F 3473 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fourth Semester

ENGINEERING MATHEMATICS—III

(Common for all branches)

[Prior to 2007 Admissions—Supplementary]

Time : Three Hours Maximum : 100 Marks

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

Module 1

1. (a) Solve $y'' + 3y' + 2y = e^{-2x} + \sin 2x$. (7 marks)

(b) Solve $(D^2 + 6D + 9)y = (x^2 + 1)\sinh x$. (7 marks)

(c) Solve by the method of variation of parameters $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = e^x \tan x$. (6 marks)

Or

2. (a) Solve $(D^2 + 4)\, y = x^2e^{-x} + \sin 2x$. (7 marks)

(b) Solve $x^2 \frac{d^2y}{dx^2} + 2x \frac{dy}{dx} - 12y = x^3 (\log x)^2$. (6 marks)

(c) Solve the system of simultaneous equations :

$$\frac{dy}{dx} + 2y - 3z = x$$

$$\frac{dz}{dx} + 2z - 3y = e^{2x}.$$

(7 marks)

Module 2

3. (a) Solve $2zx - px^2 - 2pxy + pq = 0$. (5 marks)

(b) Solve $\frac{\partial^2 z}{\partial x^2} + 3\frac{\partial^2 z}{\partial x \partial y} + 2\frac{\partial^2 z}{\partial y^2} = x + y$. (5 marks)

Turn over

(c) A tightly stretched string with fixed end points $x = 0$ and $x = l$ is initially at rest in its equilibrium position. If it is set vibrating by giving to each of its points a velocity $\lambda x\ (l - x)$, find the displacement of the string at any distance x from one end at any time t.

(10 marks)

Or

4. (a) Form the partial differential equation from $z = f(x + it) + g(x - it)$. (5 marks)

(b) Solve $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial x\, \partial y} - 6\frac{\partial^2 z}{\partial y^2} = y \cos x$. (5 marks)

(c) An insulated rod of length 'l' has its ends A and B maintained at 0°C and 100°C respectively until steady state conditions prevail. If B is suddenly reduced to 0°C and maintained at 0°C find the temperature at a distance x from A at time t. (10 marks)

Module 3

5. (a) Express $f(x) = \begin{cases} 1, \text{ for } |x| \le 1 \\ 0, \text{ for } |x| > 1 \end{cases}$ as a Fourier integral. (5 marks)

(b) Find the Fourier transform of $e^{-x^2/2}$. (7 marks)

(c) Find the Fourier sine and cosine transforms of $f(x) = e^{-ax}\ (a > 0)$. (8 marks)

Or

6. (a) Using Fourier integral prove that $\int_0^\infty \frac{\cos \lambda x}{1 + \lambda^2}\, d\lambda = \frac{\pi}{2} e^{-x}\ (x \ge 0)$. (6 marks)

(b) Find the Fourier transform of $f(x) = \begin{cases} 1, |x| < 1 \\ 0, |x| > 1 \end{cases}$. Hence evaluate $\int_0^\infty \frac{x \sin x}{x}\, dx$. (7 marks)

(c) Find the Fourier sine transform of $e^{-|x|}$ and hence evaluate $\int_0^\infty \frac{x \sin mx}{1 + x^2}\, dx$. (7 marks)

Module 4

7. (a) In a certain factory producing cycle tyres there is a small chance of one in 500 tyres to be defective. The tyres are supplied in lots of 20. Calculate the approximate number of lots containing no defective, one defective and two defective tyres in a consignment of 20000 tyres.

(10 marks)

(b) In an intelligence test conducted on 1000 students the mean was 42 and S.D. 24. Assuming the normality of the distribution, find (i) how many students score between 30 and 54 ; (ii) how many score about 60.

