G 1378 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

Branch : Information Technology

DATA STRUCTURES AND ALGORITHMS (T)

(Improvement/Supplementary—2004 Admission onwards)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. With an example explain about Big-Oh notation ?
2. What is meant by priority queue? Give its application.
3. Compare linked and array implementation of list.
4. Write a function/Algorithm to reverse a singly linked list.
5. Explain briefly about B-Tree.
6. Define Binary Tree, Strictly binary Tree and Complete binary Tree.
7. With example explain about two ways of representing graphs.
8. Explain briefly about any two hash functions.
9. Give the trace of an insertion sort algorithm for the input 8 7 3 5 2 1 4 6.
10. Derive the average time complexity of sequential search algorithm.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. Give the binary search Algorithm. Derive its Time complexity.

Or

12. What is meant by circular Queue ? Implement circular queue operations using array ?
13. How can we represent queue using linked list ? Implement Queue operations using linked list.

Or

14. Give an Algorithm to add two polynomials using Doubly Linked List.

Turn over

15. Give an Algorithm/function to insert and delete an element from a BST. Give example.

Or

16. (a) Explain briefly about AVL Tree.

    (b) With an example explain how can we draw a Binary tree from the inorder and preorder traversal of binary tree.

17. Explain DFS and BFS algorithms for graph traversal with example.

Or

18. What is meant by Hashing ? Explain about different methods for resolving clashing.

19. Give Quick sort algorithm. Trace the algorithm for the following input :

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

Or

20. Explain Radix sort algorithm with an example. Discuss the Time complexity.

(5 × 12 = 60 marks)

G 1398 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

Branch : Information Technology

COMPUTER SYSTEM ARCHITECTURE (T)

(Improvement/Supplementary—2004 admission onwards)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. How many address and data lines should be provided with the memory unit organized into N words with each word of B bits long ?
2. What do you mean by instruction cycle of a processor ? How it differs from the machine cycle ?
3. Draw and explain the timing diagram of I/O read machine cycle.
4. In the following, what are the contents of 8085 processor status word PSW after the POP PSW instruction is executed ? Assume that [2000] = 04

   LXI SP, 2000

   POP PSW
5. Explain how instruction interpretation and execution is done.
6. Explain carry look-ahead adder.
7. Explain memory hierarchy in a computer system. Give a relative grading of the memory at different levels of hierarchy with respect to size, speed and cost.
8. In a two-level virtual memory, $t_{A1} = 10^{-7}$ S and $t_{A2} = 10^{-2}$S. What must be the hit ratio H in order for the access efficiency to be at least 75 % of its maximum possible value ?
9. Explain cycle stealing mode of DMA data transfer.
10. Describe interrupt driven data transfer.

(10 × 4 = 40 marks)

Part B

Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

Module 1

11. What are addressing modes ? Explain all the addressing modes available for the basic computer system.

Or

12. With a neat complete functional block diagram, explain the internal architecture of 8085.

Turn over

Module 2

13. Classify the 8085 instructions of various types and give at least two examples of instruction in each type and explain them.

Or

14. (a) With a timing diagram, explain the various phases during the instruction cycle related with the instruction MOV A, B.

(6 marks)

(b) Explain the following instructions of 8085 and indicate status of different flags :—

(i) RLC ; (ii) CMC ; (iii) RET.

(6 marks)

Module 3

15. (a) What are the different schemes followed in optimizing control memory in microprogram control ?

(6 marks)

(b) Compare and contrast horizontal and vertical microinstructions in terms of hardware cost, speed in the case of microprogramming.

(6 marks)

Or

16. (a) Explain with a neat diagram, the operation of a carry save multiplier. (6 marks)

(b) Describe the non-restoring division with an example. (6 marks)

Module 4

17. What are the ways of organising Cache in a computer ? Give merits and demerits of all of them.

Or

18. (a) Explain the paging memory system features. (6 marks)

(b) What are the address mapping schemes employed for virtual memory ? Explain. (6 marks)

Module 5

19. (a) It is proposed to connect 8 devices to a processor. Describe various ways of connecting them stating the merits for each case.

(6 marks)

(b) Explain burst mode DMA. (6 marks)

Or

20. Explain the concept of simple and interrupt controlled polling in selecting the I/O devices. Which one is advantageous ? Justify your answer.

[5 × 12 = 60 marks]

G 1416 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

Information Technology

OBJECT ORIENTED PROGRAMMING IN C++ (T)

(Improvement/Supplementary—2004 Admissions onwards)

Time : Three Hours Maximum : 100 Marks

Write neat and efficient C++ programs wherever necessary.

Part A

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

1. Explain tokens in C++. Give examples.
2. How are C++ data types classified ? Write data types belonging to each category of the data types.
3. What is meant by a constant argument to a function ? Explain.
4. Is it possible to store two roots of a quadratic equation in a structure and define a function to return a structure with both the roots as its members ?
5. Explain key words "private" and "public" and their use in object oriented programming.
6. Show how the individual elements of a two dimensional array are accessed.
7. Explain, with example, how unary operator overloading is done in C++.
8. What is a pure virtual function ? How is it declared ?
9. "Every thing that can be done by template function can also be achieved by function overloading". Comment on the statement.
10. What will happen if an exception is thrown outside a try block ?

