12|5|17

Total Marks:80
Duration: 3Hrs

NB 1. Question No.1 is compulsory

2. Attempt any three from the remaining six questions

3. Figures to the right indicate full marks

Q1a If the Laplace Transform of $e^{-t}\int_0^t u\cos 2u\,du$ [20]

b Prove that $f(z)=\sinh z$ is analytic and find its derivative

c Obtain Half range Sine Series for $f(x)=x+1$ in $(0,\pi)$

d Find a unit vector normal to the surface $x^2y+2xz=4$ at $(2,-2,3)$

Q2 a Prove that $\overline{F}=(2xy^2+yz)i+(2x^2y+xz+2yz^2)j-(2y^2z+xy)k$ is Irrotational.

Find Scalar Potential for $\overline{F}$

     [6]

b Find the inverse Laplace Transform using Convolution theorem

$$\frac{(s-1)^2}{(s^2-2s+5)^2}$$ [6]

c. Find Fourier Series of $f(x)=\begin{cases}\pi x; 0\le x\le 1\\ \pi(2-x); 1\le x\le 2\end{cases}$ [8]

Q3 a Find the Analytic function $f(z)=u+iv$ if $v=\dfrac{x}{x^2+y^2}+\cosh x\cos y$ [6]

b Find Inverse Z transform of $\dfrac{(3z^2-18z+26)}{(z-2)(z-3)(z-4)}$, $3<|z|<4$ [6]

c Solve the Differential Equation $\dfrac{d^2y}{dt^2}+2\dfrac{dy}{dx}+2y=5\sin t$, $y(0)=0$, $y'(0)=0$ using Laplace Transform   [8]

Q4 a Find the Orthogonal Trajectory of $3x^2y-y^3=k$ [6]

b Find the Z-transform of $2^K\sinh 3K$, $K\ge 0$ [6]

c Express the function $f(x)=\begin{cases}1 & ;|x|<1\\ 0 & ;|x|>1\end{cases}$ as Fourier Integral. Hence evaluate $\int_0^\infty \dfrac{\sin\lambda}{\lambda}.\cos(\lambda x)d\lambda$ [8]

Q5 a Evaluate using Stoke 's theorem $\int_c (2x - y)dx - yz^2 dy - y^2 zdz$ where C is the circle $x^2 + y^2 = 1$

corresponding to the sphere $x^2 + y^2 + z^2 = 1$ above the XY plane [6]

b Show that $w = \dfrac{2z + 3}{z - 4}$ maps the circle $x^2 + y^2 - 4x = 0$ into straight line $4u + 3 = 0$ [6]

c Find Inverse Laplace Transform i) $e^{-s} \tanh^{-1} s$ ii) $\dfrac{6}{(2s + 1)^3}$ [8]

Q6 a Find the Laplace transform of $f(t) = \dfrac{2t}{3}, 0 \le t \le 3, f(t+3) = f(t)$ [6]

b Find Complex Form of Fourier Series for $\sin(\alpha x)$; $(-\pi, \pi)$, α is not an integer [6]

c Verify Green's theorm for $\int_c (2x^2 - y^2)dx + (x^2 + y^2)dy$ where C is the boundary of the surface

enclosed by lines x=0,y=0,x=2,y=2 [8]

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Q.P. Code : 541001

(3 Hours) [Total Marks : 80]

N.B. 1) Question number 1 is compulsory.
2) Attempt any 3 questions from the remaining 5 questions.
3) Each question carries 20 marks.
4) Within a question, each sub-question carries equal marks.

1. a) Convert $(-124)_{10}$ to its equivalent sign magnitude form. 02
    b) Convert decimal 214.32 into base 7. 02
    c) Add $(7)_{10}$ and $(6)_{10}$ in BCD 02
    d) Simplify $(B+A)(B+D)(A+C)(C+D)$. 02
    e) Construct Hamming code for BCD 0110.Use even parity. 02
    f) Prove that "A positive logic AND operation is equivalent to a negative logic OR operation". 02
    g) List the applications of shift registers. 02
    h) Minimize the following standard POS expression using K-map $Y= \Pi M(0,2,3,5,7)$ 03
    i) Write the entity declaration construct in VHDL for NOR gate. 03

2. a) Obtain the minimal expression using Quine-Mc Cluskey method.
        $F(A,B,C,D) = \Sigma m (1,5,6,12,13,14) + d(2,4)$ 10
    b) Compare TIL, CMOS and ECL families with respect to gate, voltage level, fan-in, fan-out, propagation delay, power dissipation, speed and noise margin. 10

3. a) Design a logic circuit to convert BCD to Gray code. 10
    b) Implement the following using 8:1 MUX.
        $F(A,B,C,D) = \Sigma m (0,1,3,5,7,10,11,13,14,15)$ 05
    c) Explain Astable multivibrator. 05

