

## B.TECH. DEGREE EXAMINATION, APRIL 2011

## Fourth Semester

## ENGINEERING MATHEMATICS—III (CMELRPTANSUF)

(Regular/Improvement/Supplementary)

(Common for all Branches)

Time : Three Hours

Maximum : 100 Marks

Answer one full question from each module.  
Statistical tables permitted.

## Module I

1. (a) Solve  $(1 + y^2)dx = (\tan^{-1}y - x)dy$ . (7 marks)
- (b) Solve  $(D^2 - 2D + 1)y = e^x \log x$  by the method of variation of parameters. (9 marks)
- (c) Solve  $y' + y \tan x = y^3 \sec x$ . (4 marks)

Or

- (d) Solve  $\left[ \left(1 + \frac{1}{x}\right)y + \cos y \right]dx + [x + \log x - x \sin y]dy = 0$ . (5 marks)
- (e) Solve  $(D^2 - 3D + 2)y = x^2 + e^x$ . (7 marks)
- (f) Using method of variation of parameters, solve  $\frac{d^2y}{dx^2} + 4y = \tan 2x$ . (8 marks)

## Module II

2. (a) If  $u = \sin^{-1} \left( \frac{x^2 + y^2}{x + y} \right)$ , show that  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \tan u$ . (7 marks)
- (b) Using Lagrange's undetermined multipliers find the maximum value of  $x^2 + y^2 + z^2$  subject to  $ax + by + cz = p$ . (8 marks)
- (c) Solve by Cherpit's method  $(p^2 + q^2)y = qz$ . (5 marks)

Or

- (d) The two ends A and B of a rod 30 cm. long have the temperature at 40° C and 90° C until steady state prevails. The temperatures of the ends are changed to 50° C and 70° C respectively. Find the temperature distribution in the rod at time  $t$ . (20 marks)

Turn over

## Module III

3. (a) Define Fourier transform of a function  $f(x)$ . Show that  $F[f(x - \alpha)] = e^{i\alpha a} F(\alpha)$ , where  $F(\alpha)$  is the Fourier transform of  $f(x)$ .

(5 marks)

- (b) Find the Fourier cosine transform of the function  $f(x) = \begin{cases} \cos x, & 0 < x < a \\ 0, & x > a \end{cases}$ .

(7 marks)

- (c) Verify the Parseval's identity for the function  $f(x) = \begin{cases} 1, & \text{for } |x| \leq a \\ 0, & \text{for } |x| > a \end{cases}$ .

(8 marks)

Or

- (d) Find the Fourier transform of:  $f(x) = \begin{cases} 1 - x^2, & |x| \leq 1 \\ 0, & |x| > 1 \end{cases}$

(5 marks)

- (e) Find the Fourier sine transform of  $f(x) = \frac{e^{-ax}}{x}$ ,  $a > 0$ ,  $x \neq 0$  and hence show that

$$\int_0^{\infty} \tan^{-1}\left(\frac{x}{a}\right) (\sin x) dx = \frac{\pi}{2} e^{-a}.$$

(8 marks)

- (f) State and prove the convolution theorem for Fourier transforms.

(7 marks)

## Module IV

4. (a) If a random variable  $X$  has a Poisson distribution with parameter  $\alpha$ , then prove that  $E(x) = \alpha$ , and  $V(x) = \alpha$ .

(5 marks)

- (b) The probability that a patient recovers from a disease is 0.4. If 18 persons have such a disease, determine the probability that :

(i) exactly 6 survive.

(ii) at least 10 survive.

(iii) from 3 to 9 survive.

(10 marks)

- (c) If  $X$  has normal distribution with mean  $m$  and variance  $s^2$ , find  $P[\mu - \sigma < X < \mu + \sigma]$ .

