G 5012 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Computer Science and Engineering

CS 010 405—MICROPROCESSOR SYSTEMS (CS)

(New Scheme — Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. What are the addressing modes for 8085 microprocessor?
2. What is meant by Subroutine?
3. What is the function of HOLD and HALT?
4. What are the internal devices of 8255?
5. What is USART?

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Explain the instruction sets of 8085 :
   (a) Arithmetic instructions.
   (b) Branching instructions.
7. Define :
   (a) Instruction cycle.
   (b) Machine cycle.
   (c) T-State.
8. Explain about Polling.
9. Distinguish between synchronous and asynchronous data transfer.
10. Explain about the interfacing keyboard of 8251.

(5 × 5 = 25 marks)

Turn over

Part C

Each question carries 12 *marks.*

11. With neat diagram, explain the architecture of 8085 ;

    (a) Block diagram.

    (b) Explanation.

Or

12. Write the Assembly Language program to sort a set of numbers in ascending order.

13. Draw the timing diagram of STA address. 3 machine cycles.

    (a) OP code fetch.

    (b) Memory Read.

    (c) Memory Write.

Or

14. Explain the operating modes of 8255 :

    (a) Fully negated mode.

    (b) Rotating priority mode.

    (c) Special mask mode.

15. Explain the interrupt structure of 8085.

Or

16. Explain the following addressing modes of 8085 :

    (a) Immediate Addressing.

    (b) Implicate Addressing.

    (c) Direct Addressing.

    (d) Indirect Addressing.

17. Explain the working principle of DMA controller.

Or

18. Explain the operating modes of 8255 :

    (a) Mode 0 : simple input/output.

    (b) Mode 1 : Input/output with handshake.

    (c) Mode 2 : Bi-directional I/O data transfer.

19. With neat block diagram, explain the architecutre of 8253.

Or

20. Explain the operating modes of USART.

(5 × 12 = 60 marks)

G 5023 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Computer Science and Engineering/Information Technology

CS 10 406/IT 010 404—THEORY OF COMPUTATION (CS, IT)

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. Explain Pigeonhole principle.
2. State pumping lemma and its advantage.
3. Define the language recognized by the push down automata using empty stack.
4. Explain the multitape using machine mode is it more power than the basic turing machine ? Justify your answer.
5. Give two examples of NP-complete problem.

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Discuss about chomsky hierarchy of languages.
7. Design a DFA to accept odd number of a's and even number of b's.
8. Construct a PDA for the language $\left\{ a^n \; b^{2n} \,/ n \geq 0 \right\}$.
9. Describe the method of Godelization.
10. Let L be an NP-complete language. Then P = NP if and only if L $\in$ P.

(5 × 5 = 25 marks)

Part C

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

11. (a) With an example explain computable and non computable functions.

Or

(b) Briefly explain chomksy classification with an example.

Turn over

12. (a) Design a NFA to recognize the regular expression (0 + 1) (0 + 1) * (0 + 1) using Thomson construction algorithm and convert to an equivalent minimized DFA. Trace for a string $w = 0001$.

Or

(b) Briefly explain any three applications of finite automata in detail.

13. (a) (i) Explain about Greibach Normal Form. (4 marks)

(ii) Is L = $\{a^n b^n c^n / n >= 1\}$ a context free language ? Justify your answer. (8 marks)

Or

(b) For the grammar S $\rightarrow$ aABC, A $\rightarrow$ aB/a B $\rightarrow$ bA/b C $\rightarrow$ a. Obtain the corresponding PDA. Trace for the string $w = aabaa$.

14. (a) Construct a TM that finds the difference of two natural numbers.

Or

(b) Explain the post correspondence Problem with an example.

15. (a) Prove that subgraph isomorphism problem in NP complete.

Or

(b) (i) How is Time complexity and space complexity defined in NP and P problems ?

(ii) Is P = NP an undecidable problem.