(10 × 4 = 40 marks)

Part B

Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

MODULE 1

11. Write a program to evaluate and display the factorial of all natural numbers from 0 to 10 using "do"–"while" loop.

Or

12. Write a program to read a set of real numbers and find the range. The range is given by the difference between the largest and the smallest numbers.

Turn over

MODULE 2

13. Write a function to take, as argument an integer number and return 1 if it is a prime number and 0 otherwise. Use the function to display all the prime numbers less than 1000.

Or

14. Design a structure named "point" to store the coordinates of a point. Write a program to store the end points of a straight line and hence to find the slope of the line.

MODULE 3

15. A class is required to be created to store one integer number. Declare a class with an overloaded constructor either with no arguments or one argument. If the constructor with no argument is called the number should be initialized to 0, otherwise it should be initialized to the single argument supplied to the constructor. Write a member function to display the number.

Or

16. Write a program to read a set of integer numbers and display all the even numbers and odd numbers separately. Find the maximum of the even and odd numbers entered.

MODULE 4

17. Design a Class Matrix to store elements of a matrix with operator functions to add and multiply two matrices.

Or

18. Define a derived class with the additional capability to store the distance of the point from the origin. Write the additional member function for the same.

MODULE 5

19. Write a template function to sort an array by bubble sort. Use this template function to store the name list of students in a college.

Or

20. Write a C++ program to read two numbers x and y and evaluate S given by $S = \frac{1}{x} + \frac{1}{y}$. Use exception handling to throw an exception in case division by zero is attempted.

(5 × 12 = 60 marks)

G 1834 (Pages : 2) Reg. No.....2 copies

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

EN 010 402—PRINCIPLES OF MANAGEMENT

(Regular—2010 Admissions)

(Common to AI, AU, EC, EI, IC, IT, ME, PO and PE)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Define Motivation and its significance in management.
2. Define Industrial fatigue. What are the reasons ?
3. What is the scope of production management ?
4. State the objectives of financial management.
5. Distinguish between Selling concept and Marketing concept.

(5 × 3 = 15 marks)

Part B

Answer any **five** *questions.*
Each question carries 5 *marks.*

6. List different organisational structures. Explain any *one* of them in detail.
7. Explain the objectives of quality circles.
8. What is meant by network ? Mention various types of networks used in project management.
9. What are the elements of cost ? Explain.
10. What are the different kinds of pricing ? Explain.
11. Explain different methods of costing with appropriate examples.
12. What are overhead ? What are the basis for allocation of overheads ?

(5 × 5 = 25 marks)

Part C

Answer any **one** *question from each module.*
Each question carries 12 *marks.*

Module I

13. (a) What do you mean by delegation of authority ? Differentiate between delegation and decentralization.

    (b) Define Planning. Explain the major types of plans.

Or

Turn over

14. Define span of control. What are the types of span of control ? Explain the factors determining the span of control.

Module II

15. Describe the method of recruitment and selection of persons in an industry.

Or

16. What is industrial dispute ? Describe the different methods of settling industrial disputes.

Module III

17. A project consists of 9 jobs with the following precedence relations and time estimates :

Job	:	A	B	C	D	E	F	G	H	I
Predecessor	:	—	—	A, B	A, B	B	D, E	C, F	D, E	G, H
Time (days)	:	15	10	10	10	5	5	20	10	15

(a) Draw the Project network.

(b) Identify the Critical path.

Or

18. Explain various types of data analysing methods and suggest a suitable method for a batch process industry.

Module IV

19. What are fixed capital and working capital and explain various factors affecting working capital ?

Or

20. Explain the different methods of raising finance by an enterprise.

Module V

21. Explain channels of distribution and the factors influencing it.

Or

22. Explain the concept of advertising. Describe its functions. What are the different types of advertising ?

(5 × 12 = 60 marks)

G 1843 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

Branch : Computer Science and Engineering/Information Technology

CS 010 403/IT 010 405—DATA STRUCTURES AND ALGORITHMS (CS, IT)

(Regular—2010 Admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. What is meant by Static Hashing ?
2. Define a Queue.
3. State the applications of linked lists.
4. Define a B Tree.
5. What is meant by sorting ? Mention the various sorting algorithm.

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Explain Big-Oh notation with an example.
7. Explain in detail the enqueue operation in a queue.
8. Explain the process of polynomial division in linked lists.
9. Define a graph, an undirected, and a directed graph.
10. Explain in merge sort algorithm.

