

Hall Ticket Number:

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**II/IV B.Tech (Regular) DEGREE EXAMINATION**  
**OCT / NOV, 2012**  
**(First Semester)**  
**CH/CE/CS/EC/EE/EI/IT/ME**  
**(Mathematics - III)**

Time: Three Hours

Maximum : 60 Marks

Answer Question No.1 compulsorily.

(1X12 = 12 Marks)

Answer ONE question from each unit.

(4X12=48)

1. Answer all questions

(12X1=12 Marks)

- a) Define Fourier cosine and sine integrals?
- b) Find the Fourier transform of  $f(x) = K$  if  $0 < x < a$  and  $f(x) = 0$  otherwise.
- c) Define Fourier transform of the derivative of  $f(x)$ .
- d) Solve:  $U_{xy} = -U_x$ .
- e) Define D'Alembert's solution of wave equation.
- f) Define steady-state two dimensional Heat flow?
- g) State Newton's forward difference formula?
- h) Write Simpson's one third rule?
- i) Define LU- Factorization.
- j) Write the normal equations for  $y = a + bx + cx^2$  by the method of least squares?
- k) Define ill-conditioned and well-conditioned
- l) Define Laplace equation and poisson equation?

**CONTROLLER OF EXAMINATIONS**

**UNIT - I**

2. a) Express the function  $f(x) = \begin{cases} 1 & \text{for } |x| \leq 1 \\ 0 & \text{for } |x| > 1 \end{cases}$  as Fourier integral. Hence evaluate  $\int_0^\omega \frac{\sin \lambda \cos \lambda x}{\lambda} d\lambda$ .
- b) Using Fourier integral show that  $\int_0^\infty \frac{\lambda \sin \lambda x}{K^2 + \lambda^2} d\lambda = \frac{\pi}{2} e^{-Kx}$ ,  $x > 0$ ,  $K > 0$ .

(OR)

3. a) Find the Fourier cosine transform of  $e^{-x^2}$ .
- b) Find the Fourier transform of  $f(x) = \begin{cases} 1, & |x| < a \\ 0, & |x| > a \end{cases}$

**UNIT - II**

4. a) Using method of separation of variables, Solve  $y^2 \cdot U_x - x^2 \cdot U_y = 0$ .
- b) Find the deflection  $u(x, t)$  of a vibrating string of unit length with fixed ends starting with initial velocity zero for  $f(x) = K(x-x^3)$  Where  $K=0.01$ .

(OR)

5. a) A rod of length '1' with insulated sides is initially at a uniform temperature  $U_0$ . Its ends are suddenly cooled to  $0^\circ\text{C}$  and are kept at that temperature. Find the temperature function  $U(x, t)$ .

b) Find the solution of  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$

### UNIT – III

6. a) Find the real roots of the equation  $x^4 - x - 9 = 0$  by Newton-Raphson method.  
b) Using Newton's divided difference formula evaluate  $f(8)$  and  $f(15)$  given:

x:	04	05	07	10	11	13
f(x):	48	100	294	900	1210	2028

(OR)

7. a) Find the first, second derivatives of the function tabulated below at the point  $x=1.5$ .

x:	1.5	2.0	2.5	3.0	3.5	4.0
f(x):	3.375	7.0	13.625	24.0	38.875	59.0

- b) Evaluate  $\int_0^1 \frac{dx}{1+x^2}$  using i) Trapezoidal rule ii) Simpson's one third rule with  $h=0.25$ .

### UNIT – IV

8. a) Solve by Gauss elimination method  $3x+y-z=3$ ,  $2x-8y+z=-5$ ,  $x-2y+9z=8$ .  
b) By the method of least square, fit a parabola for  $(-1, 3)$ ,  $(1, 1)$ ,  $(2, 2)$  and  $(3, 6)$ .

(OR)

9. a) Using Euler's method solve for  $y$  at  $x = 0.1$  from  $\frac{dy}{dx} = x + y + xy$ ,  $y(0)=1$  taking step size  $h=0.025$ .  
b) Given  $y' = x^2 - y$ ,  $y(0) = 1$ . Find  $y(0.1)$  and  $y(0.2)$  using Runge – Kutta fourth order method.

