1T00723 - S.E.(COMPUTER)(Sem III) (Choice Based) / 50901 - APPLIED MATHEMATICS-III

Time : 3 hrs **Marks : 80**

NB 1. Question No.I is compulsory

2. Attempt any three from the remaining six questions

3. Figures to the right indicate full marks

Q1a If Laplace transform of $erf(\sqrt{t}) = \frac{1}{s\sqrt{s+1}}$, then find $L\left\{e^t . erf\left(2\sqrt{t}\right)\right\}$ [20]

b Find the Orthogonal Trajectory of the family of curves given by $e^{-x}.\cos y + x.y = c$

c Find Complex Form of Fourier Series for . e^{2x} ; $0 < x < 2$

d. If the two regression equations are $5x - 6y + 90 = 0$, $15x - 8y - 180 = 0$,

find the means of x and y, the Correlation Coefficient and Standard deviation of x if variance of Y is 1

Q2 Show that the function is Harmonic and find the Harmonic Conjugate $v = e^x.\cos y + x^3 - 3xy^2$ [6]

b Find Laplace Transform of $f(t) = \begin{cases} t & ; 0<t<1 \\ 0 & ; 1<t<2 \end{cases}$, $f(t+2) = f(t)$ [6]

c. Find Fourier Series expansion of $f(x) = x - x^2, -1 < x < 1$ [8]

Q3 a Find the Analytic function $f(z) = u + iv$ if $v = \log\left(x^2 + y^2\right) + x - 2y$ [6]

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

c Solve the Differential Equation $\frac{d^2y}{dt^2} + 4y = f(t), f(t) = H(t-2), y(0) = 0, y'(0) = 1$ using Laplace Transform [8]

Q4 a Find $Z\{f(k) * g(k)\}$ if $f(k) = \left(\frac{1}{2}\right)^k, g(k) = \cos \pi k$ [6]

b Find the Spearman's Rank correlation coefficient between X and Y. [6]

X	60	30	37	30	42	37	55	45
Y	50	25	33	27	40	33	50	42

c Find the inverse Laplace transform of i) $\frac{3s+1}{(s+1)^4}$ ii) $\frac{e^{4-3s}}{(s+4)^{5/2}}$ [8]

Q. P. Code : 24408

Q5 a Find Inverse Laplace Transform usng Convolution theorem $\frac{1}{(s-4)^2(s+3)}$ [6]

b Show that the functions $f_1(x)=1$, $f_2(x)=x$ are Orthogonal on (-1,1). Determine the constants a, b such that the function $f(x)=-1+ax+bx^2$ is Orthogonal to both $f_1(x), f_2(x)$ on the (-1,1) [6]

c Find the Laplace transform of i) $e^{-3t}\int_0^t t\sin 4t\,dt$ ii) $\int_0^\infty \frac{e^{-t}-e^{-2t}}{t}dt$ [8]

Q6 a Fit a second degree parabola to the given data [6]

X	1	1.5	2	2.5	3	3.5	4
Y	1.1	1.3	1.6	2	2.7	3.4	4.1

bFind the image of $\left|z-\frac{5}{2}\right|=\frac{1}{2}$ under the transformation $w=\frac{3-z}{z-2}$ [6]

c Find Half Range Cosine Series for $f(x)=x\sin x$ in $(0,\pi)$ and hence find $\frac{1}{1.3}-\frac{1}{3.5}+\frac{1}{5.7}-\ldots\ldots=\frac{\pi-2}{4}$ **[8]**

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(12)

10/12/18.

Sem IV CMPN, CBCNS, Dec 18

LC

Duration: 3 Hrs

Total Marks : 80

N.B.: 1) Question No. 1 is Compulsory.
2) Attempt any three questions, from remaining five questions.
3) Figure to the right indicates full marks

Q.1.	A)	Compare Raster and Random Scan Techniques .	**5**
	B)	What are the disadvantages of DDA algorithm?	**5**
	C)	Explain inside outside test used in filling algorithm.	**5**
	D)	What are Aliasing & Antialiasing? Explain any one Antialiasing method.	**5**
Q.2.	A)	Explain Liang Barsky line clipping algorithm. Apply this algorithm to the line with coordinates (35,60) and (80,25) against the window (Xmin, Ymin) = (10,10) and (Xmax ,Ymax) =(50,50)	**10**
	B)	Derive the matrix for 2D rotation about an arbitrary point.	**10**
Q.3.	A)	Explain the Cohen-Sutherland line clipping algorithm with suitable example.	**10**
	B)	What is meant by Parallel and Perspective Projections? Derive matrix for Perspective projection.	**10**
Q.4.	A)	Specify midpoint circle algorithm. using the same ,plot the circle whose radius is 8 units and center is at (10,10)	**10**
	B)	Explain any one Polygon clipping algorithm	**10**
Q.5.	A)	Explain Bezier curve with its properties and construct	**10**
	B)	Explain Gouraud and Phong Shading along with their advantages and disadvantages.	**10**
Q.6.		Write Short Note on **(Any four)**	**20**
		(a) Depth Buffer method	
		(b) Halftone and Dithering techniques	
		(c) Fractals	
		(d) Koch Curve	
		(e) Area Subdivision method	

