20
4	2	\$15

(08 Marks)

**Module-5**

- 9 a. Explain backtracking concept. Illustrate N queens problem using backtracking to solve 4-Queens problem. (08 Marks)  
 b. Solve subset sum problem for the following example,  $s = \{3, 5, 6, 7\}$  and  $d = 15$ . Construct a state space tree. (08 Marks)

**OR**

- 10 a. Explain the concept of branch and bound and solve assignment problem for the following and obtain optimal solution.

		Job1	Job2	Job3	Job4
Person	a	9	2	7	8
	b	6	4	3	7
	c	5	8	1	8
	d	7	6	9	4

(08 Marks)

- b. Explain LC Branch and Bound and FIFO branch and bound. (08 Marks)

\*\*\*\*\*



# CBCS Scheme

USN

--	--	--	--	--	--	--	--	--	--

15CS44

## Fourth Semester B.E. Degree Examination, June/July 2017 Microprocessors and Microcontrollers

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

### Module-1

- 1 a. Explain execution unit (EU) and Bus interface unit (BIU) of 8086  $\mu$ p with a neat diagram. (08 Marks)  
b. Explain the different addressing modes used in 8086  $\mu$ p with suitable example. (08 Marks)

OR

- 2 a. Explain all bits of flag register of 8086 $\mu$ p with a neat diagram. Show the setting and resetting of flag bits with a suitable example. (06 Marks)  
b. Write an assembly level program (ALP) to add two bytes of data stored at data 1 and data 2 and save the result in sum with comments. Identify all the directives found in the program. (06 Marks)  
c. Show the memory dump for the following data section or data segment. (04 Marks)

```
· DATA
  ORG 0010H
  DATA 1 DB 25
  DATA 2 DB 10001001B
  DATA 3 DB 12H
  ORG 0020H
  DATA 4 DB '2591'
  ORG 0030H
  DATA 5 DW 9, 2, 7, 0CH, 00100000B, 5
  ORG 0040H
  DATA 6 DW 4 DUP (00H)
```

### Module-2

- 3 a. Explain Rotate instructions with suitable example. (06 Marks)  
b. With a suitable program show how a packed BCD value is converted to ASCII value. (04 Marks)  
c. Assume that there is a class of five people. With following grades: 69, 87, 96, 45, 75. Write an ALP to find the highest grade. (06 Marks)

OR

- 4 a. Write an ALP that adds the following two multiword numbers and saves the result:  
Data 1 = 548FB9963CE7H and  
Data 2 = 3FCD4FA23B8DH (08 Marks)  
b. Write an ALP to perform the following :  
i) Clear the screen  
ii) Set the cursor at row 8 and column 5 of the screen.  
iii) Prompt "There is a message for you from VTU : to read it enter Y. If the user enters 'Y' or 'y' then the message "Hello! All the best for your exams" will appear on the screen. If the user enters any other key, then the prompt "No more messages for you" should appear on the next line. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

**Module-3**

- 5 a. Explain handling of overflow problem arised in addition of signed numbers with a suitable example. (06 Marks)
- b. Explain XLAT instruction with example. (04 Marks)
- c. Explain 74138 decoder configuration to enable the memory address F000H to F7FFFH to connect four 8k RAMS. (06 Marks)

**OR**

- 6 a. Briefly explain the control word format of 8255 in I/O mode and BSR mode. Find the control word if PA = out, PB = in, PC0 – PC3 = in and PC4 -- PC7 = out. Use port addresses of 300H – 303H for the 8255 chip. Then get data from port B and send it to port A. (08 Marks)
- b. Assume that we have 4 bytes of hexadecimal data: 25H, 62H, 3FH and 52H.
- Find the checksum byte
  - Perform the checksum operation to ensure data integrity.
  - If the second byte 62H had been changed to 22H. Show how checksum detects the error. (08 Marks)

**Module-4**

- 7 a. Differentiate between RISC and CISC processors. (06 Marks)
- b. Explain ARM core data flow model with a neat diagram. (06 Marks)
- c. Discuss briefly how coprocessors can be attached to ARM processor. (04 Marks)

**OR**

- 8 a. Explain the architecture of a typical embedded device based on ARM core with a neat diagram. (08 Marks)
- b. Explain the concept of pipeline and interrupts used in ARM processor. (08 Marks)

**Module-5**

- 9 a. Explain the following instructions of ARM processor with suitable example.  
i) MLA    ii) QADD    iii) SMULL    iv) LSL. (08 Marks)
- b. Write an ALP to copy a block of data (Block 1) to another block (Block 2) using ARM instructions. (08 Marks)

**OR**

- 10 a. Write an ALP using ARM instructions that calls subroutine fact to find factorial of a given number. (08 Marks)
- b. Write short notes on memory access and branch instructions of ARM controller. (08 Marks)

\* \* \* \* \*

# CBCS Scheme

USN 

--	--	--	--	--	--	--	--	--	--

15CS45

**Fourth Semester B.E. Degree Examination, June/July 2017**  
**Object Oriented Concepts**

Time: 3 hrs.

Max. Marks: 80

**Note: Answer any FIVE full questions, choosing  
 ONE full question from each module.**

**Module-1**

- 1 a. How do name space helps in preventing pollution of the global namespace. (04 Marks)  
 b. What is function polymorphism? Write a program in C++ using overloaded function area to find area of circle, triangle and rectangle. (06 Marks)  
 c. Explain how one can bridge two classes using friend function. Write a C++ program to find the sum of two numbers using bridge friend function add(). (06 Marks)

**OR**

- 2 a. Can you overload constructor and destructor? Justify with suitable program. (06 Marks)  
 b. What is reference variable? Explain. Also write a program in C++ to swap two int values and display the values before and after swapping. (05 Marks)  
 c. What are static member of a class? Write a C++ program to count the number of objects created. (05 Marks)

**Module-2**

- 3 a. How "compile once and run anywhere" is implemented in JAVA? Discuss. (04 Marks)  
 b. Write a program to calculate the average among the elements {8, 6, 2, 7} using for each in Java. How for each is different from for loop? (06 Marks)  
 c. Explain type conversion, with an example. (06 Marks)

**OR**

- 4 a. List and explain the java buzzwords. (08 Marks)  
 b. Explain the concepts of arrays in Java with examples. Also write a program that creates and initializes a four integer elements array. Find the sum and average of its values. (08 Marks)

**Module-3**

- 5 a. Briefly explain the role of interfaces while implementing multiple inheritances in Java. (06 Marks)  
 b. Compare and contrast method overloading and method overriding with suitable examples. (06 Marks)  
 c. When constructors are called in the class hierarchy? (04 Marks)

**OR**

- 6 a. With example, give two uses of super. (05 Marks)  
 b. Define exception. Write a program which contains one method which will throw IllegalAccessException and use proper exception handlers so that exception should be printed. (06 Marks)  
 c. Define package. What are the steps involved in creating user defined package with an example. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

**Module-4**

- 7 a. How synchronization can be achieved for threads in Java? Explain with syntax. (06 Marks)  
b. Explain the adaptor class with an example. (04 Marks)  
c. With the syntax explain the use of isAlive( ) and Join( ) methods. (06 Marks)

**OR**

- 8 a. What are the differences between suspending and stopping the threads? (05 Marks)  
b. Discuss delegation event model with suitable examples. (06 Marks)  
c. Explain inner class with example. (05 Marks)