4   a) Explain Master-Slave J-K flipflop. 05
    b) Design 1:16 Demultiplexer using 1:4 demultiplexer. 05
    c) Explain Data flow modelling and Behavioural modelling in VHDL. 10

(TURN OVER)

2

5. a) Convert JK flipflop to SR flipflop and D flipflop.   10

    b) Design mod 12 asynchronous UP counter.   10

6. **Write short note on (any four):-**
    a) Ring Counter
    b) State table
    c) 2-bit Magnitude comparator
    d) 3 to 8 line decoder
    e) Universal shift register

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COMP EJ Sem - III

QP CODE : 541202

Time: 3 Hours   Max Marks: 80

N.B.: (1) Question No. 1 is compulsory.
        (2) Attempt any three questions out of remaining five.

1	(a)	Explain JVM in detail.	5
	(b)	Compare Interface and abstract class.	5
	(c)	Write a Java program to calculate maximum & minimum of three numbers using conditional operator, accept input from command line.	5
	(d)	Explain super & final keywords with suitable example.	5

2 (a) Identify classes, their attributes, relationships and multiplicity for the Hotel   8
         Management System and draw class diagram based on it.
         Main functions of the system are as follows,
         Customer registration, Room Booking, Payment, Cancellations, feedback, food
         items, other facilities etc.

    (b) Write a Java program to perform functions listed in Q2(a) using various types of   6
         constructors and methods. Display output data for all the listed functions in
         Q2(a).

    (c) WAP that accepts a shopping list of items and performs the following operations: 6
         Add an item at a specified location, delete an item in the list, and print the
         contents of the vector.

3. (a) Write an applet program to draw a smiley face. (It should cover various shapes   8
         like line, circle, rectangle, arc etc).

    (b) Draw a sequence diagram for user registration and login authentication of a   6
         website.

    (c) Write a Java program to print following output using multidimensional array.   6

         0
         1 2
         3 4 5
         6 7 8 9

4. (a) Write a Java program to find number of uppercase and lowercase characters,   8
         blank spaces, digits and special characters from input string.

    (b) Write a Java program to check if the given number is Armstrong number or not.   6
         Take input from command line. (e.g. Armstrong no. : $153=1^3+5^3+3^3$)

    (c) How will you add an interface to a package? Explain with example.   6

{TURNOVER

5. (a) Write a java program to calculate gross salary of an employee. Read employee's   8
         details as Name, Birth date, Designation, Basic salary, No. of leaves etc.
         Make use of try, catch, throws, throw and finally keywords.
    (b) Explain various methods of thread class (at least 5) with suitable example.   6
    (c) Write a Java program to calculate area of circle and triangle using multilevel   6
         inheritance.

6.   Write short note on (any four)   20
    (a) Wrapper classes
    (b) Type casting in Java
    (c) Features of OOPM
    (d) Lifecycle of a thread
    (e) Coupling and Cohesion

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18/05/17

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. Give reasons for the following   **5**

I. JFET can be used as a Voltage Variable Resistor

II. JFET is not operated with Forward V_{GS} voltage in an amplifier

B. A difference amplifier is to be designed to amplify the difference between two voltages by a factor of 10. The inputs each approximately equal to 1V. Determine suitable resistor values for the circuit shown in fig.1 using a 741 opamp.   **5**
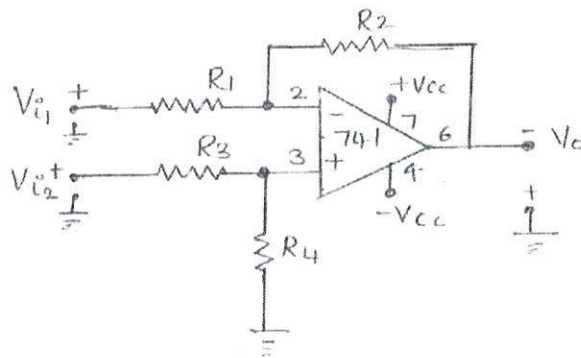

Fig.1

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 the detection of pulse code modulation.   **5**

[TURN OVER]

Q. 2   A. For the common source circuit shown in fig.2. Calculate the gate input impedance, the drain output impedance, the circuit input and output impedance and the voltage gain. Use the typical parameters for the FET.   **10**
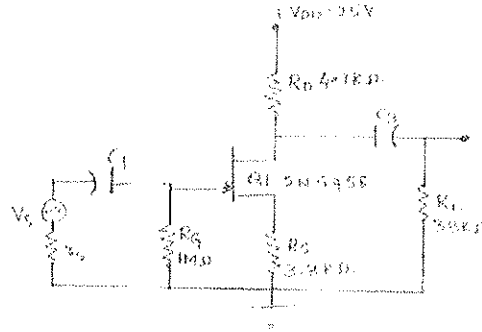

fig 2.

