

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad**II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, EXAMINATIONS,****DECEMBER-2018**Subject: Switching Theory and Logic Design

Branch: ECE

Time: 3 hours

Max. Marks: 75

PART – A**I. Answer ALL questions of the following****5x1Mark=5 Marks**

1. Illustrate about unit —distance code
2. Name the two basic types of Boolean expressions.
3. What is meant by clocked flip-flop?
4. How many flip-flops are required for Mod-32 counter?
5. Demonstrate about a successor?

II. Answer ALL questions of the following**10x2Mark=20 Marks**

1. Using Hamming code find the error in transmitted data 0111001.
2. State De-Morgan law
3. Locate the minterms in a three variable map for $f = \sum m(0,1,5,7)$
4. What is comparator? Write the output expressions of 2 bit comparator
5. Why a gated D latch is called a transparent latch?
6. Differentiate Latch and Flip-Flop.
7. Classify of counters?
8. Explain briefly how the state diagrams are useful in the design of the logic circuits.
9. What are Shift registers?
10. Give the salient features of ASM chart

PART-B**Answer ALL questions of the following****5x10 Marks= 50Marks**

1. a) State and prove the following Boolean laws.
(i) Commutative law (ii) Associative law (iii) Distributive law
b) Simplify the Boolean expression $(x'y' + z)' + z + xy + wz$ to three literals.

OR

2. a) Convert $(11011.11)_2$ to decimal 3M
b) Explain error detecting and correcting codes with an example. 4M
c) Perform subtraction of 101101-100001 using 2's complement. 3M

3. a) Simplify the following Boolean expression using K-map and implement using NOR gates, $f(A,B,C,D)=AB'C'+AC+A'CD'$
b) List the Boolean function simplification rules using tabulation method.

OR

4. a) Reduce the following function using K-map technique
 $F(A,B,C,D) = \pi M(0,2,3,8,9,12,13,15)$.
b) The input to a combinational logic circuit is a valid single digit BCD data. Design circuit using minimum hardware to detect number greater than 5 appears at the input.
5. Convert the following a) T Flip Flop to D Flip-Flop b) D Flip-Flop to T Flip-Flop.

OR

6. a) Write short notes on the Binary cell.
b) Briefly explain the fundamentals of sequential Machine operation.
7. Design a BCD counter with JK flip flop.

OR

8. Design a Modulo-9 counter T flip flops with preset and clear inputs.
9. Draw the state diagram for full adder and convert it to ASM chart and realize the above using JK flip flops and gates.

OR

10. By taking a suitable example, explain the concept of incompletely specified machines.

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II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, NOVEMBER-2018Subject: Principles of Electrical Engineering

Branch: ECE

Time: 3 hours

Max. Marks: 75

PART – A**I. Answer ALL questions of the following****5x1Mark=5 Marks**

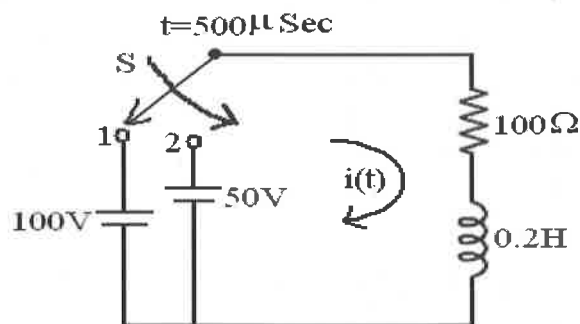
1. Define the time constant of R-C series circuit?
2. What is the Reciprocal network?
3. What are the conditions for Ideal filter?
4. What is the function of yoke in a d.c machine?
5. Where do you use Stepper motor?

II. Answer ALL questions of the following**10x2Mark=20 Marks**

1. Derive the expression for the current in series RL circuit?
2. Why the initial conditions are needed in transient analysis?
3. What is the Characteristic Impedance for symmetrical T-filter network?
4. Write the importance of ABCD parameters?
5. Find the value of m , if m -derived LPF having $f_c=1$ KHz and $f_R=1.2$ KHz.
6. What are different types of filters?
7. What are various types of Generators?
8. Give various types of voltage control methods?
9. What is a stepper motor?
10. Draw the equivalent circuit of a transformer under no load condition?