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**II/IV B.Tech (Regular) DEGREE EXAMINATION  
OCT / NOV, 2012**

**(First Semester)**

**Electronics & Communication Engineering  
(Data Structures using 'C')**

**Time:** Three Hours

**Maximum :** 60 Marks

*Answer Question No.1 compulsorily.*

(1X12 = 12 Marks)

*Answer ONE question from each unit.*

(4X12=48)

1. Answer all questions

(12X1=12 Marks)

- Define Space Complexity?
- What is the difference between array and list?
- What is meant by linear probing?
- Convert  $A*(B+C)/(D+E)$  into prefix expression?
- Write the difference between a circular queue and a queue?
- What is Sparse matrix?
- What is a Complete Binary Tree?
- What is a balanced factor for AVL Tree?
- What is the difference between B tree and a B+ tree?
- Write the Splay rotations?
- What is an algorithm?
- What is a Spanning Tree?

**UNIT – I**

- Write about the complexity of algorithms? (6M)
  - Compare Binary search with a linear search? Justify your answer? (6M)

**(OR)**

- Write a C program to perform various operations on a doubly linked list with examples? (12M)

**UNIT – II**

- Write a C program to implement a Queue using a linked representation? (8M)
  - Write the applications of Queues? (4M)

**(OR)**

- What are the basic applications of Stack? (4M)
  - Write a program to convert infix expression to prefix form? (8M)

**UNIT – III**

- Write a C program to create Binary Search Tree? (6M)
  - Write a non-recursive function for traversing a binary tree in preorder? (6M)

**(OR)**

- How can you balance an imbalanced search tree. Explain? (12M)

**UNIT – IV**

- What is DFS? Explain DFS algorithm with an example? (12M)

**(OR)**

- What are different types of representations of a Graph? (4M)
  - What is a minimum cost Spanning Tree? Explain Prim's algorithm with an example program? (8M)

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**II/IV B.Tech (Regular) DEGREE EXAMINATION  
OCT / NOV, 2012**

**(First Semester)**

**Common to ECE /EEE/ EIE  
(Electronic Devices)**

**Time:** Three Hours

*Answer Question No.1 compulsorily.*

*Answer ONE question from each unit.*

**Maximum : 60 Marks**

(1X12 = 12 Marks)

(4X12=48)

1. Answer all questions

(12X1=12 Marks)

- What is meant by N-Type semiconductor?
- Define Hall Effect?
- Why CC is called as emitter follower?
- Write the applications of UJT?
- Describe a zener diode?
- List some of the uses of thermistors?
- Why is collector current slightly less than emitter current?
- Define transconductance?
- Find the condition for thermal stability?
- Write any two advantages of FET over the conventional transistor?
- Define diffusion length?
- Explain about photo diode?

**UNIT - I**

- Prove that Fermi-Level in P-Type semiconductor is given by  $E_F = E_V + K_T \log\left(\frac{N_V}{N_A}\right)$ . (6M)
  - In a N-type semiconductor, the Fermi-level lies 0.3ev below the conduction band at 300<sup>0</sup>K. If the temperature is increased to 330<sup>0</sup>K, find the new position of Fermi-level. (6M)

(OR)
- What are the Electrical properties of semiconductor materials? (6M)
  - Explain the diode current equation? (6M)

**UNIT - II**

- What is meant by the potential barrier across a P-N junction? What is its significance? (6M)
  - Describe a Zener diode. Distinguish between Zener breakdown and avalanche breakdown? (6M)

(OR)
- Describe the principle of working of LED. What are the merits of LEDs? (6M)
  - Explain the V-I characteristics and its temperature dependence of a P-N diodes? (6M)

**UNIT - III**

- Explain the input and output characteristics of CC configuration? (6M)
  - A germanium transistor with  $\alpha=0.98$  given a reverse saturation current  $I_{CBO}=10\mu A$  in common base configuration. When transistor is used in CE configuration with a base current of  $0.22\mu A$ , calculate the collector current? (6M)