(5 × 5 = 25 marks)

Part C

Each full question carries 12 *marks.*

11. Explain time complexity of an algorithm.

Or

12. Explain space complexity of an algorithm.
13. Explain priority queues in detail.

Or

14. Explain in brief the different ways to check whether the queue is empty or not ?

Turn over

15. Explain in brief insertion of nodes and deletion of nodes in various positions in a doubly linked list.

Or

16. Explain in brief insertion of nodes and deletion of nodes in various positions in a circular doubly linked list.

17. Explain a weakly connected graph and a weighted graph.

Or

18. Explain a complete binary tree and a right skewed binary tree.

19. Compare the sorting algorithms with respect to their best,, average, and worst cases.

Or

20. Explain the radix sort and heap sort algorithm.

(5 × 12 = 60 marks)

G 1872 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

Branch : Computer Science and Engineering / Information Technology

CS 010 406 / IT 010 404—THEORY OF COMPUTATION (CS, IT)

(Regular—2010 Admissions)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Explain the principle of Mathematical Induction.
2. Differentiate between Deterministic and Non-deterministic Finite automata.
3. Define instantaneous description of push down automata.
4. Design a TM that accepts the language of odd integers written in binary.
5. What is meant by halting problem ?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Prove that all natural numbers of the form $n^3 + 3n$ are divisible by 3 using principle of induction.
7. Construct an NFA equivalent to the regular expression (0 + 1) (00 + 11) (0 + 1).
8. State and prove the pumping lemma.
9. Describe the Turing Machine which shifts a string w containing no blanks to one cell to the left.
10. Explain briefly NP hard and NP complete problems.

(5 × 5 = 25 marks)

Part C

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

11. (a) With an example explain Primitive and partial recursive functions.

Or

(b) Define Diagonalization principle. Prove that the set is uncountable.

Turn over

12. (a) Prove that if a language C is accepted by some NFA, iff it is accepted by some DFA.

Or

(b) Show that the language $\{a^n e^n = i^{\perp}, i \geq 1\}$ is not regular.

13. (a) Obtain a CFG to generate a language of all non-palindrome over the alphabet $\Sigma = \{a, b\}$. Trace for a string of acceptable and non-acceptance using Left most derivation.

Or

(b) Show that any CFL without ε can be generated by an equivalent grammar in Chomsky Normal Form.

14. (a) Is the language $\alpha(G) = \{abc / n \geq 0\}$ accepted by the Turing machine ? If so, construct the Turing machine for the same and trace for a two strings, one for acceptance and other for rejection.

Or

(b) (i) Explain briefly the church Turing Thesis. (4 marks)

(ii) Explain :

1 A random access TM. (4 marks)

2 Non-deterministic TM. (4 marks)

15. (a) Write the characteristic features of p-completeness. Explain briefly with an example.

Or

(b) (i) Distinguish P, NP, NP-Hard and NP-complete problems. (6 marks)

(ii) Explain any *two* applications of NP-complete problems. (6 marks)

[5 × 12 = 60 marks]

G 1372 (Pages : 3) Reg. No.....IT

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

ENGINEERING MATHEMATICS—III

(Common to all Branches)

[Improvement/Supplementary/2004 Admissions onwards]

Time : Three Hours Maximum : 100 Marks

Answer **one** *full question from each module.*
Each full question carries 20 *marks.*
Use of Statistical tables is permitted.

Module I

1. (a) Find the general solution of $p^2 + 2py \cot x = y^2$. (5 marks)

(b) Solve $xdx - xdy + \log xdx = 0$. (5 marks)

(c) Find the orthogonal trajectory of the cardioids

$r = a(1 - \cos\theta)$.

(10 marks)

Or

(d) Solve $(D^2 + 2D + 1)\, y = 2 + x^2$. (5 marks)

(e) Solve $(D^2 - 2D + 1)\, y = e^x \log x$ by the method of variation of parameters. (5 marks)

(f) A bullet enters a board of 0.1 m thickness with a velocity of 200 m/s, pierces it and leaves the board with a velocity of 80 m/s. Assuming that the resistance offered by the board to the bullet is proportional to the square of its velocity, find the time taken by the bullet to pierce the board.

(10 marks)

Module 2

2. (a) Solve $(pq - p - q)(z - px - qy) = pq$. (5 marks)

(b) Solve by Charpit's method : $q + xp = p^2$. (8 marks)

(c) Solve $\frac{\partial^2 z}{\partial x^2} - 7\frac{\partial^2 z}{\partial x \partial y} + 12\frac{\partial^2 z}{\partial y^2} = e^{x-y}$. (7 marks)

Or

(d) Find the complete solution of

$$\frac{\partial^2 z}{\partial x^2} - 3\frac{\partial^2 z}{\partial x \partial y} + 2\frac{\partial^2 z}{\partial y^2} = e^{(2x-3y)} + \sin(x-2y).$$

(10 marks)

(e) A bar with insulated sides is initially at temperature 0° C throughout. The end $x = 0$ is kept at 0° C and heat is suddenly applied at the end $x = l$ so that $\frac{\partial u}{\partial x} = A$ for $x = l$, where A is a constant. Find the temperature function $u(x, t)$.