[5 × 12 = 60 marks]

G 5003 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Computer Science and Engineering

CS 010 404—SIGNALS AND COMMUNICATION SYSTEMS (CS)

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. Write short notes on Quantisation.
2. Describe different communication channels.
3. Explain about Sample problems based on different modulation methods.
4. Compare Datagram's and virtual circuits.
5. What is Bar code ?

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. List the different types of signals and explain its properties.
7. Explain signal propagation delay and attenuation.
8. Explain Pulse width modulation.
9. Describe in detail Wavelength division multiplexing.
10. Explain convolution coding.

(5 × 5 = 25 marks)

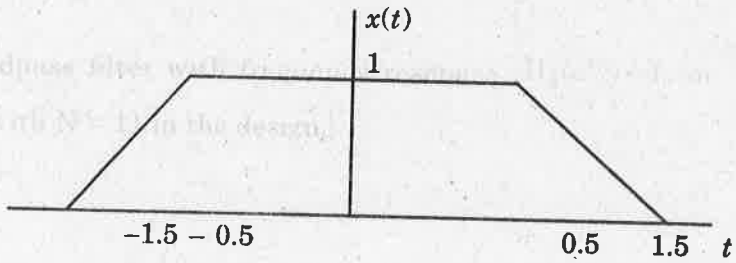
Part C

Each question carries 12 *marks.*

11. (a) Explain sampling theorem with necessary diagrams.

Or

(b) Determine the Fourier transform of the signal.



Turn over

12. (a) Draw and explain the Architecture of a Typical communication system. And explain the different types of noise.

Or

(b) Explain in detail different types of communication channels.

13. (a) Explain any *three* types of Pulse modulation techniques.

Or

(b) Explain the following types of modulation schemes (PSK, DPSK).

14. (a) Explain various switching methods.

Or

(b) Explain with block diagram Time division multiplexing (TDM) (Transmitter and Receiver section).

15. (a) Write the following error correction and detection code with example :
Line coding schemes, Block coding.

Or

(b) Write short notes on ASCII, EBCDIC, Bar coding and Baudot coding.

(5 × 12 = 60 marks)

G 4994 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Computer Science Engineering/Information Technology

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

(New Scheme — Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. What is meant by Folding?
2. Define a Stack.
3. State the advantages, disadvantages of linked lists.
4. Define a binary tree and a binary search tree.
5. What are the factors to be considered while choosing a sorting technique?

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Explain the system life cycle.
7. Explain in detail the Push and POP operation in a stack.
8. Explain the process of polynomial addition in linked lists.
9. State the merits and demerits of linked representation of a binary tree.
10. Explain in quick sort algorithm.

(5 × 5 = 25 marks)

Part C

Each question carries 12 *marks.*

11. Explain in different types of Hashing techniques.

Or

12. Explain in Collision resolution techniques.

Turn over

13. Explain priority queues in detail.

Or

14. Explain Towers of Hanoi problem in detail.

15. Explain in brief the traversal of nodes in a circular doubly linked list.

Or

16. Explain in brief deletion nodes in various positions in a circular singly linked list.

17. What is meant by binary tree traversal? What are the different traversal techniques?

Or

18. Discuss a non-recursive algorithm to perform inorder traversal of a binary tree.

19. Explain the bubbles sort and insertion sort alrorithm.

Or

20. What is meant by External Sorting? Explain in external sorting technique.

(5 × 12 = 60 marks)

G 4988 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Computer Science and Engineering

CS 010 402 – OBJECT ORIENTED PROGRAMMING (C S)

(New Scheme – Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. What are the concepts of OOPs?
2. Define Friend Function.
3. What is meant by pure abstract class?
4. Draw the exception handling model.
5. What is meant by Java Class Definition?

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Describe the applications of OOP technology.
7. Explain about Hierarchical Inheritance with suitable OOP example.
8. Write short notes on overloading function.
9. Explain the need for exception handling.
10. Explain the process of 'close' file.