PART-B**Answer ALL questions of the following****5x10 Marks= 50Marks**

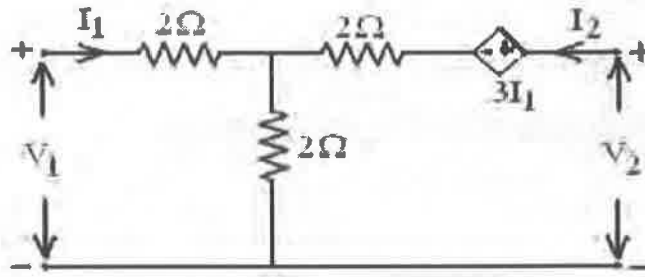
1. In the circuit shown in below, the switch is closed on the position 1 at $t = 0$ there by applying a D.C. voltage of 100V to series R-L circuit. At $t = 500\mu\text{sec}$, the switch is moved to position 2. Obtain the expression for Current $i(t)$ in the both intervals and sketch $i(t)$?

**(OR)**

2. Derive the Expressions for current in RL series and RC series circuits and wave forms with respect to time?

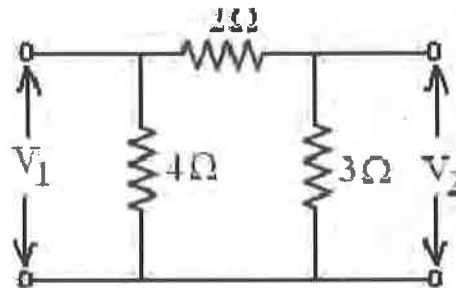
Sketch the current

3. Determine the Z and Y- parameters of the network given?



(OR)

4. Find the ABCD parameters for network shown below?



5. Explain the procedure of a Constant K- low pass filter for T-section and π -section?

(OR)

6. Design a constant K high pass filter for a given $F_c = 1$ KHz and Nominal Impedance $K = 500$ ohm?

7. Draw the characteristics of a dc shunt, series and compound motors?

(OR)

8. A 4 pole dc generator has lap connected armature winding. The flux per pole is 20 mWb and the number of conductors is 500. Calculate the Generated EMF when the Machine is running at a speed of 1500 rpm. And also calculate the speed when the same machine is wave connected with same EMF developed as in case of lap wound?

9. A 50Hz, 1 ϕ , 100 KVA transformers has full load copper loss of 1200W and its iron Loss is 960W. Calculate the efficiency at full load, unity power factor?

(OR)

10. Explain in detail the principle of operation of Shaded pole motor?

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Subject: PROBABILITY THEORY AND STOCHASTIC PROCESSES

Max. Marks: 75

5x1Mark=5 Marks

- 10x2Mark=20 Marks**

- 5x10 Marks= 50Marks**

b) In a single throw of two dice, what is the probability of obtaining a sum of atleast 9?

Q3. Show that the moment generating function of the random variable X having a normal distribution with mean μ and variance σ^2 is given by

$$M_X(t) = e^{t\mu + \frac{\sigma^2 t^2}{2}}$$

(OR)

Q4. a) Consider that a fair coin is tossed 3 times, let X be a random variable, defined as X = number of fails appeared, find the expected value of X .

b) Find the mean of poisson random variable.

Q5. The joint pdf is given as $f_{x,y}(x, y) = e^{-(2x+y)}$ for $x \geq 0$ and $y \geq 0$. Find

(a) the value of A and

(b) the marginal density functions.

(OR)

Q6. a) Define and explain conditional probability mass function. Give its properties.

b) Find the density function whose characteristic function is $\exp(-|t|)$.

Q7. a) Show that the autocorrelation function of a stationary random process is an even function of τ .

b) Give the classification of random processes.

(OR)

Q8. a) State the conditions for wide sense stationary random process.

b) Write short notes on ergodic random processes.

Q9. A stationary random process $X(t)$ has autocorrelation $R_{XX}(\tau) = 10 + 5\cos(2\tau) + 10e^{-2|\tau|}$. Find the dc and ac powers of $X(t)$.

(OR)

Q10. A random noise $X(t)$ having power spectrum $S_{XX}(\omega) = 3/(49 + \omega^2)$ is applied to a network for which $h_2(t) = u(t) t^2 \exp(-7t)$. The network response is denoted by $Y(t)$.

a) what is the average power of $X(t)$.

b) Find the power spectrum of $Y(t)$.