(10 marks)

Module 3

3. (a) Using Fourier integrals, show that

$$\int_0^\infty \frac{\lambda \sin \lambda x}{k^2 + \lambda^2} d\lambda = \frac{\pi}{2} e^{-kx}, \; x > 0, k > 0$$

(8 marks)

(b) Solve the integral equation $\int_0^\infty F(x) \cos px dx = \begin{cases} 1-p & 0 \le p \le 1 \\ 0, & p > 1 \end{cases}$ and hence deduce that $\int_0^\infty \frac{\sin t}{t^2} dt = \frac{\pi}{2}$.

(12 marks)

Or

(c) Using Parseval's identity, show that $\int_0^\infty \frac{dx}{(1+x^2)^2} = \frac{\pi}{4}$. (10 marks)

(d) Find the Fourier cosine transform of $f(x) = \frac{1}{(1+x^2)}$ and hence derive Fourier sine transform of $\phi(x) = \frac{x}{1+x^2}$.

(10 marks)

Module 4

4. (a) In 800 families with 5 children each, how many families would be expected to have (i) 3 boys and 2 girls ; (ii) 2 boys and 3 girls ; (iii) no girl ; (iv) at the most two girls ? Assume probabilities for boys and girls to be equal.

(12 marks)

(b) Suppose a book of 585 pages contains 43 typographical errors. If these errors are randomly distributed throughout the book, what is the probability that 10 pages, selected at random, will be free from errors ?

(8 marks)

Or

(c) The probability that a man aged 40 years will die before reaching the age of 45 years is 0.018. Out of a group of 400 men, now aged 40 years, what is the probability that 2 men will die within the next 5 years ?

(10 marks)

(d) Fit a normal curve to the following distribution :

x :	2	4	6	8	10
f :	1	4	6	4	1

(10 marks)

Module 5

5. (a) In a simple sample of 600 men from a certain city, 400 are found smokers. In one of 900 men from another city, 450 are found to smoke. Do the data indicate that the cities are significantly different with respect to the prevalence of smoking among men ?

(10 marks)

(b) Tests for breaking strength were carried out on two lots of 5 and 9 steel wires respectively. The variance of first lot was 250 and that of the second was 482. Is there a significant difference in their variability ?

(10 marks)

Or

(c) Obtain the equation of the normal curve that may be fitted to the data and test the goodness of fit :

x :	4	6	8	10	12	14	16	18	20	22	24	Total
$f(x)$:	1	7	15	22	35	43	38	20	13	5	1	200

(10 marks)

(b) What is the probability that a correlation coefficient of 0.75 or less can arise in a sample of 30 from a normal population in which the true correlation coefficient is 0.9 ?

(10 marks)

[5 × 20 = 100 marks]

G 1388 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

Branch : Information Technology

LINEAR INTEGRATED CIRCUITS AND APPLICATIONS (T)

(Improvement/Supplementary—2004 Admission onwards)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What is a level shifter ? Where it is used ? What is its necessity ?
2. Explain :
   (i) slew rate ; and
   (ii) gain bandwidth product of an op-amp.
3. Draw the circuit diagram and frequency response of an active notch filter and give the expression for the notch frequency.
4. What is meant by roll off rate ? Explain the meanings of 20dB/ decade and 40 dB/decade of an active filter.
5. Discuss the properties of flash ADC.
6. What is the percentage resolution of a 3 bit DAC, given that the maximum number that can be represented using the 3 bits is 7.
7. What are the limitations of linear voltage regulators ? How switched mode regulators overcome them ?
8. Explain 3-pin IC voltage regulator using a block circuit diagram.
9. Explain the need of a low-pass filter in PLL.
10. What is VCO ? What are its applications ?

(10 × 4 = 40 marks)

Part B

Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

Module 1

11. (a) Define input offset voltage as referred to an operational amplifier. Explain methods to measure and overcome the input offset voltage.

(6 marks)

Turn over

(b) An op-amp has a differential gain of 80 dB and CMRR of 90 dB. If $V_1 = 2\ \mu V$ and $V_2 = 2.4\ \mu V$, calculate the differential and common mode output voltage values.

(6 marks)

Or

12. Draw and explain the circuit diagrams of :

(i) V to I converter.

(ii) I to V converter.

Derive the expressions and explain their practical applications.

MODULE 2

13. Draw the circuit of an active second order Butterworth high pass filter to pass frequencies from 2.25 kHz. Design the circuit and sketch its frequency response.

Or

14. Draw the circuit of a sweep generator using op-amp to generate sweep at ±6 V amplitude, 600 Hz with 60% duty cycle. Design the circuit and sketch the outputs of both the op-amps.

MODULE 3

15. (a) A 4-bit DAC produces output voltage of 0.1 volt for a digital input of 0001. Find the value of V_0 for maximum input.

(4 marks)

(b) A 4 bit DAC has a maximum precision supply voltage of 15 V. What is the voltage change for each LSB ?

(4 marks)

(c) Consider a dual slope integrating type ADC. For the integrator $R_{int} = 100$ k and $C_{int} = .47\ \mu F$. Calculate T_2, the time to discharge the capacitor of $V_{in} = \pm 150$ mV.