(5 × 5 = 25 marks)

Part C

Each full question carries 12 *marks.*

11. Explain the following concepts of object oriented programming in detail with an example :
    (a) Classes.
    (b) Objects.

(8 + 4 = 12 marks)

Or

Turn over

12. Write short notes in OOPs with sample program :

    (a) Destructor.

    (b) Constructor.

(6 + 6 = 12 marks)

13. Explain a multilevel, multiple and single inheritance.

(12 marks)

Or

14. Explain in Friend class with examples.

(12 marks)

15. Discuss about polymorphism and its advantages.

(12 marks)

Or

16. Define Pure Virtual function. Describe virtual function with suitable example.

(12 marks)

17. Write a program for stack operation using class templates.

Or

18. Write a program to pass as non-generic arguments to a template function.

(12 marks)

19. Write notes on :

    (a) Object oriented notations and graphs.

    (b) Object oriented design.

(6 + 6 = 12 marks)

Or

20. (a) In detail, explain about object oriented analysis.

    (b) Compare and contrast the object oriented features of Java and C++.

(4 + 8 = 12 marks)

[5 × 12 = 60 marks]

G 4979 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Computer Science and Engineering

ADVANCED MICROPROCESSORS AND PERIPHERALS (R)

(Old Scheme—Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Write an ALP to print the message "Advanced microprocessors and peripherals" to a printer using 8255 port initialised in mode 1.
2. Explain the FIFO status word of 8279.
3. Will it be possible to interface more than sixteen 7-segment display units using 8279 ? Explain how.
4. How does a microcontroller (say, 8051) differentiate between the external and internal program memory ?
5. From which address the 8086 starts execution after reset ? Explain.
6. Explain physical address formation in 8086.
7. List the different addressing modes supported by 8086.
8. Explain the following signals available in 80286 :
   (i) PEREQ. (ii) CAP.
   (iii) $\overline{\text{PEACK}}$. (iv) $\overline{\text{BHE}}$.
9. Enlist the different data types supported by 80386.
10. Explain register windowing in RISC processors.

(10 × 4 = 40 marks)

Part B

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

Module 1

11. Interface an 8 × 8 keyboard using two 8255 ports and write a program to read the code of a pressed key. Draw your circuit diagram for the interface.

Or

12. Draw the internal architecture of 8251. Draw and discuss the asynchronous mode transmitter and receiver data formats of 8251.

MODULE 2

13. Interface a 26-keys keyboard with 8279. The keys represent the alphabets '*a*' to '*z*'. Write an 8085 ALP to find out the ASCII equivalent of the alphabet corresponding to the pressed key. Draw the circuit diagram.

Or

14. Interface a 12-bit DAC with 8255 and write a program to generate a triangular waveform of period 10ms. The cpu runs at 3 MHz clock frequency. Draw the circuit diagram.

MODULE 3

15. (a) Draw the register organisation of 8086 and explain typical applications of each register.

(b) Draw and discuss the read and write cycle timing diagrams of 8086 in minimum mode.

Or

16. Given that BX = 0158, DS = 2100

Displacement = 1B57 (DI) = 10A5

Determine the effective and physical addresses resulting from the registers and the following addressing modes :

(i) direct addressing.

(ii) register indirect using BX.

(iii) register relative using BX.

(iv) based indexed.

MODULE 4

17. Write an ALP to convert a four digit decimal number of its binary equivalent. Use a flow chart to explain your logic.

Or

18. (a) What are the differences between jump and loop instructions ? Explain with examples. **(8 marks)**

(b) Explain the physical address formation in real address mode in 80286. **(4 marks)**

MODULE 5

19. Describe the 80386 memory system, and explain the purpose and operation of the bank selection signals and also describe its features.

Or

20. What do you mean by branch prediction in Pentium Processor ? How does it enhance the speed of execution ? Explain the use of branch target buffer in branch prediction.