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Paper / Subject Code: 50905 / Data Structures

SE/Sem IV/CBCGS/ COMPN / Dec 18

(161)

17/12/18

Q.P.Code:36286

Duration: 3 Hours

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) What are various operations possible on data structures? **(05)**
   (b)What are different ways of representing a Graph data structure on a computer? **(05)**
   (c) Describe Tries with an example. **(05)**
   (d) Write a function in C to implement binary search. **(05)**

2. (a) Use stack data structure to check well-formedness of parentheses in an algebraic expression. Write C program for the same. **(10)**

   (b)Given the frequency for the following symbols, compute the Huffman code for each symbol. **(10)**

Symbol	A	B	C	D	E
Frequency	24	12	10	8	8

3. (a) Write a C program to implement priority queue using arrays. The program should perform the following operations: **(12)**
   i. Inserting in a priority queue
   ii. Deletion from a queue
   iii. Displaying contents of the queue
   (b) What are expression trees? What are its advantages? Derive the expression tree for the following algebraic expression: (a + (b/c)) * ((d/e) – f) **(08)**

4. (a) Write a C program to represent and add two polynomials using linked list. **(12)**
   (b) How does the Quicksort technique work? Give C function for the same. **(08)**

5. (a) What is a doubly linked list? Give C representation for the same. **(05)**

   (b) Given the postorder and inorder traversal of a binary tree, construct the original tree: **(10)**
   Postorder: D E F B G L J K H C A
   Inorder: D B F E A G C L J H K
   (c) What is hashing? What properties should a good hash function demonstrate? **(05)**

6. (a) Given an array int a[] = {69, 78, 63, 98, 67, 75, 66, 90, 81}. Calculate address of a[5] if base address is 1600. **(02)**

   (b) Give C function for Breadth First Search Traversal of a graph. Explain the code with an example. **(10)**

   (c) Write a C program to implement a singly linked list. The program should be able to perform the following operations: **(08)**

   (i) Insert a node at the end of the list
   (ii) Deleting a particular element
   (iii) Display the linked list

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S.E.(COMPUTER)(Sem III) (Choice Based) / 50902 - DIGITAL LOGIC DESIGN AND ANALYSIS

Duration: - 3 Hours Marks: 80 Marks

NB: - Question 1 is compulsory

Solve any three questions from the remaining.

1 a) Convert decimal number 576.24 into binary, base-9, octal, hexadecimal system. 04
b) Construct hamming code for 1010 using odd parity. 04
c) Convert $(-89)_{10}$ to its equivalent Sign Magnitude, 1's Complement and 2's Complement Form 04
d) Perform $(BC5)_H - (A2B)_H$ without converting to any other base 04
e) Prove De Morgans theorem 04

2a. Given the logic expression: $A + \overline{B}\overline{C} + AB\overline{D} + ABCD$ 10
1. Express it in standard SOP form.
2). Draw K-map and simplify.
3). Draw logic diagram using NOR gates only.

2b. Reduce using Quine McClusky method & realize the operation using only NAND gates. 10
$F(A,B,C,D) = \prod M(0,2,3,6,7,8,9,12,13)$.

3a. Design a 4-bit binary to gray code converter. 10

3b. Design a 4-bit BCD adder using IC 7483 and necessary gates. 10

4a. Implement the following logic function using all 4:1 multiplexers with the select inputs as 'B', 'C', 'D', 'E' only. 10
$F(A,B,C,D,E) = \sum m\,(0,1,2,3,6,8,9,10,13,15,17,20,24,30)$

4b. Convert a SR flip flop to J K flip flop 10

5a. Design a mod-6 synchronous counter using T FF 10

5b. Explain the operation of 4-bit universal shift register. 10

6 Write short notes on any two 20
a. VHDL
b. TTL and CMOS logic families
c. 4-bit Magnitude comparator
d. 3 to 8 line decoder

1T00723 - S.E.(COMPUTER)(Sem III) (Choice Based) / 50903 - DISCRETE STRUCTURE

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

N.B (1) Question **No. 1** is **compulsory**.
(2) Solve any **three** questions out of remaining **five** questions.
(3) Assumptions made should be clearly stated.
(4) Figures to the right indicate full marks.

