III comp (CBGS)

Data Structures

QP Code : 30654

Duration: **3 hrs**   Total Marks: 80

N.B: (1) Question No. 1 is Compulsory
         (2) Attempt any **three** questions of the remaining **five** questions
         (3) **Figures** to the **right** indicate **full** marks
         (4) Make suitable assumptions wherever necessary with proper justifications

1. (a) Define ADT with an example   (03)
    (b) What are the advantages of using linked lists over arrays?   (05)
    (c) Describe Expression Tree with an example.   (05)
    (d) Write a program in C to implement Insertion Sort   (07)

2. (a) Discuss file I/O in C language with different library functions.   (10)
    (b) Explain recursion as an application of stack with examples.   (10)

3. (a) Write a menu driven program in C to implement QUEUE ADT. The program should
        perform the following operations: (12)
            (i)   Inserting an Element in the Queue
            (ii)   Deleting an Element from the Queue
            (iii)   Displaying the Queue
            (iv)   Exiting the program
    (b) Write a function to implement Indexed Sequential Search. Explain with an Example   (08)

4. (a) Write a C program to implement a Doubly Linked List which performs the following
        operations: (12)
            (i)   Inserting element in the beginning
            (ii)   Inserting element in the end
            (iii)   Inserting element after an element
            (iv)   Deleting a particular element
            (v)   Displaying the list
    (b) Apply Huffman Coding for the word "MALAYALAM". Give the Huffman code for each
        symbol.   (08)

5. (a) Explain any one application of linked list with an example.   (08)
    (b) Write a program in C to delete a node from a Binary Search Tree. The program should
        consider all the possible cases.   (12)

6. (a) Write a program in C to implement the BFS traversal of a graph. Explain the code with
        an example.   (10)
    (b) Hash the following in a table of size 11. Use any two collision resolution techniques: (10)
        23, 55, 10, 71, 67, 32, 100, 18, 10, 90, 44.

FW-Con. : 11011-16.

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FW-Con. : 11011-16.

QP Code : 30607

Time:-3 Hrs   Marks: 80

N.B. : 1. Question **ONE** is compulsory

2. Solve any **THREE** out of remaining questions

3. Draw neat and clean diagrams

4. Assume suitable data if required.

Q. 1.   A. Justify that JFET can be used as a Voltage Variable Resistor   5

B. With neat diagram explain any one application of Zero-Crossing Detector   5

C. With neat block diagram explain how PLL can be used to generate large number of frequencies

from a single reference frequency.   5

D. Explain with suitable example what do you understand by signal multiplexing?   5

Q. 2   A. Derive an expression for trans-conductance for JFET.   10

B. List down various parameters of Opamp along with their typical values for IC741. Also explain

what the significance of CMRR and Slew Rate is?   10

Q. 3   A. Explain how operational amplifier can be used for taking average of three signals.   5

B. Explain fly wheel effect in Class C amplifier.   5

C. Explain Nyquist criteria.   5

D. Determine the magnitude of g_m for a JFET with I_{DSS} = 8 mA and V_P = −4 V at dc bias points

V_{GS}= −0.5 V and also at V_{GS}= −2.5 V.   5

Q. 4   A. Explain generation of SSB using phase shift method.   10

B. Explain the use of PLL as FM detector.   10

Q. 5   A. Explain super heterodyne receiver in detail along with the waveforms at each stage.   10

B. Explain the concept of amplitude modulation.   10

Q. 6 . A. Write short note on generation of FM by Armstrong method.   5

B. Mention important specifications of ADC and DAC required for communication.   5

C. Explain the necessity and significance of modulation in communication.   5

D. Compare n-channel and p-channel JFET with respect to their device features and voltage-

current characteristics.   5

FW-Con. 10510-16.