B. List down various parameters of Opamp along with their typical values for IC741. Also explain what is the significance of CMRR and Slew Rate?   **10**

Q. 3   A. With neat diagram explain any one application of Op-amp based Comparator.   **5**

B. Differentiate between BJT based Class A and Class C power amplifiers.   **5**

C. Compare various pulse modulation techniques.   **5**

D. Describe Shockley's equation and explain it with the relevant characteristics for JFET.**5**

Q. 4   A. Explain the generation of DSBSC using balanced modulator.   **10**

B. Discuss the operating principle of PLL and explain its use as FM detector.   **10**

Q. 5   A. Discuss the principle of operation of super heterodyne receiver in detail along with the waveforms at each stage.   **10**

B. One input to a conventional AM modulator is a 500 KHz carrier with an amplitude of 20 Vp. The second input is 10 KHz modulating signal that is of sufficient amplitude to cause a change in the output wave of ±7.5 Vp. Determine:

(i) upper and lower side frequencies

(ii) modulation coefficient and percentage modulation

(iii) peak amplitude of the modulated carrier and upper and lower side frequency voltages

(iv)expression for the modulated wave

(v) draw the output spectrum   **10**

[TURN OVER]

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**


06/06/17

Comp (CBGS)
Sem III

Q. P. Code : 541101

(3 Hours) [Total Marks: 80]

N.B. (1) Question No 1 is compulsory
(2) Solve any three question out of remaining five questions
(3) Assumption made should be clearly stated
(4) Figure to the right indicates full marks

1. (a) Prove using Mathematical Induction 05
   $$2+5+8+ ... +(3n-1)=n(3n+ 1)/2$$
   (b) Find the generating function for the following finite sequences 05
   i) 1,2,3,4, ...   ii) 2,2,2,2,2
   (c) Find solution of $a_{r+2}+2a_{r+1}-3a_r=0$ 05
   (d) Find the complement of each element in D_{30}. 05

2. (a) Let A={a,b,c,d,e,f,g,h}. Consider the following subsets of A 04
   A1={a,b,c,d}   A2={a,c,e,g,h}
   A3={a,c,e,g}   A4={b,d}   A5={f,h}
   Determine whether following is partition of A or not. Justify your answer.
   i) {A1, A2}   ii) {A3,A4,A5}
   (b) Prove that set G = {1,2,3,4,5,6} is a finite abelian group of order 6 with 08
   respect to multiplication module 7.
   (c) Explain distributive Lattice. Show that following diagrams represent non- 08
   distributive lattice.
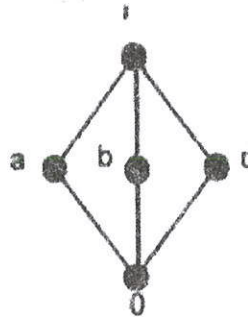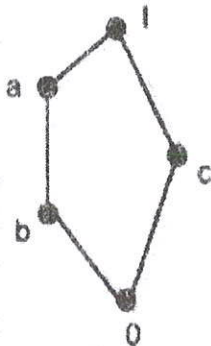
3. (a) Show that $(\sim P \wedge (\sim Q \wedge R)) \vee (Q \wedge R) \vee (P \wedge R) \Leftrightarrow R$ 04
   (b) Consider the {3,5} group encoding function defined by 08

   e(000)=00000   e(001)=00110

   e(010)=01001   e(011)=01111

   e(100)=10011   e(101)=10101

   e(110)=11010   e(111)=11000

TURN OVER

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Decode the following words relative to a maximum likelyhood decoding function.

i) 11001   ii) 01010   iii) 00111
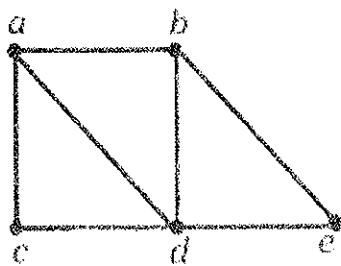
(c) Give Prim's algorithm for minimum spanning tree. Use the same to find a   08
minimum tree for the following fig.
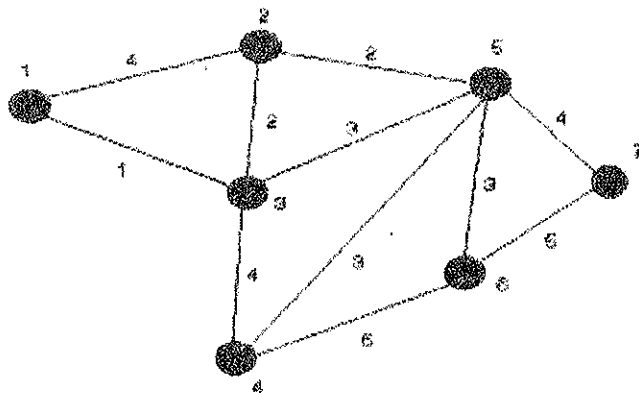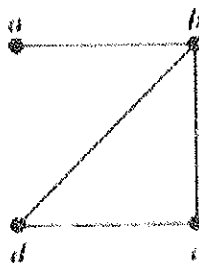