[5 × 12 = 60 marks]

G 4971 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Computer Science and Engineering

DATA STRUCTURES AND PROGRAMMING METHODOLOGY (R)

(Old Scheme—Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define Big O notation.
2. Explain recursion with an example.
3. What are sparse matrices? Explain the internal memory representation of sparse matrices.
4. Give an algorithm for adding two polynomials represented as arrays.
5. What are the advantages of a linked list over arrays ? How many nodes does the shortest linked list have ? The longest linked list ?
6. Write functions to perform enqueue and dequeue operations on a linked queue.
7. Differentiate tree and graph.
8. Write an algorithm for printing a prefix expression from an expression tree.
9. Give the trace of selection sort for the input : 8 6 5 3 2 1.
10. What is a heap ? What are its uses ?

(10 × 4 = 40 marks)

Part B

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

11. Write a recursive algorithm to compute the factorial of a number. Analyze the time and space requirements of your algorithm.

Or

12. Give an algorithm for linear search. Derive its Hest, average and worst case time complexities.

Turn over

13. What is a Deque ? Write algorithms to perform the following operations in a Deque represented as array :

    (a) To enqueue an element.

    (b) To dequeue an element

Or

14. Write a recursive algorithm that calculates and returns the length of a singly linked list.

15. Give algorithms for performing the following operations in a doubly linked list :—

    (a) To insert an element after node p.

    (b) To search for an element whose value is X.

Or

16. Write and explain the algorithm to add two polynomials represented as linked lists.

17. Explain the internal memory representation for a binary tree using : (a) Sequential and ; (b) Linked representations.

Or

18. What are the different tree traversal algorithms ? Explain with examples.

19. Explain Merge sort algorithm with an example. What is its time complexity ?

Or

20. Write the Quick sort algorithm and explain the working with a set of numbers.

(5 × 12 = 60 marks)

G 4941 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Computer Science and Engineering

COMPUTER ORGANIZATION (R)

(Old Scheme—Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define performance, execution time and bring relation between them.
2. Explain how jump instructions are implemented in data path.
3. Explain the construction of 1 bit ALU.
4. Explain the behaviour and structure implementing Booth's multiplication algorithm.
5. What is microinstruction ? Explain the format of micro instruction.
6. With a neat diagram, explain the microprogram sequencer for a control memory.
7. What is Cache coherence ? How to solve it ?
8. With the help of necessary diagrams, describe how read and write operations take place in a ROM.
9. What are two primary types of specifications in design of an I/O system ?
10. Differentiate between OMR and OCR . What are their functions ?

(10 × 4 = 40 marks)

Part B

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

Module 1

11. Describe the structure and working of a CPU. How does it interact with the memory and the control unit ? Explain.

Or

12. Explain the data path for fetching an instruction and decoding it. Show how the control signals are generated.

Module 2

13. Explain the floating point multiplication algorithm and the hardware structure with suitable block diagrams and example.

Or

Turn over

14. Explain the significance of sign bit in binary number representation. Also explain signed and unsigned addition and subtraction operation with appropriate examples.

Module 3

15. (a) Show the control sequences for the execution of Add (R2), R1 and explain.

    (b) Explain microprogrammed control of instruction executive in a processor.

(6 + 6 = 12 marks)

Or

16. (a) Explain microinstruction sequencing with next address field.

    (b) With a diagram which shows the separation of decoding and encoding functions, explain the hardwired control.

(6 + 6 = 12 marks)

Module 4

17. Explain the functions of virtual memory. Show how virtual addresses are mapped to physical address.

Or

18. Describe and compare direct mapping, set associative and fully set associative Cache and explain Cache misses in each case by taking suitable examples.

Module 5

19. (a) Explain the different schemes in I/O processor ?

    (b) Explain the features of GPIB bus standard ?