**Module-5**

- 9 a. What are the two types of applets? Explain the skeleton of an applet. Enlist applet tags. (06 Marks)  
b. Write steps to create JTable, also write a program to demonstrate the same. (05 Marks)  
c. Explain the applet architecture and demonstrate how to pass parameters for font size and font name in applets. (05 Marks)

**OR**

- 10 a. Explain briefly the components and containers used in swings. (05 Marks)  
b. Explain JLabel and ImageIcon with program. (06 Marks)  
c. What are applets? Explain different stages in the lifecycle of an applet. (05 Marks)

\* \* \* \* \*

USN

--	--	--	--	--	--	--	--	--	--

10CS45

**Fourth Semester B.E. Degree Examination, June/July 2017**  
**Microprocessors**

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting  
at least TWO questions from each part.**

**PART – A**

- 1 a. Explain the program visible internal register – organization of 8086 microprocessor. (05 Marks)
- b. What is real mode addressing? Explain default segment and offset registers. (05 Marks)
- c. Write any five differences between real mode and protected mode memory system. (05 Marks)
- d. What is pipelining? How is it achieved in 8086? (05 Marks)
- 2 a. Explain with example the various data related addressing modes of 8086. (08 Marks)
- b. Explain the various descriptors used in 80286 – core 2 processors operating in protected mode. (06 Marks)
- c. Generate the machine code for the following 8086 instruction: (06 Marks)
  - (i) MOV AX, BX
  - (ii) MOV CL, [SI]
- 3 a. Write an assembly language program to add 10 non-negative 8 bit numbers. (08 Marks)
- b. Explain the following instructions with examples: (06 Marks)
  - (i) XCHG (ii) LEA (iii) LAHF (iv) CMP (v) LODSB (vi) STOSB
- c. What do you mean by assembler directives? Explain the following directives : (i) ORG (06 Marks)
(ii) PROC and ENDP (iii) OFFSET.
- 4 a. Explain the various string manipulation instructions with example. (10 Marks)
- b. Differentiate between short, near and far jump instructions with two examples of each. (10 Marks)

**PART – B**

- 5 a. Differentiate between macros and procedures. (06 Marks)
- b. Define modular programming. Explain with suitable example. (07 Marks)
- c. Distinguish between the 16 bit and 32 bit versions of C/C++ when using the assembler. (07 Marks)
- 6 a. Bring out the differences between 8086 and 8088 microprocessor. (06 Marks)
- b. With neat timing diagram, explain 8086 memory read cycle. (07 Marks)
- c. With neat diagram, explain the minimum mode system of 8086 microprocessor. (07 Marks)
- 7 a. Mention the differences between memory mapped I/O and isolated I/O. (06 Marks)
- b. How 8086 microprocessor selects 8 bit on 16 bit data from odd or even memory banks? (06 Marks)
- c. With neat diagram, explain simple NAND gate address decoding logic to select 2K × 8 EPROM for 8086 processor. (08 Marks)
- 8 a. Explain briefly the interrupt vector table of 8086 microprocessor. (10 Marks)
- b. Explain the pin-out of 8255 along with different operational modes. (10 Marks)

\* \* \* \* \*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.



# CBCS Scheme

USN 

--	--	--	--	--	--	--	--	--	--

15CS46

## Fourth Semester B.E. Degree Examination, June/July 2017

### Data Communication

Time: 3 hrs.

Max. Marks: 80

**Note:** Answer FIVE full questions, choosing one full question from each module.

#### Module-1

- 1 a. What is data communication? With a neat diagram, explain the four basic topologies. (05 Marks)
- b. Explain TCP/IP protocol suite with Encapsulation and decapsulation concepts. (08 Marks)
- c. Explain different characteristics of periodic analog signal. Find the phase in degree and radian of a sine wave with offset  $\frac{1}{4}$  cycle with respect to time '0' (zero). (03 Marks)

OR

- 2 a. Draw line code of the sequence 010011 using NRZ, NRZ-L, NRZ-I, Manchester, RZ and differential Manchester schemes. (06 Marks)
- b. Explain digital signal transmissions methods. (06 Marks)
- c. What is noiseless channel? Find out maximum bit rate in noiseless channel with bandwidth of 3000 Hz transmitting a signal with two signal level. (04 Marks)

#### Module-2

- 3 a. Explain PCM and quantization process with steps and example. (08 Marks)
- b. Explain amplitude shift keying modulation process. (04 Marks)
- c. Find out bit rate if available bandwidth is 100 kHz which spans from 200 to 300 kHz. Consider ASK with  $d = 1, r = 1$ . (04 Marks)

OR

- 4 a. What is multiplexing? define synchronous TDM with data rate management strategies. (08 Marks)
- b. What is spread spectrum? Explain FHSS and bandwidth sharing. (08 Marks)

#### Module-3

- 5 a. How does datawords and codewords is represented in block coding and also explain how can errors be selected and corrected by using block coding. (10 Marks)
- b. Find the code word using CRC given data is 1101 and generator is 1100. (06 Marks)

OR

- 6 a. With a neat diagram, explain any two protocols of noisy channel. (12 Marks)
- b. Explain the frame format of HDLC protocol. (04 Marks)

#### Module-4

- 7 a. What is channelization? List and explain the channelization protocols. (12 Marks)
- b. Describe Gigabit Ethernet. (04 Marks)

OR

- 8 a. Describe pure ALOHA and slotted ALOHA. (06 Marks)
- b. Explain Carrier Sense Multiple Access with Collision Detection (CSMA/CD) (06 Marks)
- c. Define Bluetooth and its architecture. (04 Marks)

#### Module-5

- 9 a. Explain satellite networks and its categories. (12 Marks)
- b. Write a short note on Fixed WiMAX. (04 Marks)

OR

- 10 a. Explain mobile IP with phases. (12 Marks)
- b. Write a short note on IPV6 addressing. (04 Marks)

\* \* \* \* \*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.



USN

--	--	--	--	--	--	--	--	--	--

10CS46

**Fourth Semester B.E. Degree Examination, June/July 2017**  
**Computer Organisation**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.**

**PART - A**

- 1
  - a. Explain in brief different types of key parameters that affect the processor performance. (05 Marks)
  - b. Draw and explain the connection between memory and processor, with the respective register. (05 Marks)
  - c. List the different systems used to represent signed numbers. Perform the following operations on the 5 – bit signed numbers using 2’s compliment representation system  
 i)  $(-8) + (-12)$     ii)  $(-6) - (+2)$     iii)  $(-8) - (+3)$ . (10 Marks)
  
- 2
  - a. What is Little endian and Big endian memory? Represent any 32 bits number in big endian and little endian memory. (05 Marks)
  - b. Write an assembly language program to convert unpacked BCD number to packed BCD number. (05 Marks)
  - c. With example, explain any four addressing modes. (05 Marks)
  - d. With example, explain Logical shift and Arithmetic shift instruction. (05 Marks)
  
- 3
  - a. What is IO mapped IO and memory mapped IO? Explain them in briefly. (05 Marks)
  - b. With figure, explain Distributed Arbitration in detail. (10 Marks)
  - c. What are the different methods of DMA? Explain them in brief. (05 Marks)
  
- 4
  - a. With a block diagram, explain how output device is interfaced to processor. (10 Marks)
  - b. Explain with Timing signal of read operation on PCI (Peripheral Component Interconnect) bus by showing role of IRDY/TRDY. (10 Marks)

**PART - B**

- 5
  - a. With figure, explain Internal structure of Static memory. (05 Marks)
  - b. With figure, explain Internal organization of  $2M \times 8$  dynamic memory chip. (10 Marks)
  - c. Explain in detail the Associative mapping of cache memory. (05 Marks)
  
- 6
  - a. Design and explain 4 bit carry look ahead adder. (10 Marks)
  - b. Perform signed multiplication of numbers  $(+13)$  and  $(-6)$  by using bit pair recoding technique. (05 Marks)
  - c. Explain with example IEEE standard for floating point numbers. (05 Marks)
  
- 7
  - a. List out the action needed to execute the instruction add  $(R_3), R_1$ . Write and explain sequence of control steps for the execution of the same. (10 Marks)
  - b. With figure, explain Control Unit Organization. (10 Marks)
  
- 8
  - a. Explain the classic organization of a shared memory multiprocessor. (10 Marks)
  - b. Explain the different approaches used in multithreading. (10 Marks)

\*\*\*\*\*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
 2. Any revealing of identification, appeal to evaluator and /or equations written eg.  $42+8=50$ , will be treated as malpractice.