(OR)
- Derive the stability factor formulae for self-bias. (6M)
  - Write short notes on i) Thermal Runaway ii) Thermal stability. (6M)

**UNIT - IV**

- Explain the working of MOSFET in depletion mode? (6M)
  - Explain the construction and working of triac. Sketch its V-I characteristics. (6M)

(OR)
- Derive the relation between  $\mu$ ,  $g_m$ ,  $r_d$  in JFET and define each parameter? (6M)
  - Explain the construction and working of UJT. Define the term "Intrinsic Stand-Off Ratio"? (6M)

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**II/IV B.Tech (Regular) DEGREE EXAMINATION  
OCT / NOV, 2012**

**(First Semester)**

**Common to ECE / EIE  
(Network Analysis and Synthesis)**

**Time:** Three Hours

*Answer Question No.1 compulsorily.*

*Answer ONE question from each unit.*

**Maximum : 60 Marks**

**(1X12 = 12 Marks)**

**(4X12=48)**

**1. Answer all questions**

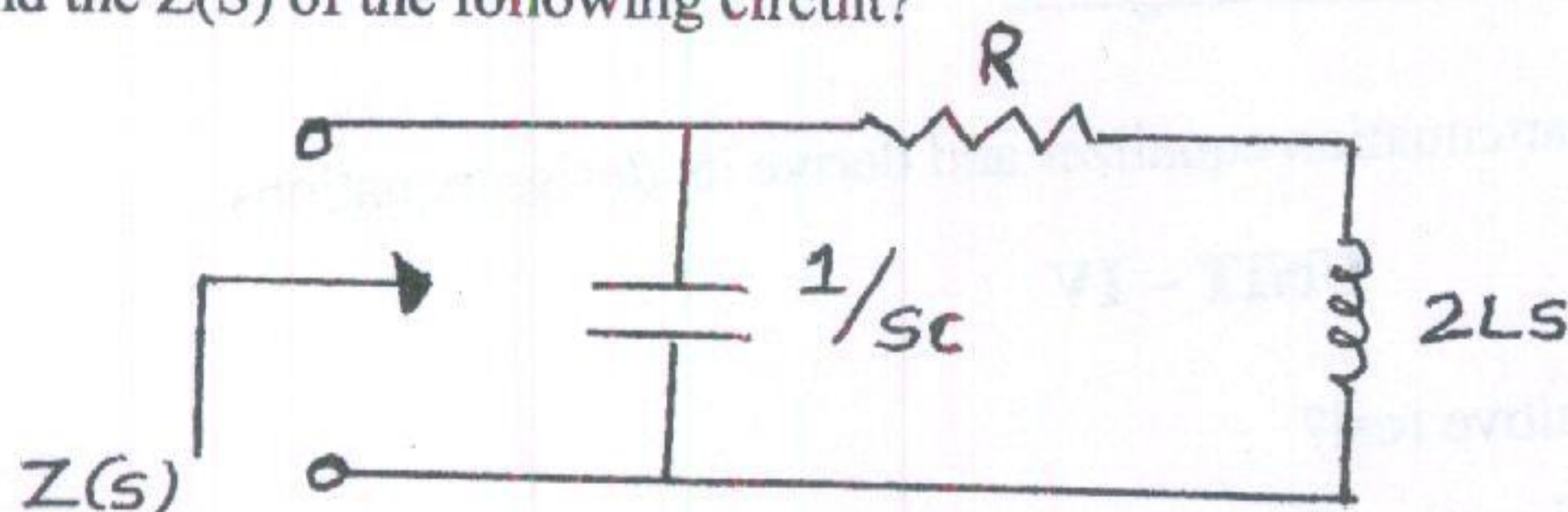
**(12X1=12 Marks)**

- State restriction on pole-zero locations for driving point function?
- What are the inverse hybrid parameters of a network?
- What are the poles and zeros of a network function?
- Define y-parameters of a network
- Draw the configuration of a m-derived  $\pi$ -section
- What is constant k-Low pass filter?
- Define band pass filter with its frequency response
- What is T-type attenuator?
- Draw the configuration of L-type attenuator
- What is full series equalizer?
- What is positive real function?
- Plot the pole-zero diagram of a network function  $H(S) = \frac{8(S-2)}{S(S^2+2S+2)}$ .