(6 + 6 = 12 marks)

Or

20. Discuss the working and performance of any four types of printers that can be used with a computer.

[5 × 12 = 60 marks]

G 4951 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Computer Science and Engineering

OBJECT ORIENTED PROGRAMMING (R)

(Old Scheme—Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Write neat and efficient C++ programs when required.

Part A

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

1. Write C++ equivalent expressions for the following :—

   (i) $xy + \frac{z^2 y^3}{x^3}$.

   (ii) $x^3 y^2 z + \frac{y^3}{x^3 y^2}$.

   (iii) $x^2 + \frac{y^2}{z^2} + xyz$.

   (iv) $xyz^2 + \frac{y^2 z^3}{x^3}$.

2. What is a Class? How objects of a class are created?

3. Explain how reusability is possible by inheritance.

4. What are the advantages of friend functions?

5. What is meant by operator overloading? Give an example.

6. Explain the importance of virtual functions in polymorphism.

7. How class templates are defined? Explain.

8. What is a generic class? What are its practical applications?

9. When will you make a function inline? Why?

10. Why Java is popular on the Internet?

(10 × 4 = 40 marks)

Turn over

Part B

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

Module 1

11. Discuss in detail the basic concepts of object oriented programming. List its important features.

Or

12. Write a program which reads the biodata of a student and print it. Biodata consists of the following : name, age, branch, semester, roll number, total marks. Write the program with the help of OOP concepts.

Module 2

13. Define a derived class with three additional capabilities to store the distance of the point from the origin. Write the additional number function for the same.

Or

14. Write a class derived from linear equation to give the equation of a line passing through two points.

Module 3

15. Define a class named character to store a character and its ASCII value (an integer number). Provide for overloaded operator functions, <, = = and > to compare their ASCII numbers.

Or

16. Using function overloading concept evaluate $\frac{1}{m^x}+\frac{2^n}{m^x}+\frac{3^n}{m^x}+\ldots..+\frac{n^n}{m^x}$.

Module 4

17. Write a program which designs a template that performs multiplication of (i) int type data and (ii) float type data.

Or

18. (a) With examples, explain the virtual destructors with arguments.
    (b) Explain the use of namespace.

Module 5

19. Implement student database with name, roll number, date of birth, blood group and marks using dynamic object allocation.

Or

20. With an example, explain how inheritance is implemented in Java.

(5 × 12 = 60 marks)

20 (i) Fit a normal curve and test the goodness of fit for :

x :	0	1	2	3	4	5	6	7	8
f :	2	4	10	15	19	12	8	7	1

(6 marks)

(ii) Test if the means are significantly different :

	Size	*Mean*	S.D.
Sample 1 :	5	11.4	2.65
Sample 2 :	7	14.4	4.37

(6 marks)

[5 × 12 = 60 marks]

G 4984 (Pages : 4) Re

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B.TECH. DEGREE EXAMINATION, MAY 2

Fourth Semester

EN 010 401—ENGINEERING MATHEMATICS—

(Regular/Improvement/Supplementary—New Sche

[Common for all Branches]

Time : Three Hours

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. Find a_0 from $f(x) = \begin{cases} -\pi, & \text{if } -\pi < x < 0 \\ x, & \text{if } 0 < x < \pi. \end{cases}$

2. Find the Fourier cosine transform of $f(x) = \begin{cases} 1, & 0 < x < 1 \\ 0, & x \geq 1. \end{cases}$

3. Solve $zp = -x$.

4. Find E (x) from

x :	0	1	2	3
$p(x)$:	·1	·2	·4	·3

5. What do you mean by Hypothesis ? Write its types.

Part B

Each question carries 5 *marks.*

6. Obtain Fourier expansion for sin ax in the interval $-l < x < l$.

7. Find the Fourier cosine transform of $x e^{-ax}$.

8. Form a partial differential equation by eliminating the ar

$\phi\left(x + y + z, x^2 + y^2 - z^2\right) = 0.$

9. Derive the mean of binomial distribution.

10. Write the working rule for testing the hypothesis ?

Part C

Each full question carries 12 marks.