(10 marks)

Or

8. (a) Fit a binomial distribution for the following data and calculate the theoretical frequencies :

x :	0	1	2	3	4	5	6
f :	13	25	52	58	32	16	4

(10 marks)

(b) Define Poisson distribution. Determine its mean and variance. (10 marks)

Module 5

9. (a) An I.Q. test was given to two different sets of college students and the results are given below :

	Mean	S.D.	Size
Set I ...	75	7	90
St II ...	73	5	120

Is the difference between the means significant ?

(10 marks)

(b) Out of a consignment of one lakh tennis balls, 400 were selected and out of them 20 were found to be defective. How many defective balls you can reasonably expect to have in the consignment at 5% level of significance ?

Or

(10 marks)

10. (a) S^2 is the variance of a sample of size 10 taken from a normal population with S.D. 5. Find the probability that S^2 will lie between 8.4 and 42.3.

(10 marks)

(b) If two independent sample of sizes $n = 26$ and $n_2 = 8$ are taken from a normal population, what is the probability that the variance of the second sample will be at least 2.4 times the variance of the first sample.

(10 marks)

[5 × 20 = 100 marks]

F 3479 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fourth Semester

Branch—Information Technology

DATA STRUCTURES AND ALGORITHMS (T)

(Prior to 2007 Admissions/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. Explain Data abstraction.
2. What are the primitive data types ?
3. Write algorithms to insert data into a List.
4. What is a linear queue and circular queue ?
5. Explain Binary Search Tree.
6. Compare Lists with arrays.
7. Write a function to implement a circular queue.
8. Give algorithm to insert elements into a doubly linked list.
9. What are Binary trees ?
10. Compare Merge sort with Radix sort.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. Explain the time and space complexity with examples.

Or

12. Write algorithms to implement two stacks in a single array to use same STACKFULL can be used for the two stacks.
13. What are advantages of Linked lists over arrays ?

Or

14. Write a function to delete a given element from ordered singly linked list and to insert one data.

Turn over

15. How trees can be implemented using linked lists ?

Or

16. Explain any *one* of the practical applications of Binary Tree.

17. Explain use of Graphs in traversal applications.

Or

18. What are Hash functions and collision resolutions ?

19. What is insertion sort algorithm and compare it with graph methods ?

Or

20. Discuss the complexity of Merge sort algorithm and Heap sort algorithm.

(5 × 12 = 60 marks)

F 3497 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fourth Semester

Branch—Information Technology

COMPUTER SYSTEMS ARCHITECTURE (T)

(Prior to 2007 Admissions—Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. Explain about DMA.
2. Explain about immediate Addressing modes and Register addressing modes in 8085.
3. List the uses of cache memory.
4. Explain Paging.
5. Explain the Restoring Division.
6. With suitable examples, explain the IO instructions.
7. What is an Instruction cycle ?
8. Write a note on the virtual memory concept.
9. What is an IO Processor ?
10. Explain the interrupt driven 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) What is an Interrupt ? List the sequence of operations that occur during an interrupt.

(12 marks)

Or

(b) Explain the steps involved in the execution of an instruction with necessary diagrams.

(12 marks)

Turn over

MODULE 2

12. (a) Explain with examples, the direct and indirect addressing modes. List its advantages. (12 marks)

Or

(b) Explain the various jump instructions in 8085. (12 marks)

MODULE 3

13. (a) Write a brief note on Microprogrammed control unit. (12 marks)

Or

(b) Explain Booth's algorithm with a suitable example. (12 marks)

MODULE 4

14. (a) Explain the organisation of a multi-level memory system. (12 marks)

Or

(b) (i) Write a note on Associative memory. (7 marks)

(ii) List the characteristics of a memory system. (5 marks)

MODULE 5

15. (a) Write a brief note on :

(i) SCSI. (6 marks)

(ii) RS 232C. (6 marks)

Or

(b) Explain about Programmed IO and Interrupt driven IO. (12 marks)

[5 × 12 = 60 marks]

F 3513 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fourth Semester

Branch : Information Technology

OBJECT ORIENTED PROGRAMMING IN C++ (T)

(Prior to 2007 Admissions – Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. How does inheritance support reusability?
2. Why is an array called a derived data type?
3. Explain how structures can be passed to functions.
4. How are classes and structures related?
5. What are objects? How are they created?
6. What is meant by nested class?
7. What are the advantages of operator overloading?
8. How does function overloading implement polymorphism?
9. What are sequences?
10. What is a template class?

