G 587 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

Branch : Computer Science and Engineering

ADVANCED MICROPROCESSORS AND PERIPHERALS (R)

(Old Scheme—Prior to 2010 admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Describe the mode set register of 8279.
2. Explain the following signal descriptions of 8251 :
   (i) SYNDET/BD. (ii) $\overline{CTS}$.
   (iii) TXEMPTY. (iv) TXD.
3. What is sensor matrix mode of 8279 ?
4. What are the advantages of microcontroller based systems over microprocessor based systems ?
5. Explain the function of opcode prefetch queue in 8086.
6. Explain the concept of segmented memory. What are its advantages ?
7. "A single instruction may use more than one addressing mode or some instructions may not require any addressing mode. " Explain with examples.
8. What are the salient features of protected virtual address mode ?
9. Enlist the different data types supported by the coprocessor 80387.
10. Discuss the disadvantages of RISC processors.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. Interface an 8255 with 8086 so as to have port A address 00, port B address 02, port C address 01 and CWR address 03. Draw your circuit diagram and give the control words.

Or

12. With a block diagram, describe the various functions of 8251. Draw and describe the synchronous mode transmit and receive data formats of 8251.

(12 marks)

13. Using a 12-bit DAC, generate a step waveform of duration 1 sec, maximum voltage 3 volts and determine the duration of each step suitably.

Or

14. Draw the schematic of an 8279 keyboard controller interfaced to 8085. An 11-key keyboard and an 8 digit seven segment display is to be driven by the system so that by reading the FIFO, we should directly get the number of the key pressed.

(12 marks)

15. (a) Draw and discuss a typical maximum mode 8086 system. What is the use of a bus controller in maximum mode ?

(8 marks)

(b) With a neat diagram, explain the 8086 interrupt pointer table. (4 marks)

Or

16. Draw the timing diagram of MOV [SI], AL instruction and explain the signal flow. (12 marks)

17. Write an assembly language program to find out ASCII codes of alphanumeric characters from a lookup table. Explain your logic with the help of a flow chart.

(12 marks)

Or

18. (a) What are the differences between shift and rotate instructions ? Explain with examples.

(b) What are the salient features of 80286 in real address mode ?

(8 + 4 = 12 marks)

19. Explain the procedure of converting a linear address into a physical address in 80386 when programmed in protected mode.

(12 marks)

Or

20. (a) What do you mean by MMX ? Explain the different MMX instructions.

(b) Does Pentium-Pro support multimedia applications ? Why ?

(8 + 4 = 12 marks)

[5 × 12 = 60 marks]

G 569 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

Branch : Computer Science and Engineering

INTEGRATED CIRCUITS (R)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. List four commonly used series of TTL and mention their specialities.
2. What are the two advantages of using the wired AND connection ?
3. Explain, why negative edge triggered JK flip-flops are used in TTL families.
4. What are the RAM timing parameters that will determine its operating speed ?
5. A 16-bit DAC has an output of voltage range from 0 to 2.55 volt. Calculate the resolution of the system.
6. An 8-bit ADC accepts an input voltage signal of range 0 to 12 V. What is the minimum value of the input voltage required to generate a change of 1 LSB.
7. The output voltage of a certain op-amp circuit changes by 10 Volt in 3μS. Calculate its slew rate.
8. Draw the circuit diagram of a scale changer using op-amp and write the expression for its output voltage.
9. What is the principle of an op-amp differentiator ? What are its drawbacks ?
10. Draw the circuit diagram of an op-amp astable multivibrator to generate f_0 = 1.8 kHz.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. Draw the circuit diagram of a 3-input TTL NAND gate which uses a totem pole output and explain its working. Verify how the circuit satisfies the truth table.

Or

12. Draw the circuit of a 4-input ECL OR gate and explain its working. Give its important features, compared to CMOS and TTL families.