(5 marks)

Or

- (d) Small electric motors are shipped in lots of 50. Before such a shipment is accepted, an inspector chooses 5 of these motors and inspects them. If none of these tested motors are defective, the lot is accepted. If one or more are found to be defective, the entire shipment is inspected. Suppose that there are, in fact, three defective motors in the lot, what is the probability that 100 % inspection is required ?  
(10 marks)
- (e) Suppose that the probability that an item produced by a particular machine is defective equal 0.2. If 10 items produced from this machine are selected at random, what is the probability that not more than one defective is found ?  
(6 marks)
- (f) Find the probability that 5 out of 10 persons are in favour of a given piece of legislation given that the sample is taken from 100 persons among whom 60 are for it.  
(4 marks)

### Module V

5. (a) Let  $\bar{X}$  be the mean of a random sample of size "n" from a distribution which is  $N(\mu, 9)$ . Find n such that  $P[\bar{X} - 1 < \mu < \bar{X} + 1] = 0.90$ .  
(10 marks)
- (b) A set of five similar coins is tossed 320 times and the result is :
- |              |   |   |    |    |     |    |    |
|--------------|---|---|----|----|-----|----|----|
| No. of heads | : | 0 | 1  | 2  | 3   | 4  | 5  |
| Frequency    | : | 6 | 25 | 74 | 110 | 73 | 32 |
- Test the hypothesis that the data follow a binomial distribution at 0.05 level of significance.  
(10 marks)

Or

- (c) Fit a Poisson distribution to the following data and test for its goodness of fit at level of significance 0.05.
- |     |   |     |     |     |    |    |
|-----|---|-----|-----|-----|----|----|
| $x$ | : | 0   | 1   | 2   | 3  | 4  |
| $f$ | : | 419 | 342 | 164 | 54 | 21 |
- (10 marks)
- (d) The voltage of a voltage source is measured 100 times and the mean voltage is found to be 230.14 V, with a standard deviation of 0.6 V. Test the hypothesis that the mean voltage of the source is 230 V at 0.05 level of significance.

[5 × 20 = 100 marks]

G 6826

(Pages : 2)

Reg. No.....

Name.....

**B.TECH. DEGREE EXAMINATION, APRIL 2011**

**Fourth Semester**

Branch : Information Technology

**DATA STRUCTURES AND ALGORITHMS (T)**

(Regular/Improvement/Supplementary)

Time : Three Hours

Maximum : 100 Marks

**Part A**

Answer all questions.

Each question carries 4 marks

1. Explain Why analysis of algorithm is important?
2. Explain about the representation of sparse matrix with an example?
3. Compare Singly linked list and Doubly linked list?
4. Write an function/Algorithm to insert an element in the front of the singly linked list?
5. What is meant by BST? Give its application?
6. What is meant by balanced tree? Give its importance?
7. What is meant by a Graph? Give its application?
8. Explain about the concept of Garbage collection?
9. Compare Insertion sort with bubble sort? When insertion sort is preferred over bubble sort?
10. Explain interpolation search?

(10 × 4 = 40 marks)

**Part B**

Answer all questions.

Each question carries 12 marks.

11. Give an Algorithm to insert an element in a particular position in an array? Derive its best and worst time complexity?

Or

12. What is meant by Stack? Implement Stack using array?

Turn over

13. Write Algorithm/function to implement the following operations on singly linked list

- (a) Insert an element to the sorted linked list.
- (b) To search an element from the linked list.

Or

14. Write Algorithm/function to implement the following operations on Doubly Linked list

- (a) Insert an element in the position X
- (b) Delete an element whose value is X

15. Give an Algorithm/function to perform inorder, preorder and postorder traversals on Binary trees.

Or

16. Construct a BST from the following numbers (numbers are entered in this order).

90, 36, 58, 96, 32, 92, 12, 93, 24, 97, 38, 60, 98.

Delete nodes 12, 60, 36, 96 from this tree. Draw the tree after each deletion.

17. Explain with example any shortest path algorithm?

Or

18. What is meant by Garbage collection? Describe any garbage collection algorithm in detail?

19. Give Merge sort algorithm? Trace the algorithm for the following input

19, 123, 43, 78, 242, 98, 34, 75, 135, 87, 17.