(4 marks)

Or

16. With a neat circuit diagram and wave forms, describe the working of a dual slope ADC.

MODULE 4

17. Draw and explain the circuit diagram of a series pass voltage regulator with feedback and overload protection. Design the circuit for $V_0 = 12V$, $I_{Lmax} = 250$ mA.

Or

18. Draw and explain the internal functional diagram of 723 monolithic voltage regulator. Explain the circuit diagrams of the same for (i) 5 volt output ; (ii) 15 volt output.

Turn over

MODULE 5

19. Draw the internal functional diagram of 565 and explain its working. How square and linear sweep voltages are generated.

Or

20. With neat circuit diagrams, explain PLL used as :

(i) Frequency translator. (6 marks)

(ii) FSK demodulator. (6 marks)

[5 × 12 = 60 marks]

MODULE 5

19. Two independent sample sizes of 7 and 6 has the following values :

Sample A	:	28	30	32	33	31	29	34
Sample B	:	29	30	30	24	27	28	—

Examine whether the samples have been drawn from normal populations having the same variance.

(12 marks)

Or

20. Records taken of the number of male and female births in 800 fa ilies having four children are as follows :

No. of male births	:	0	1	2	3	4
No. of female births	:	4	3	2	1	0
No. of families	:	32	178	290	236	94

Test whether the data are consistent with the hypothesis tl he binomial law holds and the chance of male birth is equal to that of the female birth, namely, $p = q = \frac{1}{2}$.

(12 marks)

[5 × 12 = 60 marks]

G 1833 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

EN 010 401—ENGINEERING MATHEMATICS—III

(Regular—2010 Admissions)

[Common to all Branches]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Expand $\pi x - x^2$ in a half range sine series in the interval $(0, \pi)$ upto the first three terms.

2. Find the Fourier Transform of $f(x) = \begin{cases} 1 \text{ for } |x| < 1 \\ 0 \text{ for } |x| > 1. \end{cases}$

3. Form the partial differential equation by eliminating the arbitrary functions from $f\left(x + y + z, x^2 + y^2 + z^2\right) = 0.$

4. During war, one ship out of nine was sunk on an average in a certain voyage. What was the probability that exactly 3 out of a convoy of 6 ships would arrive safely ?

5. A random sample of 900 members has a mean 3.4 cm. Check if it can be reasonably regarded as a sample from a large population of mean 3.2 cm. and SD = 2.3 cm.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Obtain Fourier series for the function

$$f(x) = \pi x, \quad 0 \le x \le 1$$
$$= \pi(2 - x) \quad 1 \le x \le 2$$

7. Find the Fourier cosine transform of $f(x) = \frac{1}{1 + x^2}$ and hence derive Fourier sine Transform of $\phi(x) = \frac{x}{1 + x^2}$.

8. Solve $\frac{\partial^2 z}{\partial x \partial y} = \sin x \sin y$, given that $\frac{\partial z}{\partial y} = -2 \sin y$, when $x = 0$ and $z = 0$, when y is an odd multiple of $\frac{\pi}{2}$.

9. Assume that the probability of an individual coal-miner being killed in a mine accident during an year is $\frac{1}{2400}$. Use Poisson's distribution to calculate the probability that in a mine employing 200 miners, there will be at least one fatal accident in a year.

10. A coin was tossed 400 times and the head turned up 216 times. Test the hypothesis that the coin is unbiased.

(5 × 5 = 25 marks)

Part C

Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

Module 1

11. If $f(x) = x, \quad 0 < x < \pi/2$
$= \pi - x, \ \pi/2 < x < \pi$, show that

(a) $f(x) = \frac{4}{\pi}\left[\sin x - \frac{\sin 3x}{3^2} + \frac{\sin 5x}{5^2} - \ldots\ldots\right]$. (5 marks)

(b) $f(x) = \frac{\pi}{4} - \frac{2}{\pi}\left[\frac{\cos 2x}{1^2} + \frac{\cos 6x}{3^2} + \frac{\cos 10x}{5^2} + \ldots\ldots\right]$. (7 marks)

Or

12. Obtain the first three coefficients in the Fourier Cosine series for y from the following data :

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

(12 marks)

Module 2

13. (a) Using Fourier integral representation, show that $\int_0^\infty \frac{\cos \omega x}{1+\omega^2} d\omega = \frac{\pi}{2} e^{-x} \ (x \geq 0)$. (6 marks)

(b) Solve for F (x) the integral equation $\int_0^\infty F(x) \sin tx \, dx = \begin{cases} 1, & 0 \leq t < 1 \\ 2, & 1 \leq t < 2 \\ 0, & t \geq 2. \end{cases}$ (6 marks)

14. (a) Using Parseval's identity, prove that $\int_0^\infty \frac{dt}{(a^2+t^2)(b^2+t^2)} = \frac{\pi}{2ab(a+b)}$. (5 marks)

(b) Solve the integral equation $\int_0^\infty F(x) \cos px = dx \begin{cases} 1-p, & 0 \leq p \leq 1 \\ 0, & p > 1 \end{cases}$ and hence deduce that

$\int_0^\infty \frac{\sin^2 t}{t^2} \, dt = \frac{\pi}{2}$.