USN

--	--	--	--	--	--	--	--	--	--

10CS32

Third Semester B.E. Degree Examination, Dec.2016/Jan.2017

Electronic Circuits

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART - A

- 1 a. Explain the phenomenon of thermal runaway. (06 Marks)
- b. Explain the working of a transistor switch. (06 Marks)
- c. Determine the operating point for a fixed bias circuit shown in Fig.Q1(c).

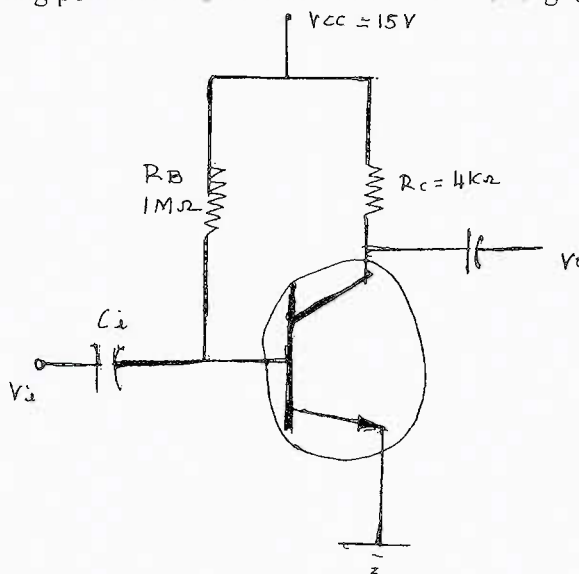


Fig.Q1(c)

(08 Marks)

- 2 a. Explain the construction and working of a n channel enhancement MOSFET. (10 Marks)
- b. What are the differences between JFETs and MOSFETs? (05 Marks)
- c. Write a note on handling of MOSFETs. (05 Marks)
- 3 a. A photodiode has a noise current of 1fA, responsivity of 0.5 A/W, active area of 1 mm<sup>2</sup> and rise time of 3.5 ns. Determine: i) NEP, ii) Detectivity, iii) D\*, iv) quantum efficiency. (04 Marks)
- b. What is an opto coupler? Define forward opto coupling efficiency, isolation voltage and bandwidth. (08 Marks)
- c. Explain the construction, characteristics and an application of a phototransistor with relevant diagrams. (08 Marks)
- 4 a. Derive expressions for Ai, Zi, Av and Yo for a transistor amplifier using h-parameter model. (12 Marks)
- b. Explain the need for cascading amplifier. Explain a two stage cascaded amplifier with a neat block diagram. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

**PART – B**

- 5 a. Explain the different classes of large signal amplifiers with their characteristic specifications. (08 Marks)
- b. List the advantages of negative feedback. (06 Marks)
- c. For the OPAMP based non-inverting amplifier circuit shown in Fig.Q5(c), determine the voltage gain, input impedance in the presence of feedback given that open loop gain and input impedance of OPAMP are 80 dB and  $1\text{ M}\Omega$  respectively.

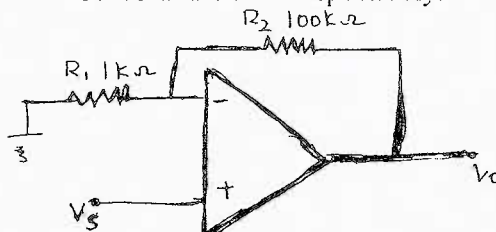


Fig.Q5(c)

(06 Marks)

- 6 a. What are voltage controlled oscillators? Explain the working of voltage controlled Hartley oscillator with a neat circuit diagram. (08 Marks)
- b. What is an RC high pass circuit? Explain how an RC high pass circuit can be used as a differentiator. (08 Marks)
- c. Explain the frequency stability criterion. (04 Marks)
- 7 a. Explain the working of a three terminal IC voltage regulator with a neat functional block diagram. (08 Marks)
- b. Define load regulation, line regulation, output impedance, ripple rejection factor. (08 Marks)
- c. Differentiate between linear power supply and switched mode power supply. (04 Marks)
- 8 a. Determine the common mode gain for an OPAMP with differential voltage gain and CMRR of an OPAMP of 110 dB and 100 dB respectively. (04 Marks)
- b. Explain the working of an absolute value circuit with a neat circuit diagram. (08 Marks)
- c. Explain the working of an inverting comparator with hysteresis with a neat circuit diagram and suitable transfer characteristics. (08 Marks)

\* \* \* \* \*

# CBCS Scheme

USN 

--	--	--	--	--	--	--	--	--	--

15CS32

## Third Semester B.E. Degree Examination, Dec.2016/Jan.2017 Analog and Digital Electronics

Time: 3 hrs.

Max. Marks: 80

**Note:** Answer FIVE full questions, choosing one full question from each module.

### Module-1

- 1 a. Explain the working of N – channel DE – MOSFET, with the help of neat diagram. (08 Marks)
- b. With circuit diagram, explain any two application of FET. (06 Marks)
- c. How CMOS can be used as inverting switch? (02 Marks)

OR

- 2 a. Design a voltage divider bias network using a DEMOSFET with supply voltage  $V_{DD} = 16V$ ,  $I_{DSS} = 10mA$  and  $V_P = 5V$  to have a quiescent drain current of 5mA and gate voltage of 4V. (Assume the drain resistor  $R_D$  to be four times the source resistor  $R_S$  and  $R_2 = 1k\Omega$ ). (08 Marks)
- b. Explain the performance parameters of Op-amp. (08 Marks)

### Module-2

- 3 a. Minimize the following Boolean function using K – map method  
 $f(a, b, c, d) = \Sigma m (5, 6, 7, 12, 13) + \Sigma d (4, 9, 14, 15)$ . (06 Marks)
- b. Apply Quine Mc – Clusky method to find the essential prime implicants for the Boolean expression  $f(a, b, c, d) = \Sigma m (1, 3, 6, 7, 9, 10, 12, 13, 14, 15)$ . (10 Marks)

OR

- 4 a. A digital system is to be designed in which the month of the year is given as input is four bit form. The month January is represented as '0000', February as '0001' and so on. The output of the system should be '1' corresponding to the input of the month containing 31 days or otherwise it is '0'. Consider the excess number in the input beyond '1011' as don't care conditions for the system of four variables. (ABCD) find the following :
  - i) Write truth table and Boolean expression in SOP  $\Sigma m$  and POS  $\Pi M$  form.
  - ii) Using K – map simplify the Boolean expression of canonical mini term form.
  - iii) Using Basic gates implement logical circuit. (10 Marks)
- b. What is Hazard? List the type of hazards and explain static 0 and static – 1 hazard. (06 Marks)