$\cos x$, $0 \le x \le 2\pi$. Obtain the Fourier expansion and hence deduce that

$\frac{1}{2}$.

(8 marks)

values of x in the range $(-\pi, \pi)$

$$x - \frac{\sin 2x}{2} + \frac{\sin 3x}{3} - \ldots\ldots$$

(4 marks)

Or

urier series expansion for $f(x) = \begin{cases} x + \pi/2, & -\pi < x \le 0 \\ \pi/2 - x, & 0 \le x < \pi. \end{cases}$ (6 marks)

he interval $-\pi < x < \pi$, $x \cos x = -\frac{1}{2}\sin x + 2\sum_{n=2}^{\infty} \frac{n(-1)^n}{n^2 - 1}\sin nx$.

(6 marks)

ansform of $f(x) = \begin{cases} a - |x|, & |x| \le a \\ 0, & |x| > a > 0. \end{cases}$ (12 marks)

Or

$\frac{dx}{+a^2)^2}$ using Parseval's identity. (6 marks)

r Cosine transform of $f(x) = e^{-ax}, a > 0$. (6 marks)

$DD' + D'^2)z = \tan(y + x)$. (6 marks)

$aDD' + a^2 D'^2)z = f(y + ax)$. (6 marks)

Or

16. (i) Solve : $(D^2 - D')z = xe^{ax} + a^2 y$. (6 marks)

(ii) Solve : $(D - 3D' - 2)^2 z = 2e^{2x} \tan(y + 3x)$. (6 marks)

17. Find the variance of : $f(x) = \begin{cases} \frac{1}{16}(x+3)^2, & -3 \le x < -1 \\ \frac{1}{16}(6 - 2x^2), & -1 \le x < 1 \\ \frac{(3-x)^2}{16}, & 1 \le x \le 3. \end{cases}$ (12 marks)

Or

18. (i) Fit a normal distribution for :

x :	1	3	5	7	9
f :	1	2	3	2	1 .

(6 marks)

(ii) There are 2 urns containing 4 white 6 Red and 15 black balls and 10 white 8 red and 12 black balls respectively. One ball is taken out from each urn. What is the probability that both are red ?

(6 marks)

19. (i) Test if the means are significantly different for

	n	*mean*	*S*.D
gp 1 :	50	181.5	3.0
gp 2 :	75	179	3.6

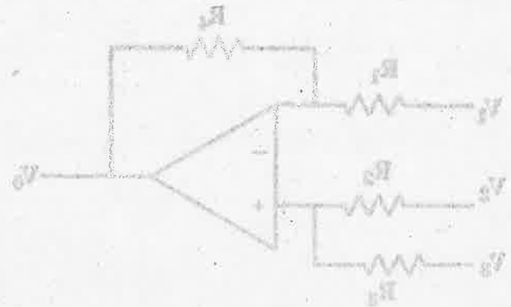
(6 marks)

(ii) Comment on the following :

Mathematical ability		*General ability*		
		Good	*Fair*	*Poor*
GOOD	: 44	22	5	
Fair	:	265	257	178
Poor	:	41	91	98

(6 marks)

Or



G 4961 (Pages : 3) Reg. No.

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2018

Fourth Semester

Branch : Computer Science and Engineering

INTEGRATED CIRCUITS (R)

(Old Scheme—Supplementary/Mercy Chance)

Time : Three Hours

Part A

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

1. Does the power drain of CMOS increase with operating frequency ? Why ?
2. What is totempole configuration ? Why it is used in a TTL circuit ?
3. Draw the logic circuit of a 4 : 1 multiplexer and explain its working.
4. How ROM is classified ? Explain each of the classifications.
5. An 8-bit D/A converter has a step size of 6 mV. Find full scale output vo resolution.
6. Why is a comparator an essential component of an A/D converter ? Why co used ?
7. Define slew rate. What are the reasons and causes of the slew rate ?
8. List four properties of ideal and real op-amp.
9. Sketch the voltage transfer characteristics of a regenerative comparator usin
10. Why the op-amp integrator is called a Miller sweep circuit ? Explain.

