Sem III Computer (CBSG)

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**

$2+5+8+ \ldots +(3n-1)=n(3n+1)/2$

(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}

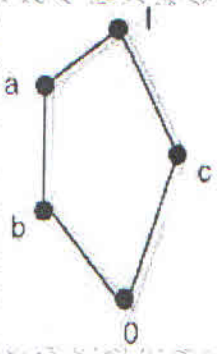
A3={a,c1e,g} A4={b,d} A5={f,h}

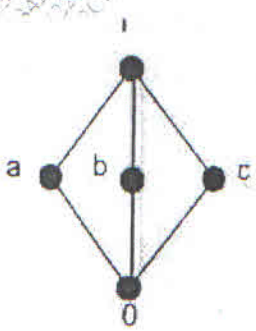
Determine whether following is partition of A or not. Justify your answer.

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 respect to multiplication module 7. **08**

(c) Explain distributive Lattice. Show that following diagrams represent non-distributive lattice. **08**





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

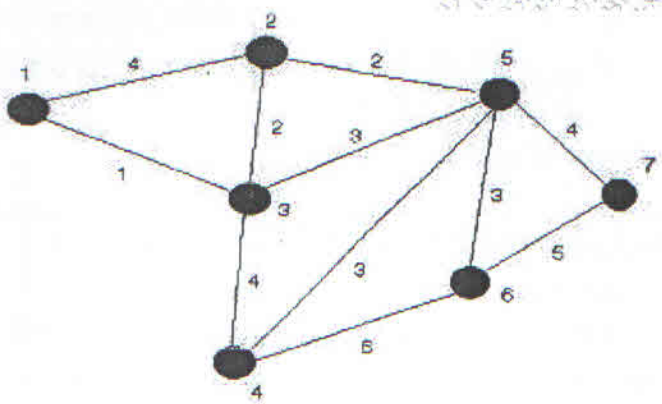
e(110)=11010 e(111)=11000

TURN OVER

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 minimum tree for the following fig. 08



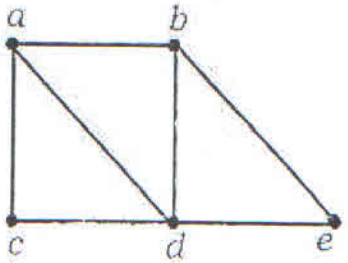
4. (a) Let the function $f: R \rightarrow R$, $f(x)=2x-3$ 08

Find $f^2 = fof$, $f^3 = fofof$

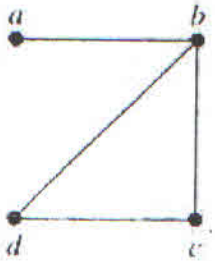
(b) Define Euler Path and Hamiltonian Path. 08

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 7 colors are used to paint 50 bicycles, at least 8 bicycles will be of same color. **08**

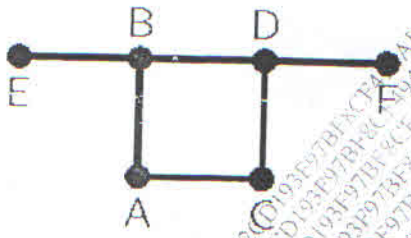
(c) Let A be a set of integers, let R be a relation on AXA defined by (a,b) R (c,d) if and only if a+d=b+c. **08**
Prove that R is an equivalence Relation.

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

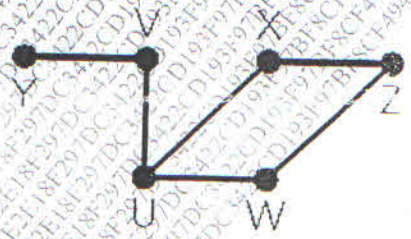
(b) Let H= $\begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix}$ **08**

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

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



G1



G2

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 of 24.5.17 (2)

S.E. Sem-III (CBGS) COMPUTER **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 operations (10)
   (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 advantages of using Indexed Sequential Search over Sequential Search. (10)
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 structure (5)
   (c) Explain Threaded Binary Tree. (5)

S.E- Sem-III (comp) 18/5/17

Electronic Circuits & Communication Fundamentals. 1

(03)

Q.P Code : 540802

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_{DS} 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**

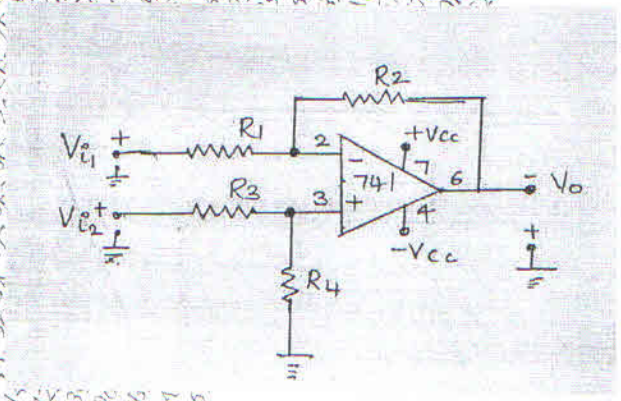

Fig.1

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**

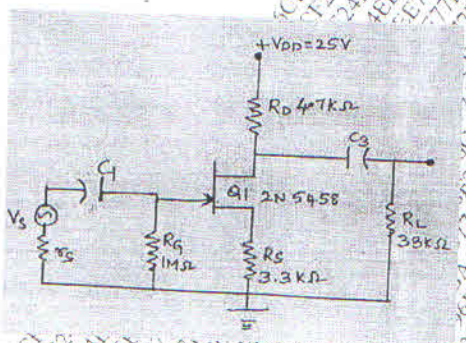

fig 2

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**

SEM-III COMP / I.T. (CBGS).
App. Maths-III

Q.P. Code : 540702

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 $v=\frac{x}{x^2+y^2}+\cosh x\cos y$ [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 $\frac{d^2y}{dt^2}+2\frac{dy}{dx}+2y=5\sin t$, $y(0)=0$, $y'(0)=0$ 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 $\int_0^\infty \frac{\sin\lambda}{\lambda}.\cos(\lambda x)d\lambda$ [8]

Q5 a Evaluate using Stoke 's theorem $\int_c (2x-y)dx - yz^2dy - y^2zdz$ 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 $w=\frac{2z+3}{z-4}$ 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) $\frac{6}{(2s+1)^3}$ [8]

Q6 a Find the Laplace transform of $f(t)=\frac{2t}{3}, 0\le t\le 3, f(t+3)=f(t)$ [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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App. Maths-III

Q.P. Code : 540702

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30/05/2017

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 **03**
$Y = \Pi M(0,2,3,5,7)$
i) Write the entity declaration construct in VHDL for NOR gate. **03**

2. a) Obtain the minimal expression using Quine-Mc Cluskey method. **10**
$F(A,B,C,D) = \Sigma m\,(1,5,6,12,13,14) + d(2,4)$
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. **05**
$F(A,B,C,D) = \Sigma m\,(0,1,3,5,7,10,11,13,14,15)$
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)

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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