### Module-3

- 5 a. Implement the following function using 8:1 multiplexer  $f(a, b, c, d) = \Sigma m (0, 1, 5, 6, 8, 10, 12, 15)$ . (06 Marks)
- b. Realize the following function using 3:8 decoder
  - i)  $f(a, b, c) = \Sigma m (1, 2, 3, 4)$       ii)  $f(a, b, c) = \Sigma m (3, 5, 7)$ . (04 Marks)
- c. What is Magnitude Comparator? Explain 1 bit magnitude comparator. (06 Marks)

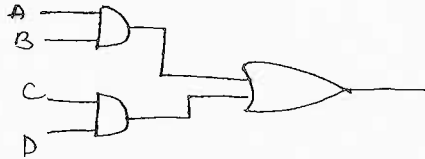
OR

- 6 a. Design 7 – segment decoder using PLA. (08 Marks)
- b. Differentiate between Combinational and Sequential circuit. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- c. Write VHDL code for given circuit. (04 Marks)

Fig.Q6(c)



#### Module-4

- 7 a. What is Race around condition? With block diagram and truth table, explain the working of JK master – slave flip – flop. (10 Marks)  
 b. Give State transition diagram and characteristics equation for JK and SR Flip Flop. (06 Marks)

#### **OR**

- 8 a. With neat diagram, explain Ring counter. (04 Marks)  
 b. What is Shift Register? With neat diagram, explain 4 bit parallel in serial out shift registers. (08 Marks)  
 c. Compare Synchronous and Asynchronous counter. (04 Marks)

#### Module-5

- 9 a. Define Counter. Design A synchronous counter for the sequence  $0 \rightarrow 4 \rightarrow 1 \rightarrow 2 \rightarrow 6 \rightarrow 0 \rightarrow 4$  using JK Flip – Flop. (12 Marks)  
 b. Explain Digital clock, with neat diagram. (04 Marks)

#### **OR**

- 10 a. Explain the Binary ladder with Digital input of 1000. (06 Marks)  
 b. Explain 2 bit simultaneous A/D converter. (10 Marks)

\* \* \* \* \*

# CBCS Scheme

USN

--	--	--	--	--	--	--	--	--	--

15CS33

**Third Semester B.E. Degree Examination, Dec.2016/Jan.2017**  
**Data Structures and Applications**

Time: 3 hrs.

Max. Marks: 80

**Note: Answer FIVE full questions, choosing one full question from each module.**

**Module-1**

- 1 a. What is an algorithm? Explain the criteria that an algorithm must satisfy. (08 Marks)  
 b. Write a function to sort integers using selection sort algorithm. (04 Marks)  
 c. Consider two polynomials,  
 $A(x) = 4x^{15} + 3x^4 + 5$  and  $B(x) = x^4 + 10x^2 + 1$   
 Show diagrammatically how these two polynomials can be stored in a 1-D array. Also give its C representation. (04 Marks)

**OR**

- 2 a. Write the Knuth Morris Pratt pattern matching algorithm and apply the same to search the pattern 'abcdabcy' in the text 'abcxabcdabxabcdabedabcy'. (08 Marks)  
 b. Write the fast transpose algorithm to transpose the given sparse matrix. Express the given sparse matrix as triplets and find its transpose.

$$A = \begin{bmatrix} 10 & 0 & 0 & 25 & 0 \\ 0 & 23 & 0 & 0 & 45 \\ 0 & 0 & 0 & 0 & 32 \\ 42 & 0 & 0 & 31 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 30 & 0 & 0 \end{bmatrix}$$

(08 Marks)

**Module-2**

- 3 a. Write the algorithm to implement a stack using dynamic array whose initial capacity is 1 and array doubling is used to increase the stack's capacity (that is dynamically reallocate twice the memory) whenever an element is added to a full stack. Implement the operations-push, pop and display. (08 Marks)  
 b. Write the algorithm for of tower of Hanoi. (04 Marks)  
 c. Write a note on Ackerman's function. (04 Marks)

**OR**

- 4 a. List the disadvantages of linear queue and explain how is it solved in circular queue. Give the algorithm to implement a circular queue with suitable example. (08 Marks)  
 b. Convert the infix expression,  $((a/(b-c+d))*(e-a)*c)$  to postfix expression. Write a function to evaluate that postfix expression and trace for the given data  $a = 6, b = 3, c = 1, d = 2, e = 4$ . (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.



Module-3

- 5 a. Give the node structure to create a singly linked list of integers and write functions to perform the following :
- Create a list.
  - Assume the list contains 3 nodes with data 10, 20, 30. Insert a node with data 40 at the end of the list.
  - Insert a node with data 50 between the nodes having data values 10 and 20.
  - Display the singly linked list. (08 Marks)
- b. What is the advantage of doubly linked list over singly linked list? Illustrate with an example. (04 Marks)
- c. For the given sparse matrix, write the diagrammatic linked list representation.

$$A = \begin{bmatrix} 0 & 10 & 0 & 0 \\ 3 & 0 & 0 & 5 \\ 8 & 0 & 2 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 8 & 0 \end{bmatrix}$$

(04 Marks)

OR

- 6 a. Write the functions for singly linked list with integer data to search an element in the list. (08 Marks)
- b. Write the node structure for linked representation of polynomial. Explain the algorithm to add two polynomials represented using linked lists. (08 Marks)

Module-4

- 7 a. What is a tree? With suitable example define (i) Binary tree (ii) Level of a binary tree (iii) Complete binary tree. (08 Marks)
- b. Write the routines to traverse the given tree using (i) Pre-order traversal and (ii) Post order traversal. (08 Marks)

OR

- 8 a. What is a binary search tree? Write algorithm to implement for recursive search or iterative search for a binary search tree. (08 Marks)
- b. Write the routines for, (i) Create a binary tree. (ii) Testing for equality of binary trees. (08 Marks)

Module-5

- 9 a. What is a graph? Give the matrix and adjacency list representation of graphs. (08 Marks)
- b. Write an algorithm for bubble sort. Trace the algorithm for the data : 30, 20, 10, 40, 80, 60, 70. (08 Marks)

OR

- 10 a. Explain open addressing and chaining used to handle overflows in hashing. (05 Marks)
- b. Explain directoryless dynamic hashing. (05 Marks)
- c. Briefly explain basic operations that can be performed on a file. Explain indexed sequential file organization. (06 Marks)

\* \* \* \* \*

# CBCS Scheme

USN

--	--	--	--	--	--	--	--	--	--

15CS34

**Third Semester B.E. Degree Examination, Dec.2016/Jan.2017**  
**Computer Organization**

Time: 3 hrs.