Turn over

13. How many RAM chips will be required to build a 4K byte RAM memory if you are provided with nibble organized RAM chips each of capacity 4K bits ? Explain with necessary diagrams.

Or

14. Draw the internal construction of PLA having three inputs, three product terms and two outputs. Show how A $(x, y, z) = \Sigma m\ (1, 3, 5, 7)$.

15. For a 4 bit R-2R ladder DAC, assume that the full scale voltage is 10 V. Calculate the step change in output voltage when the input changes from 1001 to 1110. Explain with a circuit diagram.

Or

16. With a neat block diagram, explain the counter type ADC. Explain its merits.

17. Why do offset current and offset voltage exist in an op-amp ? What are the various ways of minimising them ? Explain with necessary circuit diagrams.

Or

18. (a) What is the virtual short concept in op-amp circuits ? What are the conditions to have virtual short ? Explain.

(6 marks)

(b) The output of an op-amp voltage follower is a triangular wave with 6V peak to peak voltage amplitude and frequency 2 MHz for a square wave input of frequency 2 MHz and 8V peak to peak amplitude. What is the slew rate of the op-amp ?

(6 marks)

19. With the help of neat circuit diagram, explain the working of a three-input non-inverting summer. Derive expression for its output voltage.

Or

20. Draw the circuit diagram of a sweep generator using op-amp with necessary waveforms explain its working. Design the circuit to generate a linear sweep ± 6V amplitude, 18.72 mS trace and 1.28 mS retrace period.

[5 × 12 = 60 marks]

G 579 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

Branch : Computer Science and Engineering

DATA STRUCTURES AND PROGRAMMING LANGUAGE METHODOLOGY (R)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define Algorithm. What are the characteristics of an algorithm ?
2. What is meant by time complexity of an algorithm ? Explain.
3. Give *two* applications of stack.
4. What is a priority queue ? Explain.
5. Write algorithms to perform push and pop operations on a linked stack.
6. Write an algorithm to reverse a singly linked list using only one pass through the list.
7. How can we represent a binary tree using array ? Give an example.
8. Write an algorithm to count the number of nodes in a Binary tree.
9. Give insertion sort algorithm.
10. What is external sorting ? Give an example.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 12 *marks.*

11. What is recursion ? Write a recursive algorithms to find the *n*th Fibonacci number. Analyze the time and space complexity of your algorithm.

Or

12. Give an algorithm for binary search. What is it time complexity ?
13. What are sparse matrices ? Write an algorithm to add two sparse matrices.

Or

14. Write the algorithm for expression evaluation. Explain with an example.

Turn over

15. Write a function to merge two ordered singly linked lists of integers into one ordered list.

Or

16. Write algorithm for pattern matching in strings.

17. Write a function to construct the binary tree with a given inorder and postorder traversal.

Or

18. Give the non-recursive Breadth First Search graph traversal algorithm. Explain with an example.

19. Differentiate bubble sort and selection sort. Give the traces of the algorithms for the input :

    8 3 5 7 4 2.

Or

20. Give quick sort algorithm. Explain the working of the algorithm with an example. Prove that the worst cause time complexity of the algorithm in O (n^2).

(5 × 12 = 60 marks)

G 559 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

Branch : Computer Science and Engineering

OBJECT ORIENTED PROGRAMMING (R)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What is a class ? How does it accomplish data hiding ?
2. Explain default constructor, with the help of example.
3. Explain hybrid inheritance with an example.
4. What is a friend function ? What are its advantages and disadvantages ?
5. Discuss the significance of function overloading.
6. Explain the concept and application of an abstract class.
7. What are virtual destructors ? What are their uses in an OOP ?
8. Discuss the applications of namespaces.
9. What is the scope of dynamic objects in OOP ?
10. Explain storing handling in Java.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. Explain the use of constructors in a class, with a program example.