(7 marks)

Module 3

15. Solve $2zx - px^2 - 2pxy + pq = 0$. (12 marks)

Or

16. Solve :

(a) $(D^2 - 2DD' + D'^2) z = e^{(2x+3y)}$. (6 marks)

(b) $\frac{\partial^2 z}{\partial x^2} + 3\frac{\partial^2 z}{\partial x \partial y} + 2\frac{\partial^2 z}{\partial y^2} = 12xy$. (6 marks)

Module 4

17. A random variable X has the following probability distribution values of X :

x :	0	1	2	3	4	5	6	7	8	9
$p(x)$:	a	$3a$	$5a$	$7a$	$9a$	$11a$	$13a$	$15a$	$17a$	$19a$

(a) Determine the value of a (3 marks)

(b) Find $P(X < 3), P(X \geq 3), P(2 \leq X < 5)$. (6 marks)

(c) What is the smallest value for which $P(X \leq x) > 0.5$? (3 marks)

Or

18. A sample of 100 button cells tested to find the length of life, produced the following results : $\bar{x} = 12$ hours, $\sigma = 3$ hours. Assuming the data to be normally distributed, what percentage of button cells are expected to have life

(a) more than 15 hours ; (4 marks)

(b) less than 6 hours ; and (4 marks)

(c) between 10 and 14 hours ? (4 marks)

Turn over

G 1372 (Pages : 3) Reg. No.....IT

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

ENGINEERING MATHEMATICS—III

(Common to all Branches)

[Improvement/Supplementary/2004 Admissions onwards]

Time : Three Hours Maximum : 100 Marks

Answer **one** *full question from each module.*
Each full question carries 20 *marks.*
Use of Statistical tables is permitted.

Module I

1. (a) Find the general solution of $p^2 + 2py \cot x = y^2$. (5 marks)

(b) Solve $xdx - xdy + \log xdx = 0$. (5 marks)

(c) Find the orthogonal trajectory of the cardioids

$r = a(1 - \cos\theta)$.

(10 marks)

Or

(d) Solve $(D^2 + 2D + 1)\, y = 2 + x^2$. (5 marks)

(e) Solve $(D^2 - 2D + 1)\, y = e^x \log x$ by the method of variation of parameters. (5 marks)

(f) A bullet enters a board of 0.1 m thickness with a velocity of 200 m/s, pierces it and leaves the board with a velocity of 80 m/s. Assuming that the resistance offered by the board to the bullet is proportional to the square of its velocity, find the time taken by the bullet to pierce the board.

(10 marks)

Module 2

2. (a) Solve $(pq - p - q)(z - px - qy) = pq$. (5 marks)

(b) Solve by Charpit's method : $q + xp = p^2$. (8 marks)

(c) Solve $\frac{\partial^2 z}{\partial x^2} - 7\frac{\partial^2 z}{\partial x \partial y} + 12\frac{\partial^2 z}{\partial y^2} = e^{x-y}$. (7 marks)

Or

(d) Find the complete solution of

$$\frac{\partial^2 z}{\partial x^2} - 3\frac{\partial^2 z}{\partial x \partial y} + 2\frac{\partial^2 z}{\partial y^2} = e^{(2x-3y)} + \sin(x-2y).$$

(10 marks)

(e) A bar with insulated sides is initially at temperature 0° C throughout. The end $x = 0$ is kept at 0° C and heat is suddenly applied at the end $x = l$ so that $\frac{\partial u}{\partial x} = A$ for $x = l$, where A is a constant. Find the temperature function $u(x, t)$.

(10 marks)

Module 3

3. (a) Using Fourier integrals, show that

$$\int_0^\infty \frac{\lambda \sin \lambda x}{k^2 + \lambda^2} d\lambda = \frac{\pi}{2} e^{-kx}, \; x > 0, k > 0$$

(8 marks)

(b) Solve the integral equation $\int_0^\infty F(x) \cos px dx = \begin{cases} 1-p & 0 \le p \le 1 \\ 0, & p > 1 \end{cases}$ and hence deduce that $\int_0^\infty \frac{\sin t}{t^2} dt = \frac{\pi}{2}$.

(12 marks)

Or

(c) Using Parseval's identity, show that $\int_0^\infty \frac{dx}{(1+x^2)^2} = \frac{\pi}{4}$. (10 marks)

(d) Find the Fourier cosine transform of $f(x) = \frac{1}{(1+x^2)}$ and hence derive Fourier sine transform of $\phi(x) = \frac{x}{1+x^2}$.

(10 marks)

Module 4

4. (a) In 800 families with 5 children each, how many families would be expected to have (i) 3 boys and 2 girls ; (ii) 2 boys and 3 girls ; (iii) no girl ; (iv) at the most two girls ? Assume probabilities for boys and girls to be equal.