Part B

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

Module 1

11. (a) Sketch and explain an OR gate using DTL family.

    (b) Draw a CMOS circuit to realise the function $f = \overline{(a+b)\,c + \bar{c}\,\bar{d}}$.

Or

plain a two-input TTL NAND gate with capacitive load. Also write its output ous input combinations.

put ECL OR gate and explain how it can operate at high speed.

Module 2

rcuit is defined by the following functions :

$= \Sigma(3, 5, 6, 7)$

$= \Sigma(0, 2, 4, 7)$

uit with a PLA having 3-inputs, four product terms and two outputs.

Or

sion for a 4-variable logic function is f (D, C, B, A) = Σ^m (0, 2, 6, 8, 9, 11, 13, 15) 16 : 1 multiplexer.

Module 3

d explain the working of an ADC which does not require reconversion of the alog equivalent.

Or

n and waveforms explain the action of double ramp A/D converter and comment ersion and resolution.

Module 4

, PSRR = – 70 dB (min), CMRR = 10^5 and differential mode gain $A_d = 10^5$. The by 20 V in 4 μsec. Calculate :

al value of PSRR.

a mode gain and

e.

agrams explain the offset nulling techniques used in op-amp.

Or

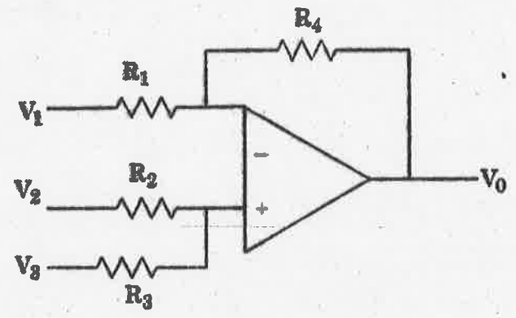
e non-inverting amplifier circuit, illustrating the type of negative feedback in s for the voltage gain, input and output resistance.

Module 5

uit diagram and necessary waveforms, describe how square waves are generated cuit ? Derive expression for its frequency.

Or

20. In the circuit shown below, $V_0 = a_1 v_1 + a_2 v_2 + a_3 v_3$. Find the values of a_1, a_2 and a_3 in terms of the resistance values. Also find the values of V_0 if (i) R_4 is short circuited ; (ii) R_4 is removed ; (iii) R_1 is short circuited.



(5 × 12 = 60 marks)

4th C.S

G 4936 (Pages : 3) Reg. No. 4th sem CS

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Engineering Mathematics—III (CMELRPTANSUF)

(Old Scheme—Supplementary/Mercy Chance)

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 1

1. (a) Solve $\frac{d^2y}{dt^2} - 3\frac{dy}{dt} + 2y = 0$, given that when $t = 0$, $y = 0$ and $\frac{dy}{dt} = 0$. (5 marks)

(b) $2(y + z)\,dx - (x + z)\,dy + (2y - x + z)\,dz = 0$. (5 marks)

(c) A particle of mass 4 gram vibrates through one centimeter on each side of the middle point of its making 330 complete vibrations per minute. Assuming its motion to be SHM, show that the maximum force upon the particle is $484\pi^2$ dyne. (10 marks)

Or

2. (a) Solve $(D^3 - 6D^2 + 11D - 6)\,y = e^{-2x} + e^{-3x}$. (6 marks)

(b) Solve $\frac{dx}{dt} + 5x - 2y = t$, $\frac{dy}{dt} + 2x + y = 0$; given that $x = y = 0$ when $t = 0$. (8 marks)