Discuss the time complexity.

Or

20. Give binary search algorithm? Compare with interpolation search algorithm and discuss the time complexity of each algorithm?

(5 × 12 = 60 marks)

G 6836

(Pages : 2)

Reg. No.....

Name.....

**B.TECH. DEGREE EXAMINATION, APRIL 2011**

**Fourth Semester**

Branch : Information Technology

**LINEAR INTEGRATED CIRCUITS AND APPLICATIONS (T)**

(Regular/Improvement/Supplementary)

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer all questions.*

*Each question carries 4 marks.*

1. Draw the equivalent circuit for an op-amp giving practical values for its parameters.
2. What is slew rate? What is the cause for the same?
3. List the merits and demerits of active filter?
4. What is a notch filter? Draw its circuit diagram.
5. If the clock frequency of an 8 bit successive approximation type ADC is 1 MHz, what is the conversion time?
6. Compare the merits and demerits of ladder type DAC with the weighted resistor type.
7. Explain the line regulation and load regulation for a linear voltage regulator.
8. What is the importance of the output resistance of a voltage regulator? Explain.
9. List any *four* desirable characteristic properties of the VCO i a PLL?
10. Name any *four* distinct applications of PLL.

(10 × 4 = 40 marks)

**Part B**

*Answer either Section (a) or (b) of each module.*

*Each full question carries 12 marks.*

**MODULE 1**

11. (a) Define and explain the following properties of an op-amp, giving the circuit set up for their measurement :
  - (i) CMRR.
  - (ii) Input offset current.
  - (iii) Input bias current.

(3 × 4 = 12 marks)

Or

Turn over

- (b) With the help of neat circuit and waveforms, explain the working of precision half wave and full wave rectifiers.

MODULE 2

12. (a) Draw the circuit of a second order active low pass Butterworth filter and design it for a cut-off frequency of 500 Hz.

Or

- (b) Draw the circuit of a linear sweep generator using a comparator and integrator. Explain its working with appropriate waveforms.

MODULE 3

13. (a) With a neat circuit diagram, explain the working of a 4 bit weighted resistor DAC.

Or

- (b) Draw the circuit of a 4 bit Flash ADC and explain the conversion process with the help of its function table.

MODULE 4

14. (a) Using ICs, design a regulated power supply to produce an output voltage, adjustable from 2 V to 12 V. Draw the circuit.

Or

- (b) Draw and explain the block diagram of a switching regulator. Compare them with linear regulators.

MODULE 5

15. (a) With a neat block diagram, describe how the PLL can be used to demodulate FM wave.

Or

- (b) Explain the functional block diagram of 565. With a circuit diagram show how FSK can be generated using it.

(5 × 12 = 60 marks)

G 6846

(Pages : 2)

Reg. No.....

Name.....

**B.TECH. DEGREE EXAMINATION, APRIL 2011**

**Fourth Semester**

**Branch : Information Technology**

**COMPUTER SYSTEMS ARCHITECTURE (T)**

**(Regular/Improvement/Supplementary)**

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer all questions.*

*Each question carries 4 marks.*

1. Explain the direct addressing modes and indirect addressing modes in 8085 with *one* example.
2. What is a Cache memory ?
3. Explain Segmentation.
4. What is an Interrupt ?
5. What is a Machine cycle ?
6. Explain the register structure of 8085.
7. What are the different types of DMA ?
8. Write a note on any *one* standard IO interface.
9. What are Addressing Modes ?
10. Explain Programmed data transfer.