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. (a) What types of expressions can be formed in C++? Discuss each one of them with examples.

Or

(b) Write a program to read a line of text from the keyboard and to display the following :

(i) Number of words ; and (ii) Number of characters.

12. (a) Discuss the argument passing methods in the functions used with C++.

Or

(b) Write a program to reverse a string using (i) a function func 1 ( ) using another array (ii) a function func 2 ( ) without using another array.

Turn over

13. (a) Explain with an example how an object can be created within a function and returned to another function.

Or

(b) Illustrate how constructors could be overloaded.

14. (a) Define a class string. Use overloaded = = operator to compare two strings.

Or

(b) Discuss the methods of achieving polymorphism.

15. (a) What are the different types of iterators? Discuss their characteristics.

Or

(b) Write a brief account on standard template library design.

(5 × 12 = 60 marks)

F 3504 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fourth Semester

Branch : Electronics and Communication, Information Technology, Applied Electronics and Instrumentation, Electronics and Instrumentation Engineering

SIGNALS AND SYSTEMS (L, T, A, S)

(Prior to 2007 Admissions – Supplementary)

Time : Three Hours Maximum : 100 Marks

Missing Data may be suitably assumed.

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. Define and plot the following signals : unit impulse, unit step, unit ramp and exponential signal.
2. What is meant by causality and stability?
3. List any *four* properties of Fourier Transform.
4. State and explain sampling theorem.
5. Find the discrete Fourier Series of $x(n) = \{1, 1, 0, 0\}$.
6. Find the DTFT of the signal $x(n) = \{1, 2, \underset{\uparrow}{3}, 2, 1\}$.
7. What is ROC i Laplace transform and what are its properties?
8. Find the inverse z-transform of $X(z) = \dfrac{z}{2z^2 - 3z + 1}$.
9. What is Bayes theorem? Explain.
10. The P.D.F. of a random variable X is given by $f_x(X)$. A random variable Y is defined as $Y = aX + b$ where $a < 0$. Determine PDF of Y in terms of PDF of X.

(10 × 4 = 40 marks)

Part B

Answer **either** *(a)* **or** *(b) section of each module.*
Each full question carries 12 *marks.*

MODULE I

11. (a) (i) Convolute the two continuous time signals $x_1(t)$ and $x_2(t)$ given below :

$x_1(t) = \text{Cos}\, \pi t\, [u(t+1) - u(t+3)]$ $x_2(t) = u(t)$.

(ii) List the properties of convolution sum.

(8 + 4 = 12 marks)

Or

Turn over

(b) (i) Find the step response of an LTI system, whose impulse response is define by

$h(n) = \frac{1}{3}\sum_{k=0}^{2} 8(n-k)$.

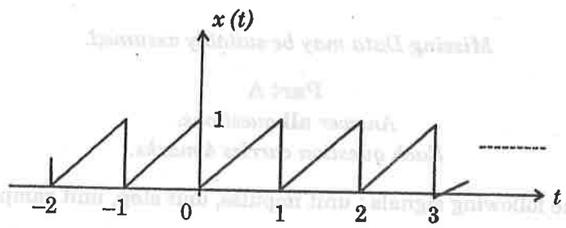
(ii) For the differential equation given below, find the natural and forced response

$y''(t) + 4y'(t) + 4y(t) = 2e^{-2t}\, u(t)\; y(0) = 0,\; y'(0) = 1$.