Max. Marks: 80

**Note: Answer any FIVE full questions, choosing one full question from each module.**

**Module-1**

- 1 a. With a neat diagram, explain basic operational concept of computer. (06 Marks)
- b. What is performance measurement? Explain overall SPEC rating for computer. (04 Marks)
- c. Draw single bus structure, discuss about memory mapped I/O. (06 Marks)

**OR**

- 2 a. What is an addressing mode? Explain any three addressing modes with example. (10 Marks)
- b. Explain BIG-ENDIAN and LITTLE-ENDIAN methods of byte addressing with proper example. (06 Marks)

**Module-2**

- 3 a. What is an Interrupt? With example illustrate concept of interrupt. (06 Marks)
- b. Define Exception. Explain 2 kinds of exception. (04 Marks)
- c. With a neat diagram explain DMA controller. (06 Marks)

**OR**

- 4 a. Explain PCI bus. (05 Marks)
- b. List SCSI bus signal with their functionalities. (05 Marks)
- c. Explain the tree structure of USB with split bus operation. (06 Marks)

**Module-3**

- 5 a. Briefly explain any two mapping function used in cache memory. (08 Marks)
- b. With a neat diagram explain the internal organization of memory chip (2M×8 and dynamic memory chip). (08 Marks)

**OR**

- 6 a. Explain the following :  
i) Hit Rate and Miss penalty ii) Virtual memory organization. (08 Marks)
- b. With diagram explain how virtual memory translation take place. (08 Marks)

**Module-4**

- 7 a. Draw 4-bit carry-look ahead adder and explain. (06 Marks)
- b. Perform multiplication for -13 and +09 using Booth's Algorithm. (06 Marks)
- c. Design a logic circuit to perform addition/subtraction of 'n' bit number X and Y. (04 Marks)

**OR**

- 8 a. Explain IEEE standard for floating point number. (06 Marks)
- b. With figure explain circuit arrangement for binary division. (10 Marks)

**Module-5**

- 9 a. With a figure explain single bus organization of datapath inside a processor. (08 Marks)
- b. What are the actions required to Execute a complete instruction Add (R3), R<sub>1</sub>. (02 Marks)
- c. Give the control sequence for execution of instruction ADD (R3), R<sub>1</sub>. (06 Marks)

**OR**

- 10 a. Briefly explain the block diagram of camera. (08 Marks)
- b. Explain multiprocessors. Justify how time is reduced. (08 Marks)

\* \* \* \* \*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

USN

--	--	--	--	--	--	--	--	--	--

10CS35

**Third Semester B.E. Degree Examination, Dec.2016/Jan.2017**  
**Data Structures with C**

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting  
at least TWO questions from each part.**

**PART – A**

- 1 a. Define pointer. With examples, explain pointer declaration, pointer initialization and use of the pointer in allocating a block of memory dynamically. (06 Marks)  
b. What is recursion? What are the various types of recursion? (05 Marks)  
c. Explain the following: i) Big - Oh    ii) Big - Ω    iii) Big - θ. (09 Marks)
  
- 2 a. Define structure and union with suitable example. (08 Marks)  
b. Write a C program using structures with following fields NAME, ROLLNO, marks in M<sub>1</sub>, M<sub>2</sub>, M<sub>3</sub> and find Total and average. Read any N records and print all the records and also print the record who is having second highest total with all the fields. (12 Marks)
  
- 3 a. Define queue. Write a function for both INSERT( ) and DELETE( ) functions. (08 Marks)  
b. Write an algorithm to convert infix to postfix expression and apply the same to convert following expressions from infix to postfix:  
i) a/b – c + d \* e - a \* c    ii) (a – b) + c/d \$n e. (12 Marks)
  
- 4 a. What is a linked list? Explain the different types of linked list with diagram. (10 Marks)  
b. Write a C-program to implement the insertion and delete operation on queue using linked list. (10 Marks)

**PART – B**

- 5 a. Define binary tree. For the given tree find the following:
  - i) Siblings
  - ii) Leaf nodes
  - iii) Ancestors
  - iv) Depth of a tree
  - v) Level of trees.(10 Marks)

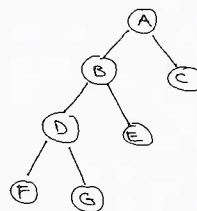


Fig.Q.5(a)

- b. Explain the following with suitable example:
  - i) Strictly binary tree (06 Marks)
  - ii) Complete binary tree (04 Marks)
  - iii) Skewed tree.
- c. What is heap? Explain the different types of heaps. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- 6 a. What is a binary search tree? Draw the binary search tree for the following list 14, 5, 6, 2, 18, 20, 15, 19, -3, 16. (10 Marks)
- b. What is a forest? Explain the different methods of traversing a tree with following tree. (10 Marks)

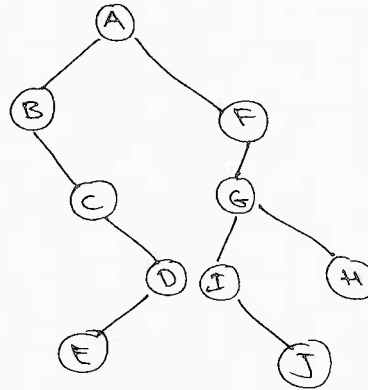


Fig.Q.6(b)

- 7 a. What is a priority queue? Explain the various types of priority queues. (08 Marks)
- b. Write a short note on:
- Binomial heaps
  - Priority heaps
  - Fibonacci heaps.
- (12 Marks)
- 8 a. What is an AVL tree? Write the algorithm to insert an item into AVL tree. (10 Marks)
- b. Explain the following:
- Red-black trees
  - Splay trees.
- (10 Marks)

\* \* \* \* \*

USN

--	--	--	--	--	--	--	--	--	--

10CS36

**Third Semester B.E. Degree Examination, Dec.2016/Jan.2017**  
**Object Oriented Programming with C++**

Time: 3 hrs.

Max. Marks:100

*Note: Answer FIVE full questions, selecting  
at least TWO questions from each part.*

**PART – A**

- 1 a. Describe the following characteristics of object oriented programming:  
i) Encapsulation ii) Polymorphism iii) Inheritance. (06 Marks)
- b. Explain function overloading and its benefits. Write a C++ program to define three overloaded functions area( ), to find area of rectangle, area of rectangular box and area of circle. (08 Marks)
- c. How can you make member functions inline? Give an example. (06 Marks)
- 2 a. What are constructors and destructors? What are their characteristics? Explain different types of constructors. (12 Marks)
- b. Explain static data members and static member functions with an example. (08 Marks)
- 3 a. Discuss function template and its usage. Write a C++ program to create a template function to swap two integers, two floats and two characters. (10 Marks)
- b. What is operator overloading? Write a C++ program to demonstrate overloading of operator + and -. Use friend function for + and member function for - stating the difference. (10 Marks)
- 4 a. What is inheritance? Explain the advantages of inheritance. (06 Marks)
- b. Explain single and multilevel inheritance with examples. (10 Marks)
- c. What is the effect of using the protected access specifier on the visibility of a base class member? (04 Marks)

**PART – B**

- 5 a. In what order are the class constructor and destructor invoked when a derived class object is created? Explain with an example. (08 Marks)
- b. Write a short note on virtual base class. (06 Marks)
- c. Write a C++ program and explain how to show passing parameters to base class constructors. (06 Marks)
- 6 a. Write a short note on virtual function with example. (06 Marks)
- b. What is pure virtual function and abstract class? Write a C++ program to implement an abstract class. (10 Marks)
- c. Differentiate between early and late binding. (04 Marks)
- 7 a. Write a note on file open modes. (05 Marks)
- b. What are the manipulators? Discuss 4 predefined manipulators supplied by C++ I/O streams. (05 Marks)
- c. What are iostreams? Explain the stream class hierarchy with a neat diagram. (10 Marks)
- 8 a. What do you mean by exception handling? Discuss try-catch mechanism. Write a C++ program to show the implementation of exception handling. (10 Marks)
- b. Why do we use standard template library? What are the components of STL? Discuss each component briefly with examples. (10 Marks)

\* \* \* \* \*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.