(10 × 4 = 40 marks)

**Part B**

*Answer either (a) or (b) section of each module.*

*Each full question carries 12 marks.*

**Module 1**

11. (a) Explain the data path for fetching on instruction and decoding it. (12 marks)
- Or*
- (b) (i) Explain the different layers of a computer system. (6 marks)
- (ii) List the steps involved in the execution of an instruction. (6 marks)

**Turn over**



## Module 2

12. (a) Explain the different instruction types in 8085 with *one* example for each. (12 marks)
- Or*
- (b) (i) Explain the register addressing and indirect addressing modes in 8085. (7 marks)
- (ii) Explain the advantages of indirect addressing. (5 marks)

## Module 3

13. (a) (i) Explain the advantages of Carry Look Ahead addition. (5 marks)
- (ii) Explain Booth's algorithm with an example. (7 marks)

*Or*

- (b) Explain the stages involved in the design of Hardwired control logic. (12 marks)

## Module 4

14. (a) (i) Explain how speedup is achieved by Translation buffers. (6 marks)
- (ii) Explain Paging and list its advantages. (6 marks)

*Or*

- (b) (i) Explain the characteristics of a memory system. (5 marks)
- (ii) Explain the organisation of a multilevel memory system and write its advantages. (7 marks)

## Module 5

15. (a) Write short notes on :
- (i) IO Processors. (6 marks)
- (ii) IO Addressing. (6 marks)

*Or*

- (b) Explain how DMA is different from Programmed IO and Interrupt driven IO. (12 marks)
- [5 × 12 = 60 marks]

G 6864

(Pages : 2)

Reg. No.....

Name.....

**B.TECH. DEGREE EXAMINATION, APRIL 2011**

**Fourth Semester**

**Branch : Information Technology**

**OBJECT ORIENTED PROGRAMMING IN C++ (T)**

**(Regular/Improvement/Supplementary)**

**Time : Three Hours**

**Maximum : 100 Marks**

**Part A**

*Answer all questions.*

*Each carries 4 marks.*

1. What are the benefits of object oriented programming ?
2. In C++, a variable can be declared anywhere in the scope. What is the significance of this feature ?
3. List at least four new operators added by C++ that aids OOP.
4. What is the main advantage of passing arguments by reference ? Explain.
5. What is the significance of an empty parenthesis in a function declaration ?
6. Explain how objects are created and used in C++ ?
7. Discuss the advantages of inheritance.
8. What are virtual functions ? What are their uses an OOP ?
9. Explain nested exception handling with an example.
10. What is the importance of templates in C++ ?

(10 × 4 = 40 marks)

**Part B**

*Answer either Section (a) or (b) from each module.*

*Each full question carries 12 marks.*

**MODULE 1**

11. (a) (i) Explain the various data types used in C++. (6 marks)
- (ii) What are the application of OOP ? Explain. (6 marks)

*Or*

**Turn over**

- (b) Explain the basic concepts of object oriented programming. What are its benefits ? Give examples of object oriented programming languages and their special features.

(12 marks)

MODULE 2

12. (a) Write a C++ program that uses a function to calculate the sum of square of even numbers in an array of 100 numbers.

(12 marks)

Or

- (b) Write a C++ program to define a class "BANK" and perform the following operations :- Deposit, withdraw, balance.

(12 marks)

MODULE 3

13. (a) (i) Define and explain constructors and destructors. Describe various types with examples.

(6 marks)

- (ii) Write and explain three number functions that are created automatically if they are not included in the class definition.

(6 marks)

Or

- (b) (i) Explain the properties of constructor and destructor, compared to other member functions of a class.

(6 marks)

- (ii) With an example, show the sequence in which constructors and destructors are called in a program ?

(6 marks)

MODULE 4

14. (a) Distinguish between function overloading and operator overloading giving appropriate examples :

(12 marks)

Or

- (b) Simulate a sample three-level inheritance program using an abstract class for data control. Use any environment of your choice in C++ language.

(12 marks)

MODULE 5

15. (a) (i) Explain template class specialisation.

(6 marks)

- (ii) State and explain some of the possibilities of occurrence of an exception.

(6 marks)

- (b) With the help of a program, explain how class templates and function templates are used ?

(12 marks)

[5 × 12 = 60 marks]