(6 + 6 = 12 marks)

MODULE II

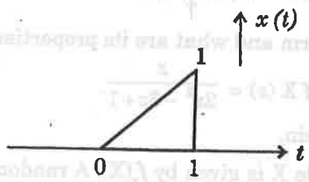
12. (a) Find the complex Fourier coefficient for the periodic waveform $x(t)$ shown in figure. Draw the amplitude and phase spectra.



(12 marks)

Or

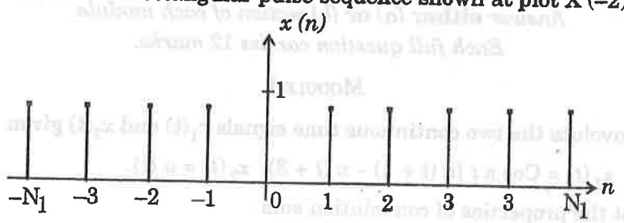
(b) Find the real and imaginery parts of the Fourier Transform of the pulse $x(t)$ shown in figure.



(12 marks)

MODULE III

13 (a) Find the DTFT of the rectangular pulse sequence shown at plot X (–2).



Or

(12 marks)

(b) (i) State and explain Parseval's theorem.

(ii) Find $x(n)$ for $x(k)$ given below :

$$X(k) = \cos\left[\frac{6\pi}{17}k\right].$$

MODULE IV

14. (a) (i) State and prove the following theorem in Laplace Transform. Shifting theorem, Initial value theorem and Final value theorem.

(ii) Obtain the relation between S plane and z-plane.

(8 + 4 = 12 marks)

Or

(b) Find the z-transform of

(i) $x(n) = \left(\frac{1}{2}\right)^n \cos(an)(n)$.

(ii) $x(n) = \left(\frac{1}{2}\right)^n$, n – even

$= 3^n 1$, n – odd.

(12 marks)

15. (a) (i) Explain random process, stationary process, non-stationary process and time average.

(ii) Show that energy spectral density and autocorrelation are Fourier transform pairs.

(5 + 7 = 12 marks)

Or

(b) The PDF of a continuous random variable is said to have Laplace distribution given by

$f_X(\alpha) = \frac{1}{2}e^{-|x|}$, $-\alpha < x < \alpha$.

Find the mean, mean square value and variance of the random variable.

(12 marks)

[5 × 12 = 60 marks]

F 3488 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fourth Semester

Branch : Information Technology

LINEAR INTEGRATED CIRCUITS AND APPLICATIONS (T)

(Prior to 2007 admissions)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 4 *marks.*

1. Define CMRR, slew rate and bandwidth of an op-amp.
2. Draw and explain the circuit of an integrator.
3. Discuss the characteristics of Butterworth filters.
4. Draw and explain the circuit of a comparator.
5. Compare weighted registor and R-2R DACs.
6. What are the merits and demerits of successive approximation ADC ?
7. What is a Voltage reference ? Why is it needed ?
8. What are the limitations of linear voltage regulators ?
9. Differentiate between digital and analog PLLs.
10. What is a window detector ?

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. (a) Discuss the frequency compensation techniques used in op-amps.

Or

(b) Draw and explain the circuit of an instrumentation amplifier. What are its applications ?

12. (a) Design a II order LPF for a cut-off frequency of 200 Hz and draw the circuit diagram.

Or

(b) Design an op-amp circuit to generate a sine wave of 10 kHz.

Turn over

13. (a) Draw the circuit of a R-2R type DAC. Explain its principle of operation. Derive an expression for its output voltage.

Or

(b) Explain with a schematic diagram the working of an analog multiplier. What are its limitations?

14. (a) Draw the block diagram of a linear voltage regulator. Explain the functions of each block.

Or

(b) Design an op-amp voltage regulator circuit to give an output voltage adjustable from 10 V to 15 V. The maximum output current is to be 100 mA and the supply voltage $V_s = 20$ V.

15. (a) Explain with a functional block diagram the working of PLLs.

Or

(b) Explain with diagrams the principle of operation of a monolithic square wave generator.

(5 × 12 = 60 marks)