Or

12. A circular ring is completely designated by its outer and inner radii. Write a C++ program to read the outer radius and inner radius and find the area of the ring by subtracting the area of the inner circle from that of the outer circle. Use a class named "circle" to store data about the circle.

Turn over

13. Define a class to store the co-ordinates of a point with member functions to read the co-ordinates and display the co-ordinates.

Or

14. Define a class to find an equation to a line with the given slope and passing through a point.

15. Design a class "MATRIX" to store the elements of a matrix with operator functions to add and multiply two matrices.

Or

16. A class named INTEGER 3 will store three integer numbers. Define the class with constructors to initialise the objects of the class. Overload operator '+' to add a constant to all its data members.

17. Write a C++ program using overloaded function reciprocal ( ) to find the reciprocal of a number for any type of arguments. Rewrite the same program using a template function to achieve the same objective.

Or

18. Write a template function to take, as arguments, either two integer numbers, real numbers or characters and return 1 if they are equal and 0 otherwise. How will the function be called in function main ( ) ?

19. What are the common restrictions laid while using inline functions ? Describe automatic inlining with suitable examples.

Or

20. Explain the need of multithreads in JAVA. Explain the syntax of exception handling with the keywords used and also the exception types.

(5 × 12 = 60 marks)

G 549 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

Branch : Computer Science and Engineering

COMPUTER ORGANIZATION (R)

(Old Scheme—Supplementary/Mercy Chance)

[Prior to 2010 admissions]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What are the advantages of layered architecture ?
2. Explain the control sequence for executing the instruction ADD.
3. Explain signed division operation with an example.
4. Write a note on floating point number prepresentation.
5. Distinguish between microprogrammed control and hardwired control.
6. Explain the three instruction classes in simple data path control.
7. Give and explain the sequence of operations for storing a word in memory.
8. Explain the cache replacement policies.
9. Describe briefly the I/O processors.
10. Explain the working of an optical mouse.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. Design data paths for executing the types of instructions whose formats are given below :

    (i) opcode, source 1, source 2, destination.

    (ii) opcode, jump address.

    (iii) opcode, source, memory address.

Or

12. Describe the structure of a typical CPU. Show how it interacts with the memory and control unit.

Turn over

13. Design a hardware for adding two floating point numbers. Explain the operations performed at each step.

Or

14. Explain how restoring and non-restoring divisions can be carried out in a computer ? Draw the block diagrams and explain with suitable examples.

15. Develop a microprogram with a neat flow chart for implementing a micro-operation that counts the number of 1's in a register R1 and stores the result in another register R2.

Or

16. Explain horizontal and vertical micro-instructions. Compare and contrast between them in terms of hardware cost, speed and case of microprogramming.

17. Explain the operations on cache in virtual memory environment ? Explain cache coherence problem.

Or

18. (a) Bring out the salient features and differences between "Read only" and "Read/write" memories. Why are both types of memories required in a digital computer main memory system ? Why are DRAMs preferred in large systems while small systems usually go in for SRAMs ? (8 marks)

    (b) Explain memory heirarchy in a digital computer system. (4 marks)

19. (a) Discuss the important features of GPIB (IEEE 488.2) standard. (6 marks)

    (b) Explain the principle of optical storage devices used as input units of computer system. (6 marks)

Or

20. Explain the working of RS232C standard. Describe how the same is used in interfacing a printer to a computer system.

(5 × 12 = 60 marks)

G 539

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

Branch : Computer Science and Engineering/Information Technology

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

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

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

1. Define Pigeonhole principle.
2. What are the applications of automata theory ?
3. Define a context free grammar.
4. What is the language accepted by TM ?
5. What does mean SAT ?

(5 × 3 = 15 marks)

Part B

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

6. Write down the difference between primitive and partial recursive functions ?
7. Differentiate NFA and DFA.
8. What are the applications of pumping lemma ?
9. What are the special features of TM ?
10. Write notes on Reduction problem ?