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Branch: ECE

Time: 3 hours

Max. Marks: 75

PART – A**I. Answer ALL questions of the following**

5x1Mark=5 Marks

1. Define Signal?
2. Define Fourier transform pair?
3. State Convolution property?
4. Define convolution integral of continuous time system?
5. What is ROC in Z transforms?

II. Answer ALL questions of the following

10x2Mark=20 Marks

1. State parseval's theorem for continuous time periodic signals?
2. Write down the trigonometric form of the Fourier series representation of a periodic signal?
3. What is duality Property?
4. State convolution property in relation to Fourier transforms?
5. What is poly wiener criterion?
6. What is Causality?
7. Define Energy Spectral Density?
8. Write any two properties of cross correlation function?
9. State the time shifting property for Laplace transforms?
10. What is the relationship between Z transform and Fourier Transform?

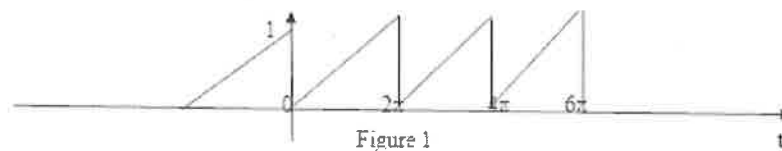
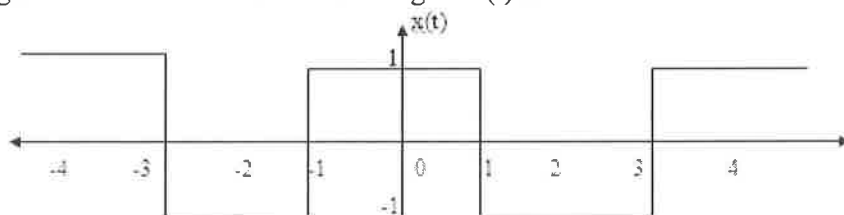
PART-B**Answer ALL questions of the following**

5x10 Marks= 50Marks

Q1. a) Find Cosine Fourier series for the periodic signal $x(t)$

$$x(t) = 0 \quad \text{for } -\pi \leq t \leq 0$$

$$1 \quad \text{for } 0 \leq t \leq \pi$$

b). Find cosine Fourier series for the signal shown in the fig.1**(OR)****Q2. a)** Find the trigonometric Fourier series of the signal $x(t)$ shown below

- 3.a) Find the Fourier Transform of a Signal $x(t) = e^{-|t|}$.
 b) State and Prove sampling theorem for low pass signals?

(OR)

- 4 a) Find the Fourier Transform of Rectangular Pulse?
 b) State and prove the Time shifting property of Fourier transform?

- 5 a) Derive the condition for Distortionless transmission through a system?
 b) Derive the relation between rise time and band width?

(OR)

6. a) What is the time domain criterion & frequency domain criterion for physical realizability?
 b) Explain the characteristics of Ideal filter?

- 7a) Find the convolution of the following signals by graphical method:

$$x(t) = e^{-3t} u(t); h(t) = u(t+3)$$

- b) Using Graphical Method, Find the convolution of $x(t)$ and $h(t)$.
 $x(t) = 1 \quad -3 \leq t \leq 3$
 $= 0 \quad \text{otherwise}$
 $h(t) = 2 \quad 0 \leq t \leq 3$
 $= 0 \quad \text{otherwise}$

(OR)

8. a) Find the convolution graphically between $x_1(t) = \text{rect}(t/10)$ and $x_2(t) = \text{rect}(t/20)$?
 b) State and prove the properties of auto correlation of Power Signals ?

- 9 a) Determine the Z-Transform of $x(n) = 2^n u(n) - 3^n u(-n-1)$ and find its ROC?
 b) State & prove any five properties of Z-transform?

(OR)

- 10 a) What are the differences between Laplace Transform & Z-Transform?
 b) Prove that the sequences $x(n) = a^n u(n)$ and $-a^n u(-n-1)$ have the same $X(z)$ and differ only in ROC?

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Branch: Common to EEE & ECE

Time: 3 hours

Max. Marks: 75

PART – A**I. Answer ALL questions of the following****5x1Mark=5 Marks**

1. Define ordinary point.
2. Write the Legendre's differential equation
3. Find K such that $u(x,y) = x^3 + 3kxy^2$ may be harmonic
4. Obtain the Taylor series expansion of $f(z) = \frac{1}{z}$ about the point $z=1$
5. Define Translation and Rotation.