# CBCS Scheme

USN

--	--	--	--	--	--	--	--	--	--

15CS36

Third Semester B.E. Degree Examination, Dec.2016/Jan.2017

## Discrete Mathematical Structures

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

### Module-1

- 1 a. Let p, q and r be propositions having truth values 0, 0 and 1 respectively. Find the truth values of the following compound proposition  
 i)  $(p \wedge q) \rightarrow r$     ii)  $p \rightarrow (q \wedge r)$     iii)  $p \wedge (r \rightarrow q)$     iv)  $p \rightarrow (q \rightarrow (\neg r))$     (04 Marks)
- b. Define tautology. Prove that for any propositions p, q, r the compound proposition  $[(p \vee q) \wedge \{(p \rightarrow r) \wedge (q \rightarrow r)\}] \rightarrow r$  is tautology.    (04 Marks)
- c. Establish the validity of the following argument  
 $\forall x, [p(x) \vee q(x)]$   
 $\exists x, \neg p(x)$   
 $\forall x, [\neg q(x) \vee r(x)]$   
 $\forall x, [s(x) \rightarrow \neg r(x)]$   
 $\therefore \exists x \neg s(x)$     (04 Marks)
- d. Give i) direct proof and ii) proof by contradiction for the following statement. "If 'n' is an odd integer, then n+9 is an even integer".    (04 Marks)

### OR

- 2 a. Define dual of a logical statement. Verify the principle of duality for the following logical equivalence  $[\sim (p \wedge q) \rightarrow \sim p \vee (\sim p \vee q)] \Leftrightarrow (\sim p \vee q)$ .    (04 Marks)
- b. Prove the following by using laws of logic  
 i)  $p \rightarrow (q \rightarrow r) \Leftrightarrow (p \wedge q) \rightarrow r$   
 ii)  $[\sim p \wedge (\sim q \vee r)] \vee [(q \wedge r) \vee (p \wedge q)] \Leftrightarrow r$ .    (04 Marks)
- c. Establish the validity of the following argument using the rules of inference:  
 $[p \wedge (p \rightarrow q) \wedge (s \vee t) \wedge (r \rightarrow \sim q)] \rightarrow (s \vee t)$     (04 Marks)
- d. Define i) open sentence ii) quantifiers. For the following statements, the universe comprises all non-zero integers. Determine the truth values of each statement :  
 i)  $\exists x, \exists y (xy = 1)$     ii)  $\exists x, \forall y (xy = 1)$     iii)  $\forall x, \exists y (xy = 1)$ .    (04 Marks)

### Module-2

- 3 a. By mathematical induction, prove that  
 $1^2 + 3^2 + 5^2 + \dots + (2n-1)^2 = \frac{n(2n+1)(2n-1)}{3}$ .    (05 Marks)
- b. For the Fibonacci sequence show that    (05 Marks)  

$$F_n = \frac{1}{\sqrt{5}} \left[ \left( \frac{1+\sqrt{5}}{2} \right)^n - \left( \frac{1-\sqrt{5}}{2} \right)^n \right]$$
- c. A woman has 11 close relatives and she wishes to invite 5 of them to dinner. In how many ways can she invite them in the following situations :  
 i) There is no restriction on the choice  
 ii) Two particular persons will not attend separately    iii) Two particular persons will not attend together.    (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42-8 = 50, will be treated as malpractice.

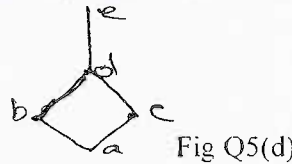


OR

- 4 a. Prove that every positive integer  $n \geq 24$  can be written as a sum of 5's and/or 7's. (04 Marks)  
 b. Find an explicit definition of the sequence defined recursively by  $a_1 = 7, a_n = 2a_{n-1} + 1$  for  $n \geq 2$ . (04 Marks)  
 c. i) How many arrangements are there for all letters in the word SOCIOLOGICAL?  
 ii) In how many of these arrangements A and G are adjacent? In how many of these arrangements all the vowels are adjacent? (04 Marks)  
 d. Find the coefficient of i)  $x^9y^3$  in the expansion of  $(2x - 3y)^{12}$  ii)  $a^2b^3c^2d^5$  in the expansion of  $(a + 2b - 3c + 2d + 5)^{10}$ . (04 Marks)

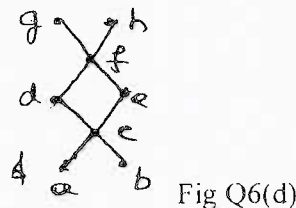
**Module-3**

- 5 a. Let a function  $f : \mathbb{R} \rightarrow \mathbb{R}$  be defined by  $f(x) = x^2 + 1$ . Find the images of  $A_1 = \{2, 3\}$ ,  $A_2 = \{-2, 0, 3\}$ ,  $A_3 = (0, 1)$  and  $A_4 = [-6, 3]$ . (04 Marks)  
 b. ABC is an equilateral triangle whose sides are of length one cm each. If we select 5 points inside the triangle, prove that at least two of these points are such that the distance between them is less than  $\frac{1}{2}$  cm. (04 Marks)  
 c. Let f, g, h be functions from  $\mathbb{Z}$  to  $\mathbb{Z}$  defined by  $f(x) = x - 1, g(x) = 3x$  and  $h(x) = \begin{cases} 0 & \text{if } x \text{ is even} \\ 1 & \text{if } x \text{ is added} \end{cases}$ . Determine  $(fo(goh))(x)$  and  $((fog)oh)(x)$  and verify that  $fo(goh) = (fog)oh$ . (04 Marks)  
 d. For  $A = \{a, b, c, d, e\}$  the Hasse diagram for the Poset  $(A, R)$  is as shown in Fig Q5(d). Determine the relation matrix for R and Construct the digraph for R (04 Marks)



OR

- 6 a. Let  $A = \{1, 2, 3\}$  and  $B = \{2, 4, 5\}$ . Determine the  
 i) Number of binary relations on A.  
 ii) Number of relations from A to B that contain (1, 2) and (1, 5)  
 iii) Number of relations from A, B that contain exactly five ordered pairs  
 iv) Number of binary relations on A that contains at least seven ordered pairs. (04 Marks)  
 b. Let  $A = B = \mathbb{R}$  be the set of the real numbers, the functions  $f : A \rightarrow B$  and  $g : B \rightarrow A$  be defined by  $f(x) = 2x^3 - 1, \forall x \in A; g(y) = \left\{ \frac{1}{2}(y+1) \right\}^{1/3} \forall y \in B$ . Show that each of f and g is the inverse of the other. (04 Marks)  
 c. Define a relation R on  $A \times A$  by  $(x_1, y_1) R (x_2, y_2)$  iff  $x_1 + y_1 = x_2 + y_2$ , where  $A = \{1, 2, 3, 4, 5\}$ .  
 i) Verify that R is an equivalence relation on  $A \times A$ .  
 ii) Determine the equivalence classes  $[(1, 3)]$  and  $[(2, 4)]$ . (04 Marks)  
 d. Consider the Hasse diagram of a POSET  $(A, R)$  given in Fig Q6(d). If  $B = \{c, d, e\}$  find all upper bounds, lower bounds, the least upper bound and the greatest lower bound of B. (04 Marks)