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. Define Diagonalization principle. Prove that the set is uncountable.

Or

12. Explain in detail about the Chomsky classification.

Turn over

13. Conversion of DFA into regular expression.

Or

14. Write notes on deterministic and Non deterministic finite automation ?

15. State and Prove the pumping lemma for CFL.

Or

16. Discuss about deterministic and Non deterministic PDA.

17. Explain the various techniques for Turing machine construction.

Or

18. Prove that the Halting problem is undecidable.

19. Write the characteristic features of *p*-completeness ? Explain with an example.

Or

20. State and Prove Cooks theorem.

(5 × 12 = 60 marks)

G 528 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

Branch : Computer Science and Engineering

CC 010 405—MICROPROCESSOR SYSTEMS (CS)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What are Ternary operators or Conditional operators ?
2. Explain 'do-while' loop with example.
3. What is meant by pointer ? Write down the applications of pointer.
4. Explain union.
5. Differentiate text mode and binary mode.

(5 × 3 = 15 marks)

Part B

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

6. Give a brief explanation about special operators in 'C'.
7. Compare single and multidimensional arrays.
8. Differentiate automatic variables and external variables in storage classes.
9. Explain any one of the application of union in detail.
10. Write short notes on file handling functions.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. Write C program to print the prime numbers less than 500.

Or

12. Describe the various types of operators in 'C' language along with its priority.

Turn over

13. Display the 2D array in matrix form, traversing the individual row and column, accessing different element of matrix, matrix addition and multiplication.

Or

14. Explain looping statements with suitable sample program.

15. Brief call by value and call by reference in detail.

Or

16. Write a C program to find the factorial of a given number using recursion.

17. Define Union. Explain Union in detail.

Or

18. How to use structure and union variable show with an example ? Give the comparison between structure and union.

19. Describe in detail about the Preprocessors in C.

Or

20. Write short notes on : (a) File pointers ; (b) Data files.

(5 × 12 = 60 marks)

G 519 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

Branch : Computer Science and Engineering

CS 010 404—SIGNALS AND COMMUNICATION SYSTEMS (CS)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Enumerate the properties of the signals. Explain any *two*.
2. Define and explain Noise. List the types of noise.
3. What is the difference between PPM and PDM ? Explain in detail.
4. What is the principle of WDM ? Mention the types of WDM.
5. Explain the properties of hamming codes.

(5 × 3 = 15 marks)

Part B

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

6. Define and explain CTFS.
7. Differentiate Twisted pair from coaxial cables. Explain.
8. What is OOK ? Bring out its mathematical representation.
9. Explain the principles of Half and full duplex transmissions with neat diagrams.
10. Give an account on "Baudot code".

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. (i) State and explain sampling theorem.

    (ii) Prove the properties of CTFS.

Or

12. Differentiate continuous time signals from discrete time signals with examples. Explain the difference.

Turn over

13. Define and explain the typical parameters of communication systems.

Or

14. State and explain Shannon Hartley theorem. Derive an expression for Channel capacity of a Noisy channel.

15. Explain AM, PM and FM in detail with neat diagrams. Bring out their mathematical representations.

Or

16. Compare and contrast the parameters of different modulation formats. Explain the comparison in detail.

17. Explain the principles of TDM and FDM in detail with neat diagrams.

Or

18. Explain the basic concept of SONET with neat diagrams.

19. Explain the properties and advantages of Linear block codes. Drive its code vector.

Or

20. Write technical notes on :

    (i) EBCDIC ;

    (ii) Parity coding ;

    (iii) Syndrome Calculator.

(5 × 12 = 60 marks)

G 504 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

Branch : Computer Science and Engineering

CS 010 402—OBJECT ORIENTED PROGRAMMING (CS)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Write down the basic concepts of OOPs?
2. Give any three benefits of Inheritance.
3. List out the Operators that cannot be overloaded.
4. What do you mean by exception handling ?
5. Define formatted console operations.