QP Code : 30702

(3 Hours)   **[Total Marks : 80**

N.B. (1) Question No. 1 is compulsory

    (2) Assume suitable data if necessary

    (3) Attempt any three questions from remaining questions

1

  (a) Convert $(532.125)_8$ into decimal, binary and hexadecimal.   (3)

  (b) Convert $(47.3)_7$ BCD, Excess-3 and Gray code.   (3)

  (c) Subtract using 1's and 2's complement method $(56)_{10} - (76)_{10}$.   (4)

  (d) Obtain odd parity Hamming code for 1011.   (2)

  (e) Implement Ex-OR gate using NOR gate only.   (2)

  (f) Perform the following operations without changing the base.

    i) $(314)_8 + (737)_8$ ii) $(312.40)_5 + (214.33)_5$

  (g) State and prove Demorgans theorem.   (2)

2 (a) Reduce equation using Quine McCluskey method and realize circuit using   (10)

    basic gates.

    $F(A,B,C,D) = \sum m\ (1, 3,7,9,10,11,13,15)$.

  (b) Design 8 bit BCD adder.   (10)

3 (a) Design a logic circuit to convert Gray to BCD code.   (10)

  (b) Implement the following using only one 8:1 Mux and few gates.   (5)

    $F(A,B,C,D) = \sum m\ (0,3,5,7,9,,13,15)$

  (c) Design a full adder circuit using half adders and some gates.   (5)

4 (a) Compare TTL and CMOS logic.   (5)

  (b) Implement Full subtractor using Demultiplexer.   (5)

  (c) Explain 4 bit Universal shift register.   (10)

5 (a) Design mod 5 asynchronous Up counter.   (10)

  (b) Convert SR flipflop to JK flipflop and D flipflop.   (10)

6 Write short note on (any four):-   (20)

  (a) VHDL

  (b) Decade Counter

  (c) State table
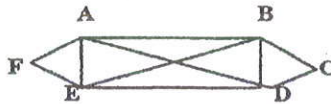
  (d) 4-bit Magnitude comparator

  (e) Multivibrators

FW-Con. 11489-16.

QP Code : **30745**

(3 Hours)   [Total Marks :80

N.B. : (1) Question no. **1** is **compulsory**.
         (2) Attempt any **three** questions from the remaining **five** questions.
         (3) **All** questions carry equal marks as indicated by **figures** to the **right**.
         (4) Assumptions made should be clearly stated.

1. (a) Find how many integers between 1and 60 are not divisible by 2 nor by 3 and nor   6
         by 5 respectively.

    (b) By using mathematical induction prove that $1 + a + a^2 + \ldots a^n = \dfrac{1 - a^{n+1}}{1 - a}$,where   6

         $n \geq 0$

    (c) Let A={1,2,3,4,5}and R be the relation defined by a R b if and only if a < b. Compute   8
         R, R² and R³ .Draw digraph of R, R² and R³ .

2. (a) Show that a group G is Ablian,if and only if $(ab)^2 = a^2 b^2$ for all elements a and   6
         b in G.

    (b) Let A={1,2,3,4,6}=B,a R b if and only if a is multiple of b. Find R. Find each of   6
         the Following (i) R(4) (ii) R(G) (iii) R({2,4,6}).

    (c) Show that the (2,5)encoding function e: B² → B⁵ defined by e (00) = 00000   8
         e (01) = 01110   e (10) = 10101   e (11) = 11011is a group code. How many
         errors will it detect and correct?

3. (a) State pigeon hole and extended pigeon hole principle. Show that 7 colors are used   6
         to paint 50 bicycles ,at least 8 bicycle will be of same color.

    (b) Define distributive lattice .Show that in a bounded distributive lattice, if a   6
         complement exists ,its unique.