**Module-4**

- 7 a. Determine the number of positive integers  $n$  such that  $1 \leq n \leq 100$  and  $n$  is not divisible by 2, 3, or 5. (04 Marks)
- b. In how many ways can the 26 letters of the English alphabet be permuted so that none of the patterns CAR, DOG, PUN or BYTE occurs? (04 Marks)
- c. A girl student has Sarees of 5 different colors, blue, green red, white and yellow. On Monday she does not wear green, on Tuesdays blue or red, on Wednesday blue or green, on Thursday red or yellow; on Friday red. In how many ways can she dress without repeating a color during a week (from Monday to Friday)? (04 Marks)
- d. The number of affected files in a system 1000 (to start with) and this increases 250% every two hours. Use a recurrence relation to determine the number of virus affected files in the system after one day. (04 Marks)

**OR**

- 8 a. In how many ways can one arrange the letters in the word CORRESPONDENTS so that
- There is no pair of consecutive identical letters?
  - There are exactly two pairs of consecutive identical letters? (06 Marks)
- b. An apple, a banana, a mango and an orange are to be distributed to four boys  $B_1, B_2, B_3,$  and  $B_4$ . The boys  $B_1$  and  $B_2$  do not wish to have apple, the boy,  $B_3$  does not want banana or mango and  $B_4$  refuses orange. In how many ways the distribution can be made so that no boy is displeased? (05 Marks)
- c. Solve the recurrence relation  $a_n = 3a_{n-1} - 2a_{n-2}$  for  $n \geq 2$  given that  $a_1 = 5$  and  $a_2 = 3$ . (05 Marks)

**Module-5**

- 9 a. Define :
- Bipartite graph
  - Complete bipartite graph
  - Regular graph
  - Connected graph with an example. (04 Marks)
- b. Define isomorphism. Verify the two graphs are isomorphic (04 Marks)

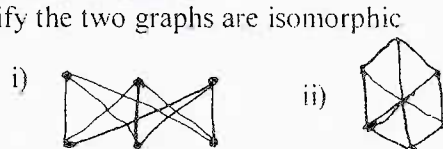


Fig Q9(b)

- c. Show that a tree with  $n$  vertices has  $n-1$  edges. (04 Marks)
- d. Obtain an optimal prefix code for the message ROAD IS GOOD. Indicate the code. (04 Marks)

**OR**

- 10 a. Determine the order  $|V|$  of the graph  $G = (V, E)$  in
- $G$  is a cubic graph with 9 edges
  - $G$  is regular with 15 edges
  - $G$  has 10 edges with 2 vertices of degree 4 and all other vertices of degree 3. (04 Marks)
- b. Prove that in a graph
- The sum of the degrees of all the vertices is an even number and is equal to twice the number of edges in the graph.
  - The number of vertices of odd degrees is even. (04 Marks)
- c. Discuss the solution of Konigsberg bridge problem. (04 Marks)
- d. Define optimal tree and construct an optimal tree for a given set of weights  $\{4, 15, 25, 5, 8, 16\}$ . Hence find the weight of the optimal tree. (04 Marks)



- 3 a. Define a tree and a forest. Prove that a tree with two or more vertices contains at least 2 leaves. Further, show that if a tree has exactly two pendent vertices, the degree of every non-pendant vertex is two. (06 Marks)
- b. Show that a Hamilton path is a spanning tree. Draw all the spanning trees of the graph Fig.Q.3(b). (06 Marks)

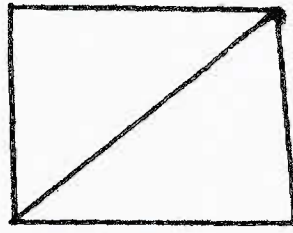


Fig.Q.3(b)

- c. Construct an optimal prefix code for the letters of the word 'ENGINEERING'. Hence deduce the code for this word. (08 Marks)
- 4 a. Apply Prim's algorithm to find a minimal spanning tree for the graph Fig.Q.4(a). (07 Marks)

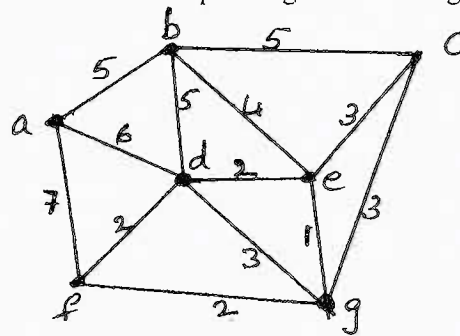


Fig.Q.4(a)

- b. Apply Dijkstra's algorithm to the weighted digraph, to find the shortest distance from vertex 1 to each of the other vertices Fig.Q.4(b). (08 Marks)

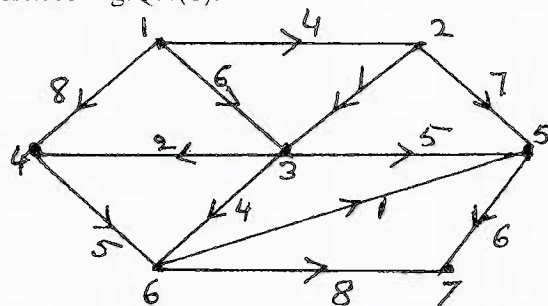


Fig.Q.4(b)

- c. Define matching. Five students  $s_1, s_2, s_3, s_4, s_5$  are members of 3 committees  $c_1, c_2, c_3$ . The committee  $c_1$  has  $s_4$  and  $s_3$  as members, the committee  $c_2$  has  $s_1, s_3, s_5$  as members and the committee  $c_3$  has  $s_2$  and  $s_5$  as members. Each committee is to select a student representative. Can a selection be made in such a way that each committee has a distinct representative? (05 Marks)

**PART – B**

- 5 a. How many arrangements are there for all the letters in the word ‘SOCIOLOGICAL’? In how many of these arrangements i) A and G are adjacent? ii) All the vowels are adjacent? (07 Marks)
- b. Find the coefficient of i)  $x^{12}$  in the expansion of  $x^3(1 - 2x)^{10}$  and ii)  $x^2y^2z^3$  in the expansion of  $(3x - 2y - 4z)^7$ . (06 Marks)
- c. Define Catalan number. Using the moves R:  $(x, y) \rightarrow (x + 1, y)$  and u:  $(x, y) \rightarrow (x, y + 1)$  find in how many ways can one go.
- i) From  $(0, 0)$  to  $(6, 6)$  and not rise above the line  $y = x$ ?
- ii) From  $(2, 1)$  to  $(7, 6)$  and not rise above the line  $y = x - 1$ ? (07 Marks)
- 6 a. Find the number of non-negative integer solutions of the equation  $x_1 + x_2 + x_3 + x_4 = 18$  under the condition  $x_i \leq 7$  for  $i = 1, 2, 3, 4$ . (07 Marks)
- b. There are  $n$  pairs of children’s gloves in a box. Each pair is of a different colour. Suppose the right gloves are distributed at random to  $n$  children and there after the left gloves are also distributed to them at random. Find the probability that.
- i) No child gets a matching pair.
- ii) Every child gets a matching pair.
- iii) Exactly one child gets a matching pair. (06 Marks)
- c. Find the rook polynomial for the board shown below (shaded part). (07 Marks)

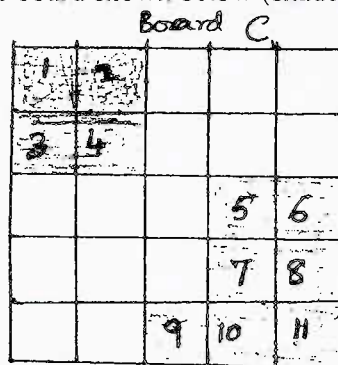


Fig.Q.6(c).