(5 × 3 = 15 marks)

Part B

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

6. Explain in detail about the concepts of OOPs.
7. What are the different forms of inheritance ? Explain with an example.
8. Explain in detail about Unary Operator Overloading with an example program.
9. What are the Virtual Classes ? Explain the need for virtual classes while building class Hierarchy.
10. What is a File ? What are the steps involved in manipulating a file in a C++ programs ?

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. What is Copy constructors ? Give syntax and example program.

Or

12. What is Destructors ? Give syntax and example program.

Turn over

13. What are the differences between inheriting a class with public and private visibility mode ?

Or

14. Discuss cost and benefits of inheritance.

15. Define Function selection algorithm. Explain it with one example program.

Or

16. Explain in detail about the concept of the pure virtual methods.

17. What are the rules that need to be kept in mind in deciding virtual functions ?

Or

18. Explain in detail about Throwing and Catching Mechanism.

19. Write down the notes on Object Oriented design.

Or

20. List out the Object Oriented features in Java.

(5 × 12 = 60 marks)

G 510 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

Branch : Computer Science and Engineering/Information Technology

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

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. State the principles of programming ?
2. State any three applications of stack and queue ?
3. What is meant by linked list ? Write down the types of linked list ?
4. Define tree and binary tree.
5. Write the function in C for insertion sort ?

(5 × 3 = 15 marks)

Part B

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

6. What are the advantages and disadvantages of various collision resolution strategies ?
7. Explain the various applications of stack.
8. Give an algorithm to reverse the elements of a linked list without using temporary list ?
9. Formulate an algorithm to insert an element in a binary tree ?
10. Explain divide and conquer method sorting.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. What is open addressing hashing ? Describe any one technique.

Or

12. Explain in detail about rehashing and extendable hashing.

Turn over

13. Write an algorithm to find whether a particular element is present or not in a circular queue.

Or

14. Implement typical stack operation when stacks are represented using : (a) Arrays ; (b) using singly linked lists ?

15. Discuss the Doubly linked list and algorithm for the operations that can be performed on them in detail.

Or

16. Explain in detail about cursor based linked lists.

17. Explain the various tree traversal and predict a binary tree with Preorder: ABCDEFGHI and Inorder: BCAEDGHFI ?

Or

18. Formulate an algorithm to search an element in a Binary Tree.

19. Write the routine for sorting n elements in increasing order using heap sort.

Or

20. What is external sorting ? Discuss the algorithms with proper examples.

(5 × 12 = 60 marks)

20. (a) Given :

Day	:	Mon	Tue	Wed	Thu	Fri	Sat	Sun
f	:	16	8	12	11	6	14	14

(No. of accidents)

Is there any reason to doubt that the accident is equally likely to occur on any day of the weak ?

(6 marks)

(b) A machine produced 20 defective units in a sample of 400. After overhauling the machine, it produced 10 defective units in a hatch of 300. Has the machine improved due to overhauling ?

(6 marks)

[5 × 12 = 60 marks]

G 500 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

EN 010 401—ENGINEERING MATHEMATICS—III

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

(Common to all Branches)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. If $f(x) = \begin{cases} kx, & 0 \le x \le l/2 \\ k(l-x), & l/2 \le x \le l \end{cases}$

find a_0.

2. Show that the Fourier Cosine transform of Fourier Cosine transform of a given function is itself.

3. Solve : $a(p+q) = z$.

4. Find the distribution function from $f(x) = \begin{cases} c(3+2x), & 0 < x < 2 \\ 0, & \text{otherwise} \end{cases}$.

5. What are type-I and type-II errors ?

(5 × 3 = 15 marks)