**UNIT - I**

**2. a) Find the Z(S) of the following circuit?**

**(6M)**



**b) Find the time domain response by locating the poles and zeros in the S-plane of the voltage transform function**

given by  $V(S) = \frac{6(S+2)}{(S+6)(S+3)}$

**(6M)**

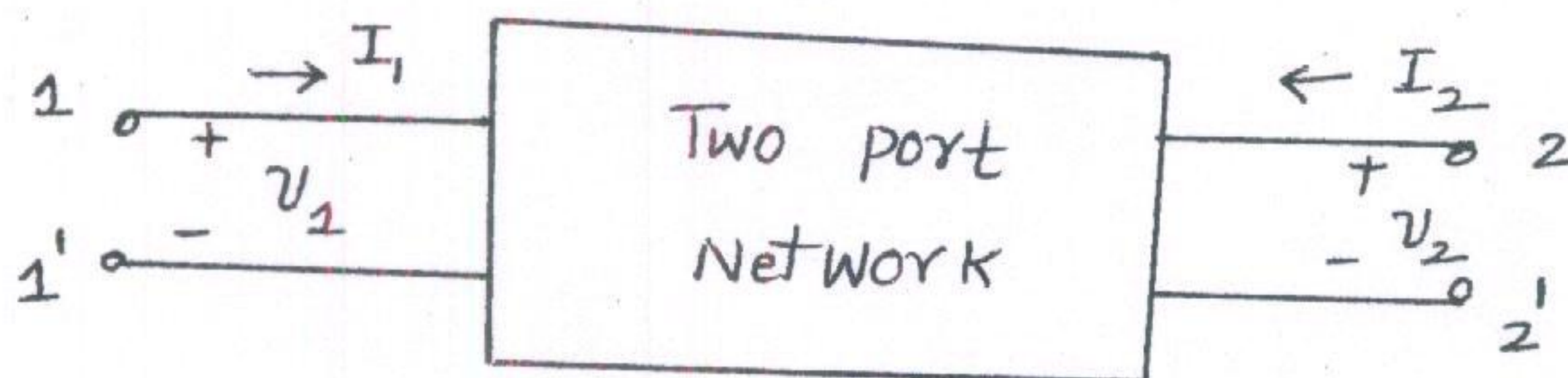
**(OR)**

**3. a) Express h-parameters of a 2-port network in terms of its z-parameters?**

**(5M)**

**b) Below two port network is represented by the equations  $V_1 + 3I_2 = 6I_1$  and  $4V_2 + 2V_1 = 3I_2$ . Using above information calculate the values of i)  $Y_{11}$  ii)  $Z_{12}$  iii)  $h_{21}$ .**

**(7M)**



## UNIT – II

4. a) Design a m-derived low pass filter having cut-off frequency of 10KHz, design impedance of  $800\Omega$ , and the resonant frequency 11kHz. (6M)
- b) Design K-type band pass filter having design frequency of  $1K\Omega$  and cut-off frequencies 2KHz and 10KHz. (6M)

(OR)