- 7 a. Using generating function, derive the formula  $\sum_{k=0}^n k^3 = \left\{ \frac{n(n+1)}{2} \right\}^2$ . (07 Marks)
- b. In how many ways can 12 oranges be distributed among 3 children A, B, C so that A gets at least 4, B and C gets at least 2, but C gets no more than 5? (07 Marks)
- c. A company appoints 11 software engineers, each of whom is to be assigned to one of four offices of the company. Each office should get at least one of these engineers. In how many ways can these assignments be made? (06 Marks)
- 8 a. Find the recurrence relation and the initial condition for the sequence 0, 2, 6, 12, 20, 30, 42, ... Hence find the general term of the sequence. (06 Marks)
- b. Solve the recurrence relation  $a_n + a_{n-1} - 6a_{n-2} = 0$  for  $n \geq 2$  given that  $a_0 = -1$  and  $a_1 = 8$ . (07 Marks)
- c. Find the generating function for the recurrence relation,  $a_{n+2} - 5a_{n+1} + 6a_n = 2$ ,  $n \geq 0$  and  $a_0 = 3, a_1 = 7$ . Hence solve it. (07 Marks)

\*\*\*\*\*



USN

--	--	--	--	--	--	--	--	--	--

10CS44

Fourth Semester B.E. Degree Examination, Dec.2016/Jan.2017

UNIX and Shell Programming

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART - A

- 1 a. Explain the salient features of UNIX operating system. (07 Marks)
- b. With neat diagram explain the architecture of UNIX clearly bring out the division of labor between Kernel and shell. (08 Marks)
- c. Explain the following commands with examples. (05 Marks)
  - i) cat ii) pwd iii) who iv) tty v) bc
- 2 a. What is file permission? What are the different ways of setting file permission? Explain. (07 Marks)
- b. A file's current permission are rw - r - xr - - specify the chmod expression required to change them for the following. Using both relative and absolute methods of assigning permissions. (08 Marks)
  - i) -w-r--r-- ii) r--r----- iii) rwxrwxrwx iv) -----
- c. Explain the three modes of Vi editor with diagram. (05 Marks)
- 3 a. What is shell process? What are the different phases in the creation of process? (07 Marks)
- b. Explain what wild - card patterns match : (08 Marks)
  - [A - Z]????\* ii) \*[0 - 9]\* iii) \*![0 - 9] iv) \*.[!S] [!h]
- c. What is process status? Explain ps command with options. (05 Marks)
- 4 a. Differentiate between hard link and soft link in UNIX with examples. (06 Marks)
- b. Explain the following filters with examples: (08 Marks)
  - i) tail ii) tr iii) pr iv) cut.
- c. Explain the following environment variables with examples: (06 Marks)
  - i) LOGNAME ii) PATH iii) HOME.

PART - B

- 5 a. With the example, explain the grep command any five options. (10 Marks)
- b. What is sed? Explain the difference between line addressing and context addressing in sed. (10 Marks)
- 6 a. What is shell programming? Write a shell program in order to perform the following tasks: (08 Marks)
  - i) Display current login users ii) print current directory iii) Process status.
- b. Explain the shell features of while and for loop with examples. (08 Marks)
- c. Explain trap in shell scripts with suitable example. (04 Marks)
- 7 a. Explain the following Built in variables of awk with examples. (08 Marks)
  - i) FS ii) NF iii) FILENAME iv) NR.
- b. With suitable examples, explain if and while statement in awk. (06 Marks)
- c. Explain the following built-in functions of awk with examples : (06 Marks)
  - i) Substr ii) length iii) index.
- 8 a. Explain the string handling functions of perl with examples. (08 Marks)
- b. Explain the following with respect to PERL with examples: (06 Marks)
  - i) For each looping construct ii) Join.
- c. Write a PERL program to print numbers that are accepted from the keyboard using while. (06 Marks)

\*\*\*\*\*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.





USN

--	--	--	--	--	--	--	--	--	--

10CS46

**Fourth Semester B.E. Degree Examination, Dec.2016/Jan.2017**  
**Computer Organization**

Time: 3 hrs.

Max. Marks:100

*Note: Answer any FIVE full questions, selecting  
atleast TWO questions from each part.*

**PART – A**

1.
  - a. What is pipelining? How does it improve the performance of the computer? (08 Marks)
  - b. Compare CISC versus RISC processors. (04 Marks)
  - c. Explain clearly SPEC rating and its significance. (08 Marks)
  
2.
  - a. What is the need of an addressing mode? Explain three addressing modes with examples. (08 Marks)
  - b. Convert the following numbers to signed, 2's compliment binary number and add them.  
 (i) 7 and -5      (ii) -10 and -13 (04 Marks)
  - c. What is stack frames? Explain. (04 Marks)
  - d. Explain the shift and rotate operations with example. (04 Marks)
  
3.
  - a. In modern computers, why interrupts are required? Support your claim with a suitable example. (04 Marks)
  - b. Showing the possible register configuration in DMA interface, explain direct memory access. (08 Marks)
  - c. With a neat sketch, explain the individual input and output interface circuits. Also elicit their salient features. (08 Marks)
  
4.
  - a. Write a note on PCI configuration and explain with neat figure the single processor system configurations. (08 Marks)
  - b. Explain the different phases in the operations of SCSI bus speed in detail. (06 Marks)
  - c. Explain the following :  
 (i) USB addressing      (ii) USB protocols. (06 Marks)

**PART – B**

5.
  - a. Describe SDRAM and DDR SDRAM operations for data transfer between main memory and cache memory systems. (08 Marks)
  - b. Explain any one cache mapping function. (06 Marks)
  - c. Consider a two level cache with access times of 5 ns and 80 ns respectively. If the hit rates are 95% and 75% respectively in the two caches and the memory access time is 250 ns, what is the average access time? (04 Marks)
  - d. Calculate the effective address time if average page fault service time of 20 milliseconds and a memory access time of 80 nano seconds. (Assume the probability of a page fault as 10%). (02 Marks)
  
6.
  - a. Explain how a 16-bit carry look ahead adder can be built from a 4-bit adder. (08 Marks)
  - b. Using the non storing division algorithm, perform the division of numbers 23 by 5 (23 ÷ 5). (08 Marks)
  - c. Explain the IEEE standards for floating point number. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- 7 a. Explain the process of fetching a word from memory using timing diagram of memory read operations, with an example. (08 Marks)
- b. Bring out any four difference between hardwired and microprogrammed control. (04 Marks)
- c. With a neat diagram, explain the microinstruction sequencing organization. (08 Marks)
- 8 a. Write a short note on power wall. (06 Marks)
- b. State and explain the Amdhal's law and compute the speed up gained for the following. Suppose that the new CPU is 10 times faster in computing floating point calculations and old CPU is busy with floating point calculations 40% of the time. Calculate speed up gained by the new CPU. (08 Marks)
- c. With a neat block diagram bring out the characteristics of shared memory multiprocessors (SMPs). (06 Marks)

\* \* \* \* \*