Part B

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

6. Write the Fourier Series for $f(x) = \begin{cases} 1-x, & -\pi < x < 0 \\ 1+x, & 0 < x < \pi \end{cases}$.

7. Find the finite Fourier Cosine transform of $f(x) = \frac{\pi}{3} - x + \frac{x^2}{2\pi}$.

Turn over

8. Solve : $\left(\frac{y^2 z}{x}\right) p + xzq = y^2$.

9. Fit a binomial distribution for :

x :	0	1	2	3	4
f :	5	29	36	25	5

10. Write the application of ψ^2 -test. (5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. Obtain the Fourier Series for $f(x) = \begin{cases} l - x, & 0 < x \le l \\ 0, & l \le x < 2l \end{cases}$

Hence deduce that $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \ldots = \frac{\pi}{4}$ and $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots = \frac{\pi^2}{8}$. (12 marks)

Or

12. If $f(x) = lx - x^2$ in $(0, l)$, show that the half range, sine series for $f(x)$ is

$\frac{8l^2}{\pi^3} \sum_{n=0}^{\infty} \frac{1}{(2n+1)^3} \sin \frac{(2n+1)\pi x}{l} \ldots$ and deduce that $\frac{\pi^3}{3^2} = 1 - \frac{1}{3^3} + \frac{1}{5^3} - \ldots$ (12 marks)

13. Show that the Fourier transform of $f(x) = \begin{cases} a^2 - x^2 & \text{for } |x| \le a \\ 0 & \text{for } |x| > a > 0 \end{cases}$

is $2.\sqrt{\frac{2}{\pi}} \left(\frac{\sin as - as \cos as}{s^3}\right)$. Hence deduce that $\int_0^{\infty} \frac{\sin t - t \cos t}{t^3} dt = \pi/4$. (12 marks)

Or

14. (i) Find the finite sine transform of $f(x) = x^3$. (6 marks)

(ii) Find the cosine transform of $f(x) = \begin{cases} \cos x, & 0 < x < a \\ 0, & x > a \end{cases}$ (6 marks)

15. (a) Solve : $r - 2s + t = \sin(2x + 3y)$. (6 marks)

(b) Solve : $\left(D^2 + D^{1^2}\right) z = \cos mx \cos ny$. (6 marks)

Or

16. (a) Solve : $D(D + D' - 1)(D + 3D' - 2)\ z = x^2 - 4xy + 2y^2$. (9 marks)

(b) Solve : $r - s + p = 1$. (3 marks)

17. (a) If 15% of a normal population lies below the value 30 and 10% of the population lies above the value 42, calculate its Mean and Standard Deviation. (6 marks)

(b) Fit a Poisson Distribution to :

x :	0	1	2	3	4
f :	43	38	22	9	1

(6 marks)

Or

18. (a) Six coins are tossed once. Find the probability of obtaining heads.
(i) exactly 3 times.
(ii) atmost 3 times.
(iii) atleast 3 times.
(iv) atleast once. (8 marks)

(b) Given : X is a Poisson variate with $P(X = 2) = \frac{2}{3} P(X = 1)$. Find $P(X = 0)$ and $P(X \ge 2)$. (4 marks)

19. (a) Test for the difference of variances for :

Method 1	:	20	16	27	26	22	23
Method 2	:	27	33	42	32	35	34	38

(6 marks)

(b) The 9 items of a sample have 45, 47, 50, 52, 48, 47, 49, 53, 51. Does the mean of these values differ significantly from the assumed mean 47.5 ? (6 marks)

Or

G 544 (Pages : 3) **Reg. No**.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

ENGINEERING MATHEMATICS—III (CMELRPTANSUF)

(Old Scheme—Supplementary/Mercy Chance—Prior to 2010 admissions)

Time : Three Hours **Maximum : 100 Marks**

Answer **all** *questions.*
Each full question carries 20 *marks.*
Use of Statistical tables is permitted.