(12 marks)

(b) Suppose a book of 585 pages contains 43 typographical errors. If these errors are randomly distributed throughout the book, what is the probability that 10 pages, selected at random, will be free from errors ?

(8 marks)

Or

(c) The probability that a man aged 40 years will die before reaching the age of 45 years is 0.018. Out of a group of 400 men, now aged 40 years, what is the probability that 2 men will die within the next 5 years ?

(10 marks)

(d) Fit a normal curve to the following distribution :

x :	2	4	6	8	10
f :	1	4	6	4	1

(10 marks)

Module 5

5. (a) In a simple sample of 600 men from a certain city, 400 are found smokers. In one of 900 men from another city, 450 are found to smoke. Do the data indicate that the cities are significantly different with respect to the prevalence of smoking among men ?

(10 marks)

(b) Tests for breaking strength were carried out on two lots of 5 and 9 steel wires respectively. The variance of first lot was 250 and that of the second was 482. Is there a significant difference in their variability ?

(10 marks)

Or

(c) Obtain the equation of the normal curve that may be fitted to the data and test the goodness of fit :

x :	4	6	8	10	12	14	16	18	20	22	24	Total
$f(x)$:	1	7	15	22	35	43	38	20	13	5	1	200

(10 marks)

(b) What is the probability that a correlation coefficient of 0.75 or less can arise in a sample of 30 from a normal population in which the true correlation coefficient is 0.9 ?

(10 marks)

[5 × 20 = 100 marks]

MODULE 5

19. Two independent sample sizes of 7 and 6 has the following values :

Sample A	:	28	30	32	33	31	29	34
Sample B	:	29	30	30	24	27	28	—

Examine whether the samples have been drawn from normal populations having the same variance.

(12 marks)

Or

20. Records taken of the number of male and female births in 800 fa ilies having four children are as follows :

No. of male births	:	0	1	2	3	4
No. of female births	:	4	3	2	1	0
No. of families	:	32	178	290	236	94

Test whether the data are consistent with the hypothesis tl he binomial law holds and the chance of male birth is equal to that of the female birth, namely, $p = q = \frac{1}{2}$.

(12 marks)

[5 × 12 = 60 marks]

G 1833 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

EN 010 401—ENGINEERING MATHEMATICS—III

(Regular—2010 Admissions)

[Common to all Branches]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Expand $\pi x - x^2$ in a half range sine series in the interval $(0, \pi)$ upto the first three terms.

2. Find the Fourier Transform of $f(x) = \begin{cases} 1 \text{ for } |x| < 1 \\ 0 \text{ for } |x| > 1. \end{cases}$

3. Form the partial differential equation by eliminating the arbitrary functions from $f\left(x + y + z, x^2 + y^2 + z^2\right) = 0.$

4. During war, one ship out of nine was sunk on an average in a certain voyage. What was the probability that exactly 3 out of a convoy of 6 ships would arrive safely ?

5. A random sample of 900 members has a mean 3.4 cm. Check if it can be reasonably regarded as a sample from a large population of mean 3.2 cm. and SD = 2.3 cm.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Obtain Fourier series for the function

$$f(x) = \pi x, \quad 0 \le x \le 1$$
$$= \pi(2 - x) \quad 1 \le x \le 2$$

7. Find the Fourier cosine transform of $f(x) = \frac{1}{1 + x^2}$ and hence derive Fourier sine Transform of $\phi(x) = \frac{x}{1 + x^2}$.

8. Solve $\frac{\partial^2 z}{\partial x \partial y} = \sin x \sin y$, given that $\frac{\partial z}{\partial y} = -2 \sin y$, when $x = 0$ and $z = 0$, when y is an odd multiple of $\frac{\pi}{2}$.

9. Assume that the probability of an individual coal-miner being killed in a mine accident during an year is $\frac{1}{2400}$. Use Poisson's distribution to calculate the probability that in a mine employing 200 miners, there will be at least one fatal accident in a year.

10. A coin was tossed 400 times and the head turned up 216 times. Test the hypothesis that the coin is unbiased.

(5 × 5 = 25 marks)

Part C

Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

Module 1

11. If $f(x) = x, \quad 0 < x < \pi/2$
$= \pi - x, \ \pi/2 < x < \pi$, show that

(a) $f(x) = \frac{4}{\pi}\left[\sin x - \frac{\sin 3x}{3^2} + \frac{\sin 5x}{5^2} - \ldots\ldots\right]$. (5 marks)

(b) $f(x) = \frac{\pi}{4} - \frac{2}{\pi}\left[\frac{\cos 2x}{1^2} + \frac{\cos 6x}{3^2} + \frac{\cos 10x}{5^2} + \ldots\ldots\right]$. (7 marks)

Or

12. Obtain the first three coefficients in the Fourier Cosine series for y from the following data :

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

(12 marks)