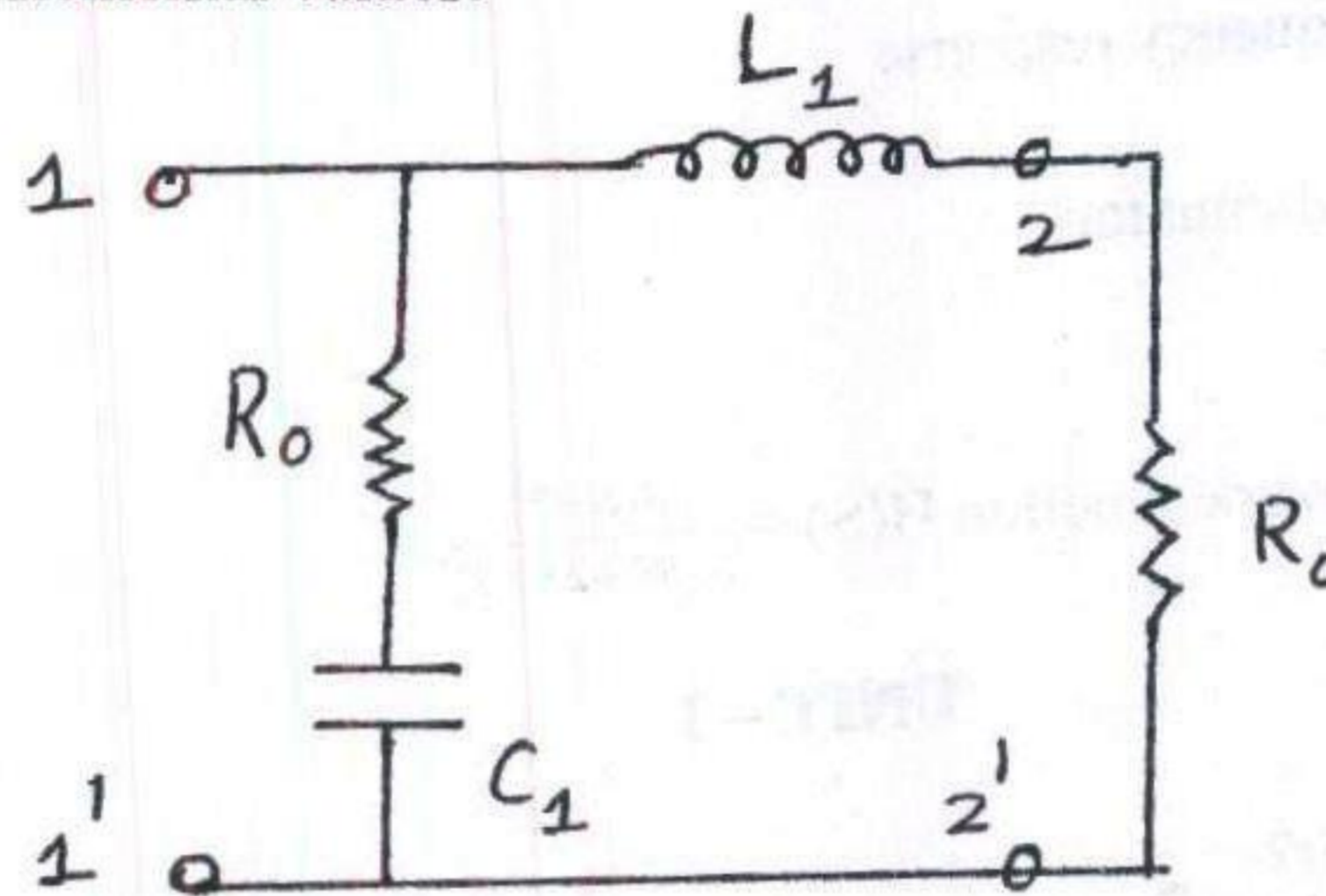
5. a) Define filter and classify them with respect to its frequency response. (Both ideal and practical responses) (4M)
- b) Derive the equations for characteristic impedance and propagation constant of a symmetrical T-network. (8M)

## UNIT – III

6. a) Design i) A symmetrical lattice attenuator ii) Lattice Equalizer. (6M)
- b) i) Design a  $\pi$ -type attenuator to give 20dB attenuation and to have a characteristic impedance of  $1K\Omega$ .  
ii) Design a symmetrical lattice attenuator to have characteristic impedance of  $600\Omega$  and attenuation of 20dB. (6M)

(OR)

7. a) Design a full shunt equalizer shown in figure for a design resistance  $R_0 = 800\Omega$  and attenuation of 10dB at 600Hz. Calculate Elemental values. (7M)



- b) Explain with configuration, Bridge-T attenuation equalizer and derive its design equations. (5M)