II. Answer ALL questions of the following**10x2Mark=20 Marks**

1. Write the working procedure to solve the Cauchy Euler differential equations.
2. Determine whether $x=0$ is a regular singular point or irregular singular point of the differential equation $x^2y^{11} + y^1 + x^2y = 0$.
3. Define Legendre's polynomial $P_n(x)$
4. Show that $P_n(1) = 1$
5. Determine P such that the function $f(z) = \frac{1}{2} \log(x^2 + y^2) + i \tan^{-1}\left(\frac{px}{y}\right)$ be an analytic function.
6. Prove that the function $f(z) = \bar{z}$ is not analytic at any point
7. Find the poles for $f(z) = \frac{z^2}{(z-1)(z+2)^2}$
8. What type of singularity have the function $F(z) = z e^{\frac{1}{z^2}}$
9. Under the transformation $W = \frac{1}{z}$ find the image of the circle $|z - 2i| = 2$
10. What is the region of the w-plane into which the rectangular region in the Z-plane bounded by the lines $x = 0, y = 0, x = 1, y = 2$ is mapped under the transformation $w = z + (2-i)$?

PART-B**Answer ALL questions of the following****5x10 Marks= 50Marks**

1. Solve in series $(1 - x^2) \frac{d^2y}{dx^2} - x \frac{dy}{dx} + 4y = 0$

OR

2. Solve $(2x-1)^2 \frac{d^2y}{dx^2} + (2x-1) \frac{dy}{dx} - 2y = 8x^2 - 2x + 3$

3. Express $2 - 3x + 4x^2$ in terms of Legendre's polynomial

OR

4. a) Prove that $\frac{d}{dx} [xJ_n(x)J_{n+1}(x)] = x[J_n^2(x) - J_{n+1}^2(x)]$ [4M]

b) Derive Rodrigue's formula. [6M]

5. If $V = x^2 - y^2 + \frac{x}{x^2+y^2}$ is imaginary part of an analytic function, find the analytic function and its real part.

OR

6. State and prove Cauchy's integral formula

7. By integrating around a unit circle, Evaluate $\int_0^{2\pi} \frac{\cos 3\theta}{5-4\cos\theta} d\theta$

OR

8. a) Expand $f(z) = \frac{1+2z}{z^2+z^3}$ in a series of positive and negative powers of Z

b) Evaluate $\int_c \frac{ze^z}{z(z-3)} dz$ where c is $|z|=2$ by residue theorem

9. Find the image of the hyperbola $x^2 - y^2 = 1$ under the transformation $w = \frac{1}{z}$

OR

10. Find the bilinear transformation which maps the points $z = \infty, i, 0$ onto the points $W = 0, i, \infty$.

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DECEMBER-2018**Subject: **ELECTRICAL CIRCUITS**Branch: **Common to EEE & ECE**

Time: 3 hours

Max. Marks: 75

PART – A**I. Answer ALL questions of the following**

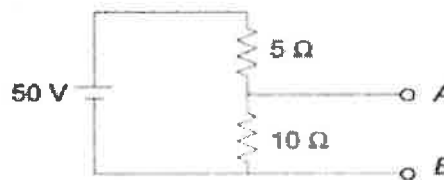
5x1Mark=5 Marks

1. Illustrate the Voltage-Current relationship for resistor, inductor and capacitor?
2. Define Active power and Reactive power?
3. Define self and mutual inductance of the coil?
4. Define Tie-set and cut-set?
5. Illustrate the statement of Norton's theorem (AC)?

II. Answer ALL questions of the following

10x2Mark=20 Marks

1. What is the voltage across 10Ω resistor for the circuit shown in the figure?



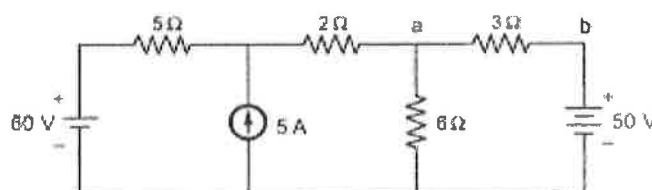
2. Define R,L,C parameters and give the expressions for current and voltages?
3. What is J operator. Explain the significance of J operator?
4. Define Q-factor and Band width?
5. What is meant by dot convention?
6. Two identical coupled coils have an equivalent inductance of 60mH when connected in series aiding and 30mH in series opposing. Find L_1 , L_2 , M and K?
7. Define graph, node and degree of a node?
8. Write the properties of dual networks?
9. Illustrate the statement of Thevenin's theorem (DC)?
10. Illustrate the statement of Maximum Power Transfer theorem (DC) and What its Maximum Power condition?