Q.1 (a) Two dice are rolled, find the probability that the sum is [6M]
(i)Equal to 1 (ii) Equal to 4 (iii) Less than 13

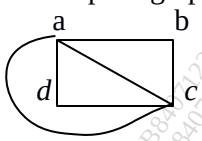
(b) Use the laws of logic to show that
$[(p \rightarrow q) \wedge \sim q] \rightarrow \sim p$ is a tautology [6M]

(c) Determine the matrix of the partial order of divisibility on the set A.Draw the Hasse diagram of the Poset.Indicate those which are chains [8M]
(1) A={1,2,3,5,6,10,15,30}
(2) A={3,6,12,36,72}

Q.2 (a) Find the complement of each element in D_{42}. [6M]

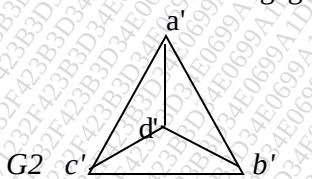
(b) Let Q be the set of positive rational numbers which can be expressed in the form $2^a 3^b$, where a and b are integers .Prove that algebraic structure (Q, .) is a group. Where . is multiplication operation. [6M]

(c) Define isomorphic graphs .Show whether the following graphs are isomorphic or not . [8M]



G1

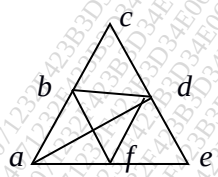
Fig (a)



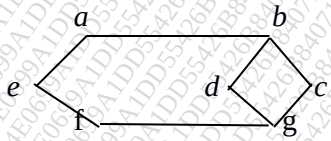
G2

Fig (b)

Q.3 (a) Determine which of the following graph contains an Eulerian or Hamiltonian circuit. [6M]



Fig(a)



Fig(b)

(b) For all sets A, X and Y show that
$A \times (X \cap Y) = (A \times X) \cap (A \times Y)$ [6M]

(c) Let f (x) =x+2, g(x) =x -2 and h(x) =3x for $x \in R$,Where R= Set of real numbers. Find [8M]
$(g \circ f)$, $(f \circ g)$,$(f \circ f)$, $(g \circ g)$,$(f \circ h)$,$(h \circ g)$,$(h \circ f)$,$(f \circ h \circ g)$

Q.4 (a) Let R is a binary relation. Let S = {(a, b) | (a, c)∈ R and (c, b) ∈ R for some c} Show that if R is an equivalence relation then S is also an equivalence relation. [6M]

[TURN OVER

(b) Determine the generating function of the numeric function a_r, where [6M]

(i) $a_r = 3^r + 4^{r+1}$, $r \geq 0$
(ii) $a_r = 5$, $r \geq 0$

(c) Consider the (3, 6) encoding function $e: B^3 \rightarrow B^6$ defined by [8M]
e(000)= 000000 e(001)= 001100 e(010)= 010011 e(011)= 011111
e(100)= 100101 e(101)= 101001 e(110)= 110110 e(111)= 111010
Decode the following words relative to a maximum likelihood decoding function.
(i) 000101 (ii) 010101

Q.5 (a) Determine the number of positive integers n where $1 \leq n \leq 100$ and n is not divisible by 2, 3 or 5. [6M]

(b) Use mathematical induction to show that [6M]
1+5+9+.....+ (4n-3) =n (2n-1)

(c) Find the greatest lower bound and least upper bound of the set {3, 9, 12} and {1, 2, 4, 5, 10} if they exists in the poset (z+, /).Where / is the relation of divisibility. [8M]

Q.6 (a) Let A= {1,2,3,4}and Let R = {(1,1) (1,2) (1,4) (2,4) (3,1) (3,2) (4,2) (4,3) (4,4)} .Find transitive closure by Warshall's algorithm. [6M]

(b) Let H= $\{[0]_6, [3]_6\}$ find the left and right cosets in group Z_6. Is H a normal subgroup of group of Z_6. [6M]

(c) Find the complete solution of the recurrence relation [8M]
$a_n + 2a_{n-1} = n+3$ for $n \geq 1$ and with $a_0 = 3$

2018

Paper / Subject Code: 50904 / Electronics Circuits and Communication Fundamentals (CMPN)

S. E. Sem. III (CBCGS) Dec 2018

LC

Q. P. Code : 26300

(3 Hours) **(Total 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. Explain the concept and significance of CMRR and Slew Rate in case of op-amps. **5**