Module 2

13. (a) Using Fourier integral representation, show that $\int_0^\infty \frac{\cos \omega x}{1+\omega^2} d\omega = \frac{\pi}{2} e^{-x} \ (x \geq 0)$. (6 marks)

(b) Solve for F (x) the integral equation $\int_0^\infty F(x) \sin tx \, dx = \begin{cases} 1, & 0 \leq t < 1 \\ 2, & 1 \leq t < 2 \\ 0, & t \geq 2. \end{cases}$ (6 marks)

14. (a) Using Parseval's identity, prove that $\int_0^\infty \frac{dt}{(a^2+t^2)(b^2+t^2)} = \frac{\pi}{2ab(a+b)}$. (5 marks)

(b) Solve the integral equation $\int_0^\infty F(x) \cos px = dx \begin{cases} 1-p, & 0 \leq p \leq 1 \\ 0, & p > 1 \end{cases}$ and hence deduce that

$\int_0^\infty \frac{\sin^2 t}{t^2} \, dt = \frac{\pi}{2}$.

(7 marks)

Module 3

15. Solve $2zx - px^2 - 2pxy + pq = 0$. (12 marks)

Or

16. Solve :

(a) $(D^2 - 2DD' + D'^2) z = e^{(2x+3y)}$. (6 marks)

(b) $\frac{\partial^2 z}{\partial x^2} + 3\frac{\partial^2 z}{\partial x \partial y} + 2\frac{\partial^2 z}{\partial y^2} = 12xy$. (6 marks)

Module 4

17. A random variable X has the following probability distribution values of X :

x :	0	1	2	3	4	5	6	7	8	9
$p(x)$:	a	$3a$	$5a$	$7a$	$9a$	$11a$	$13a$	$15a$	$17a$	$19a$

(a) Determine the value of a (3 marks)

(b) Find $P(X < 3), P(X \geq 3), P(2 \leq X < 5)$. (6 marks)

(c) What is the smallest value for which $P(X \leq x) > 0.5$? (3 marks)

Or

18. A sample of 100 button cells tested to find the length of life, produced the following results : $\bar{x} = 12$ hours, $\sigma = 3$ hours. Assuming the data to be normally distributed, what percentage of button cells are expected to have life

(a) more than 15 hours ; (4 marks)

(b) less than 6 hours ; and (4 marks)

(c) between 10 and 14 hours ? (4 marks)

Turn over

G 1854 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

Branch : Information Technology

IT 010 403—COMPUTER ORGANIZATION AND ARCHITECTURE (IT)

(Regular–2010 Admissions)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Explain functional components of a computer.
2. Discuss the importance of ALU and Control unit.
3. Differentiate SRAM with DRAM.
4. Discuss the importance of I/O ports.
5. What are issues of a deadlock ? Explain.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Distinguish between autoincrement and autodecrement addressing mode.
7. What are the advantages and disadvantages of hardwired and microprogrammed control ?
8. Briefly explain different address translation schemes.
9. Discuss the operation of any two output devices.
10. Write a short note on Interconnection Network.

(5 × 5 = 25 marks)

Part C

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

11. (a) Distinguish between RISC and CISC architecture.

Or

(b) Write a short note on functional components of a computer.

12. (a) What is instruction hazard ? Explain the methods for dealing with the instruction hazards.

Or

(b) What are the special registers in a typical computer ? Explain their purposes in detail.

Turn over

13. (a) Briefly explain organization of a cache memory.

Or

(b) Explain how the virtual address is converted into real address in a paged virtual memory system.

14. (a) Explain in detail about interrupt handling.

Or

(b) Describe the functions of SCSI with a neat diagram.

15. (a) Discuss the design issues of pipeline architecture.

Or

(b) Explain the different issues of deadlock, and scheduling.

(5 × 12 = 60 marks)

G 1866 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

Branch : Information Technology

IT 010 406—OBJECT ORIENTED TECHNIQUES (IT)

(Regular—2010 Admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. List out the basic concepts of object oriented programming.
2. Define Object.
3. State Inheritance.
4. What is stream ?
5. Which containers use a Border layout as their default layout ?

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. What are the *four* corner stones of OOP ?
7. Explain briefly in Name Space.
8. What are the merits and demerits of an Inheritance ?
9. What is interface and its use ?
10. What is the difference between applications and applet ?

(5 × 5 = 25 marks)

Part C

Each full question carries 12 *marks.*

11. Explain the use of constant pointers and pointers to constant with an example.

Or

12. Write a C++ program to illustrate the static function.
13. Explain about Constructor and Destructor, with suitable C++ Coding.

Or

14. Explain the different types of polymorphism.

Turn over

15. What is inheritance ? How inheritance is implemented in Java ? Explain with suitable examples.

Or

16. In detail explain Inner Classes.

17. Explain how Exception handling is done in Java.

Or

18. Define Interfaces. Explain the extension of interfaces, implementation and accessing it.

19. Explain the different states in Life Cycle of applet.

Or

20. Write the characteristics of Java and the concepts in Java.

(5 × 12 = 60 marks)