## UNIT – IV

8. a) Is the function  $Y(S) = \frac{6S^3 + 4S^2 + 2S + 1}{S^2 + 2}$  positive real? (6M)
- b) State the properties of RC and RL functions? (6M)

(OR)

9. a) For the following network impedance function synthesize it into 1<sup>st</sup> foster form and II<sup>nd</sup> cauer form of RL networks.

$$Z(S) = \frac{S^2 + 6S + 3}{S^2 + 3S} \quad (6M)$$

- b) Synthesize the following network functions in Foster II<sup>nd</sup> form. (6M)

i)  $Z(S) = \frac{(S+3)(S+4)}{(S+1)(S+7)(S+8)}$       ii)  $Y(S) = \frac{(S^2+2)(S^2+6)}{(S+1)(S+4)}$

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**II/IV B.Tech (Regular) DEGREE EXAMINATION  
OCT / NOV, 2012**

**(First Semester)**

**Common to ECE, EEE, EIE  
(Digital Electronics)**

**Time:** Three Hours

*Answer Question No.1 compulsorily.*

*Answer ONE question from each unit.*

**Maximum : 60 Marks**

(1X12 = 12 Marks)

(4X12=48)

**1. Answer all questions**

(12X1=12 Marks)

- Determine the base of the numbers for the operation  $24 + 17 = 40$  to be correct?
- Find the 2's complement of 000000?
- What do you mean by self complementing codes?
- State DeMorgan's theorem
- What are prime implicants?
- What is the difference between a combinational circuit and a sequential circuit?
- What is data selector?
- What is an excitation table?
- Write the characteristic equation of D flip-flop?
- Give two applications of open collector logic
- Mod-N Johnson counter requires how many flip-flops?
- Differentiate PLA and PAL?

**UNIT – I**

- State and explain Duality principle with an example? (6M)
  - Perform the subtraction of decimal 9137-2345 using 9's complement method? Express the result in 8421, 2421 and excess-3 codes? (6M)

**(OR)**

- Determine the base of the numbers if the following arithmetic operations are correct? (6M)
    - $11 + 23 + 47 = 103$
    - $\sqrt{41} = 5$
    - $\frac{41}{3} = 3.$
  - Draw the truth tables and logic diagrams for the following Boolean functions? (6M)
    - $F = (A + B)(A^1 + B^1)$
    - $F = x^1yz + xz + xy$

**UNIT – II**

- Obtain the minimal SOP expression for the following Boolean function using K-map and draw the logic diagram using NAND gates?
 
$$F(A, B, C, D) = \sum m(0, 1, 4, 6, 8, 9, 10, 12) + \sum d(3, 7, 13, 14, 15)$$
 (8M)
  - Design a Full subtractor circuit and implement it using decoders? (4M)

(OR)

5. a) Simplify the following Boolean function using K-map?

$$F(A, B, C, D) = \sum m(0, 1, 2, 5, 8, 9, 10)$$

(8M)

- b) Implement the following function using a multiplexer?

$$F(x, y, z) = \sum m(0, 2, 6, 7)$$

(4M)

### UNIT – III

6. a) Design a Mod-6 counter using J-K flip-flop?

(6M)

- b) A clocked sequential circuit is provided with a single input X and single output Z. Whenever the input produce a string of pulses 111 or 000 and at the end of the sequence it produce an output Z=1 and overlapping is also allowed.

(6M)

- i) Obtain state diagram and state table.

- ii) Design the circuit using D flip-flops?

(OR)

7. a) Convert the following. i) JK flip-flop to T flip-flop. ii) RS flip-flop to D flip-flop

(6M)

- b) Design and explain the function of 4-bit bidirectional shift register?

(6M)

### UNIT – IV

8. a) Draw and explain the operation of open collector TTL NAND gate?

(6M)

- b) Draw the ECL gate and explain its working?

(6M)

(OR)

9. Write short notes on any three of the following digital logic families?

(4x3=12M)

- a) DTL    b) TTL    c) ECL    d) MOS    e) CMOS