(c) Solve by the method of variation of parameters $y'' - 2y' + y = e^x \log x$. (6 marks)

MODULE 2

3. (a) Form partial differential equation by eliminating the arbitrary functions

$$z = f(x + ay) + g(x - ay).$$

(5 marks)

(b) Solve $pz - qz = z^2 + (x + y)^2$. (5 marks)

(c) A bar 10 cm. long, with insulated sides, having its ends A and B maintained at temperatures 50° C. and 100° C. respectively, until steady-state conditions prevail. The temperature at A is suddenly raised to 90° C. and at the same time that at B is lowered to 60° C. FInd the temperature distribution in the bar at time t. (10 marks)

Or

Turn over

4. (a) Solve by Charpit's method $(p^2 + q^2)\, y = qz$. (10 marks)

(b) Solve $\frac{\partial^2 z}{\partial x^2} + 2\frac{\partial^2 z}{\partial x\, \partial y} + \frac{\partial^2 z}{\partial y^2} = x^2 + xy + y^2$. (10 marks)

MODULE 3

5. (a) Find the Fourier sine and cosine transforms of $f(x) = \begin{cases} 1, & 0 \le x < a \\ 0, & x \ge a \end{cases}$. (12 marks)

(b) Solve the integral equation $\int_0^\infty f(x)\cos \lambda x\, dx = e^{-\lambda}$. (8 marks)

Or

6. (a) Express $f(x) = \begin{cases} 1, & 0 \le x < \pi \\ 0, & x \ge \pi \end{cases}$ as a Fourier sine integral and hence evaluate

$$\int_0^\infty \frac{1 - \cos \pi\lambda}{\lambda} \sin \lambda x\, d\lambda .$$

(10 marks)

(b) Find the Fourier Sine Transform of e^{-ax} and hence find the Fourier Sine Transform of $\frac{x}{x^2 + a^2}$.

(10 marks)

MODULE 4

7. (a) The following data are the number of seeds germinating out of 10 on damp filter for 80 sets of seeds. Fit a binomial distribution to this data :

x :	0	1	2	3	4	5	6	7	8	9	10	Total
f :	5	18	22	10	8	8	7	2	0	0	0	80

(10 marks)

(b) The incidence of occupational disease in an industry is such that the workmen have a 10% chance of suffering from it. What is the probability that in a group of 8, six or more will suffer from it ?

(10 marks)

Or

8. (a) It is known from the past experience that the number of telephone calls made daily in a certain community between 4 p.m. and 5 p.m. have a mean of 350 and a standard deviation of 30. What percentage of the time will there be more than 400 telephone calls made in this community between 4 p.m. and 5 p.m.?

(10 marks)

(b) The probability that a man aged 45 years will die before reaching the age of 50 years may be taken as 0.019. Out of a group of 500 men, now aged 45 years, what is the probability that 2 men will die within the next 5 years?

(10 marks)

MODULE 5

9. (a) Two random samples are drawn from two normal populations, gave the following results :

Sample 1 :	20	17	25	29	24	20	18	19
Sample 2 :	19	21	18	17	27	26	25	19

Test whether the two samples have the same variance at 5% of level of significance.

(10 marks)

(b) A set of 5 similar coins is tossed 320 times and the result is :

No. of heads :	0	1	2	3	4	5
Frequency :	5	28	75	115	68	31

Test the hypothesis that the data follow a Binomial distribution for V = 5, $\chi^2_{0.05} = 11.07$.

(10 marks)

Or

10. (a) If the mean of an infinite population is 550 with standard deviation 8.1, how large a sample must be used in order that there be one chance in 100 that the mean of the sample is less than 547?

(10 marks)

(b) The standard deviation calculated from two random samples of sizes 9 and 13 are 2.1 and 1.8 respectively. May the samples be regrated as drawn from normal populations with the same standard deviation?

(10 marks)

[5 × 20 = 100 marks]