B. Given β=120 and I_E= 3.2 mA for a common-emitter configuration with $r_0=\infty\ \Omega$, determine:

(a) Z_i

(b) A_v if a load of 2 kΩ is applied. **5**

(c) A_i with the 2 kΩ load. **5**

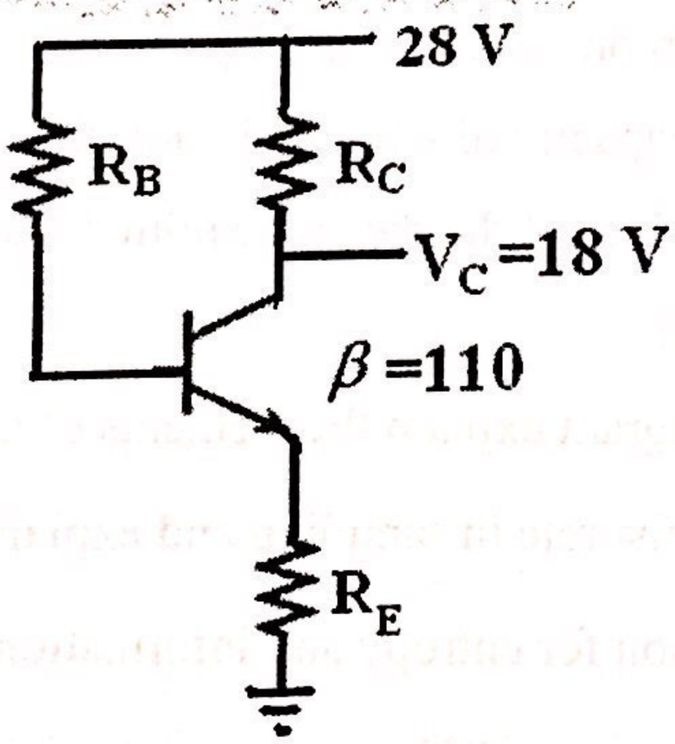
C. Discuss the factors that influence modulation index of an FM wave. **5**

D. Justify that adaptive delta modulation superior to delta modulation.

Q. 2 A. The emitter bias configuration as shown in following figure has the specifications:

$I_{CQ} = \frac{1}{2} I_{Csat}$ $I_{Csat} = 8\,mA$ $V_C = 18\,V$ and $\beta = 110$

Determine R_C, R_E and R_B. **10**



B. Explain how op-am can be used comparator and zero crossing detector. **10**

TURN OVER

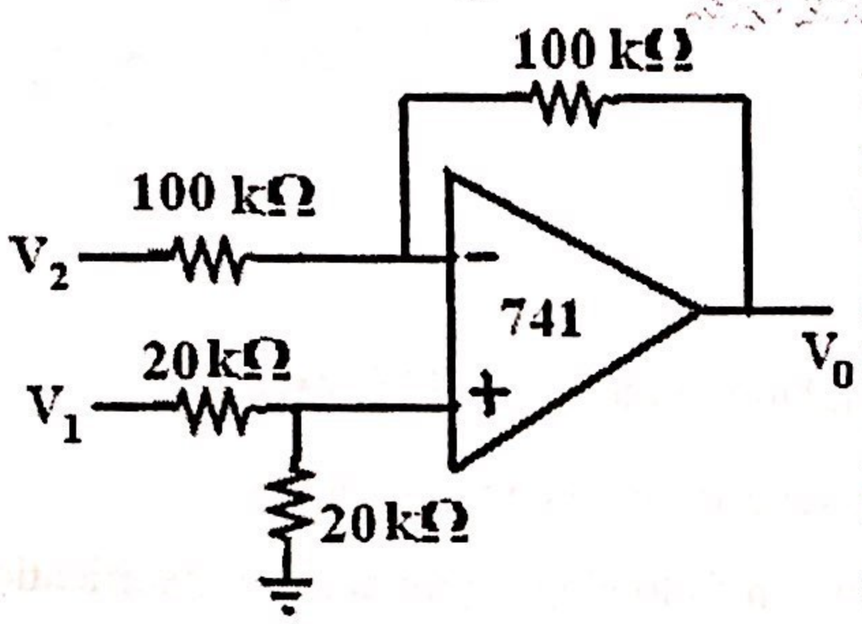
Q. 3 A. What is the source of the leakage current in a transistor?

If the emitter current of a transistor is 8 mA and I_B is 1/100 of I_C, determine the levels of I_C and I_B. 5

B. Draw and explain Colpitts oscillator. 5

C. Explain principle of FDM. 5

D. Determine the output voltage for the circuit if V_1=5V and V_2=3V



5

Q. 4 A. What is DSBSC wave and explain its generation using balanced modulator. 10

B. What is multiplexing in communication system? Draw block diagram of TDM-PCM system and explain. 10

Q. 5 A. State Shannon's theorem on channel capacity.

What is the maximum capacity of a perfectly noiseless channel whose bandwidth is 120 Hz, in which the values of the data transmitted may be indicated by any one of the 10 different amplitudes? 10

B. With respect to neat diagram explain the elements of analog communication system. 10

Q. 6 A. What is meant by Nyquist rate in sampling and explain its significance. 5

B. Give the proper definition for entropy and information rate. 5

C. Write short note on op-amp as differentiator. 5

D. Differentiate between Class A and Class C power amplifiers with respect to circuit diagram, operating cycle and power efficiency. 5