1. (a) Solve $x^2\frac{dy}{dx}=3x^2-2xy+1$. (5 marks)

(b) Solve $\left(D^3+1\right)y=\sin(2x+3)$. (7 marks)

(c) Solve $(3x+2)^2\frac{d^2y}{dx^2}+3(3x+2)\frac{dy}{dx}-36y=3x^2+4x+1$. (8 marks)

Or

2. (a) Solve $x^2\frac{d^2y}{dx^2}+x\frac{dy}{dx}+y=\log x\sin(\log x)$. (8 marks)

(b) By method of variation of parameters solve $y''-2y'+2y=e^x\tan x$. (7 marks)

(c) Solve $\frac{d^2y}{dx^2}+y=\operatorname{cosec} x$. (5 marks)

3. (a) From the p.d.e. by eliminating the arbitrary function from $z=f(x+it)+g(x-it)$. (5 marks)

(b) Solve $px-qz=z^2+(x+y)^2$. (7 marks)

(c) A string is stretched and fastened to two points l apart motion is started by displacing the string in the form $y=a\sin\frac{\pi x}{l}$ from which it is released at time t = 0. Show that the displacement of any point at a distance x from one end at time t is given by $y(x,t)=a\sin\frac{\pi x}{l}\cos\frac{\pi ct}{l}$. (8 marks)

Or

Turn over

4. (a) A rod of length l with insulated sides is initially at a uniform temperature u_0 its ends are suddenly cooled to 0°C and are kept at that temperature. Find the temperature function $u(x,t)$.

(8 marks)

(b) Solve $\frac{\partial^2 z}{\partial x^2} - \frac{\partial^2 z}{\partial x \partial y} - \frac{6\partial^2 z}{\partial y^2} = 0$. (5 marks)

(c) Solve $\left(p^2 + q^2\right) y = qz$. (7 marks)

5. (a) Using Fourier sine integral show that :

$$\int_0^\infty \frac{1-\cos \pi\lambda}{\lambda} \sin x\lambda \, d\lambda = \begin{cases} \frac{\pi}{2}, & 0 < x < \pi \\ 0, & x > \pi \end{cases}$$ (8 marks)

(b) Find the Fourier transform of $f(x) = \begin{cases} 1-x^2, & \text{of } |x|<1 \\ 0, & |x|>1 \end{cases}$ and use it to evaluate

$$\int_0^\infty \frac{x\cos x - \sin u}{x^3} \cos\left(\frac{x}{2}\right) dx$$. (12 marks)

Or

6. (a) Find the Fourier cosine transform of e^{-x^2}. (8 marks)

(b) Using Parseval's identity show that $\int_0^\infty \frac{x^2 dx}{\left(1+x^2\right)^2} = \frac{\pi}{4}$. (12 marks)

7. (a) Out of 800 families with *four* children each how many families would you expect to have

(i) 2 boys and 2 girls. (ii) Atleast one boy.

(iii) No girl. (iv) Atleast 2 girls.

Assume equal probabilities for boys and girls.

(10 marks)

(b) Derive the mean and variance of Poisson distribution. (10 marks)

Or

8. (a) Fit a binomial distribution to the following data :

x :	0	1	2	3	4	5
	2	14	20	34	22	8

(12 marks)

(b) In a normal distribution 31% of the items are under 45 and 8% and over 64. Find the mean and standard deviation of the distribution.

(8 marks)

9. (a) The following figures refer to observations in live independent samples :

Sample I :	25	30	28	34	27	20	13	32	22	38
Sample II :	40	34	22	20	31	40	30	23	36	17

Analyse whether the samples have been drawn from the populations of equal mean.

(12 marks)

(b) A coin was tossed 400 times and returned heads 216 times. Test the hypothesis that the coin is ubiased.

(8 marks)

Or

10. (a) Two independent samples of sizes 7 and 6 had 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)

(b) A sample of 20 items has been 42 units and S.D. 5 units. Test the hypothesis that it is a random sample from a normal population with mean 45 units.

(8 marks)

[5 × 20 = 100 marks]