4.   (a) Let the function f:R→ R, f(x)=2x-3   08
Find f² = fof, f³ = fofof

(b) Define Euler Path and Hamiltonian Path.   08
i)   Determine Euler Cycle and path in graph shown in (a)
ii) Determine Hamiltonian Cycle and path in graph shown in (b)

(a)   (b)

(c) In a class of students undergoing a computer course the following were observed. 08
Out of a total of 50 students:

30 know Pascal,

18 know Fortran,

26 know COBOL,

9 know both Pascal and Fortran,

16 know both Pascal and COBOL,

8 know both Fortran and COBOL,

47 know at least one of the three languages.

From this we have to determine
    a. How many students know none of these languages?
    b. How many students know all three languages?
    c. How many students know exactly one language?

5.   (a) Define binary tree. Explain various operations on Binary tree.   04

    (b) Explain Pigeonhole principle and Extended Pigeonhole Principle. Show that if 08
7 colors are used to paint 50 bicycles, at least 8 bicycles will be of same
color.

    (c) Let A be a set of integers, let R be a relation on AXA defined by (a,b) R (c,d) 08
if and only if a+d=b+c.
Prove that R is an equivalence Relation.

6.   (a) Define reflexive closure and symmetric closure of a relation. Also find   04
reflexive and symmetric closure of R.
A={1,2,3,4}
R={(1,1),(1,2),(1,4),(2,4),(3,1),(3,2),(4,2),(4,3),{1,4)}
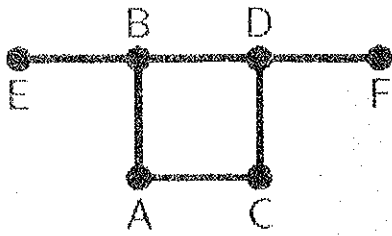
TURN OVER

(b) Let H=
$$\begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix}$$
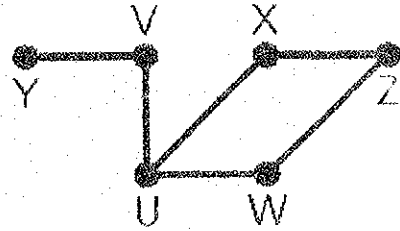08

Be a parity check matrix. Determine the group code $e_H : B^3 \to B^6$

(c) Determine if following graphs G1 and G2 are isomorphic or not.   08

G1   G2

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T1123 / T1497   DATA STRUCTURES

QP CODE : 540900

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) Explain different types of Data Structures with example.   (05)
    (b) What are the various techniques to represent Graphs in memory?   (05)
    (c) What is recursion? Write a recursive function in 'C' to find sum of digits of a number. (05)
    (d) Convert the following expression to postfix.   (05)
        $(f - g) * ((a + b)*(c - d)) / e$

2. (a) What is Huffman coding? Construct the Huffman Tree and determine the code for each
        symbol in the sentence "ENGINEERING".   (10)
    (b) Write a 'C' program to implement singly linked list which supports the following (10)
        operations
                (i)   Insert a node in the beginning
                (ii)   Insert a node in the end
                (iii) Insert a node after a specific node
                (iv)   Deleting element from the beginning
                (v)   Displaying the list
                (vi)   Exit

3. (a) Using Linear probing and Quadratic Probing insert the following values in a hash table of
        Size 10. Show how many collisions occur in each iteration:
                            28, 55, 71, 67, 11, 10, 90, 44.   (10)
    (b) Write a program in 'C' for Quick Sort.   (10)

4. (a) Write a Program in 'C' to implement Doubly linked list with methods insert, delete and
        search.   (10)
    (b) Compare Quick Sort and Radix Sort based on their advantages and disadvantages. (5)
    (c) Discuss some practical applications of trees   (5)

5. (a) Explain AVL trees. Insert the following elements in a AVL search tree: (10)
                        63, 52, 49, 83, 92, 29, 23, 54, 13, 99
    (b) Write a 'C' program to search a list using Indexed Sequential Search. What are the (10)
        advantages of using Indexed Sequential Search over Sequential Search.

6. (a) What is Heap? Sort the following numbers using Heap Sort.   (10)
                        67, 12, 89, 26, 38, 45, 22, 79, 53
    (b) Give ADT for the queue data structure. Discuss any two applications of queue data (5)
        structure
    (c) Explain Threaded Binary Tree.   (5)

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