    (c) Functions f,g, h are defined on a set,X= {1,2,3} as f = {(1,2) (2,3) (3,1)}   8
         g = {(1,2) (2,1) {3,3)} h = {(1,1) (2,2) (3,1)} (i) Find f o g, g o f are they
         equal ? (ii) Find f o g o h and f o h o g

4. (a) Define Eular path and Eular circuit,determine whether the given graph has Eular   6
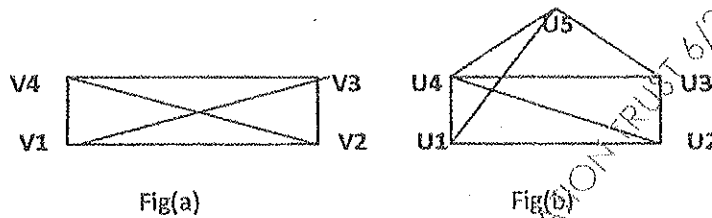   path and Eular circuit.

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FW-Con.12081-16.

(b) Define Hamiltonian path and Hamiltonian circuit,determine whether the given graph has Hamiltonian path and Hamiltonian circuit .   6
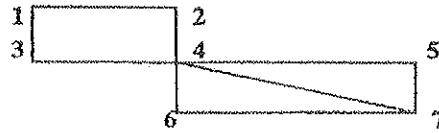
(c) Define isomorphic graphs. Show that the following two graphs are isomorphic.   8

Fig(a)   Fig(b)

5. (a) What is an Universal and existential quantifiers? Prove the distribution law.   6
$$(p \vee q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$$

(b) Let $A=\{1,2,3,4\}$ and let $R=\{(1,2)\ (2,3)(3,4)(2,1)\}$ Find transitive closure of R by using Warshall's algorithm.   6

(c) Prove that the set $A=\{0,1,2,3,4,5\}$ is a finite Abelian group under addition modulo 6.   8

6. (a) Find the ordinary generating functions for the given sequences: 6
(i)$\{1, 2, 3,4,5 ----\}$ (ii) $\{2,2,2,2 ----\}$(iii) $\{1,1,1,1----\}$

(b) Define group, monoid, semigroup.   6

(c) Solve the following recurrence relation: $a_n - 7a_{n-1} + 10\ a_{n-2} = 0$ with initial condition $a_0 = 1, a_2 = 6$ 8

QP Code : 30777

Instructions:
(1) Question No 1 is compulsory   (3 Hours)   TOTAL MARKS : 80
(2) Attempt any three questions out of remaining
(3) Figures to right indicate full marks

Question No.		Max. Marks
Q1(a)	Write a recursive method to calculate factorial of a integer number.	5
Q1(b)	Explain how Java is platform-independent.	5
Q1(c)	Explain bitwise operators available in java with example	5
Q1(d)	Write note on applet lifecycle	5
Q2(a)	Write a detailed note on System.arraycopy()	5
Q2(b)	Write a program to display following pattern:- 1 0 1 1 0 1 0 1 0 1	5
Q2(c)	With suitable example, explain creation and use of user defined packages.	10
Q3(a)	Identify classes and their attributes and draw the relationships that are described by the following rules. Include the multiplicities for each relationship. (i) Companies may employ many people, and people may work for many companies. Every employee in a company has a manager who may manage many subordinate employees. (ii) Library maintains books and magazines. A student can issue a book or return a book. A fine is charged if book is returned after 8 days. The magazines are not issued, but student can read it in library.	10
Q3(b)	Write a program to create vector objects with student names. Program should perform following operations based on choice: i) Add student name ii) Remove student name iii) Display –displays contents of vector using enumeration interface.	10
Q4(a)	Write a program to perform division of two numbers accepted from user. Handle the IOException, NumberFormatException and ArithmeticException using multiple try catch block.	10
Q4(b)	Draw sequence diagram for withdrawing an amount from ATM.	5
Q4(c)	Explain Cohesion and coupling with suitable example.	5
Q5(a)	Write a program to display the area of square and rectangle using the concept of overloaded constructor.	10
Q5(b)	With the help of suitable example explain how threads are created in Java.	5
Q5(c)	Explain multiple inheritance in Java with example.	5

Turn over

Q6	Write short notes on (any four) (a) Wrapper classes (b) Static data members and Methods (c) Abstract class & methods (d) Parameter passing to an applet (e) JVM	20