PART-B

Answer ALL questions of the following

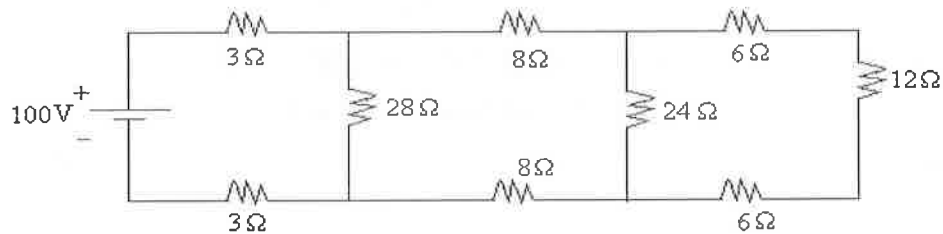
5x10 Marks= 50Marks

1. Find the current through branch a-b by using mesh analysis for the circuit shown in the figure?

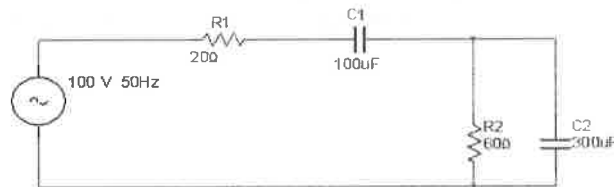


(OR)

2. Find the current delivered by the source for the network shown in the figure by using network reductions technique?

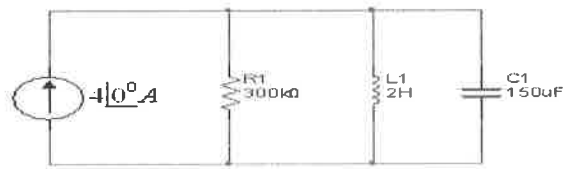


3. For the circuit shown in the figure. Calculate i) Impedance ii) Total current iii) Phase angle



(OR)

4. For the network shown in the figure. Find i) Resonance frequency ii) Current in all branches. iii) Quality factor.



5. Derive an expression for parallel opposing of coupled coils?

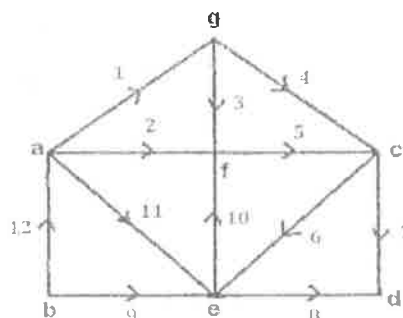
(OR)

6. An iron ring of 20cm in diameter and 15cm^2 in area of cross section is wound with coil of 400 turns. Determine the current in the coil to establish a flux density of 1.5wb/m^2 . If the relative permeability of iron is 800. In case if an air gap of 2.5mm is cut in the ring, what is the current in the coil to establish the same flux density. Neglect leakage flux.

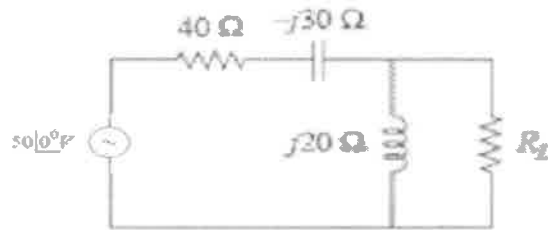
7. Explain the procedure for obtaining fundamental cut-set matrix of given network.

(OR)

8. a) Explain about loop method of analysis of networks with dependent and independent sources?
b) For the following graph draw all the possible trees and all possible loops. a,b,c,d,e,f,g are the nodes of the graph?



9. Find the value of R_L by using maximum power transfer theorem? And also find the value of maximum power?



(OR)

- 10 Find the current through load resistor R_L by using Millman's theorem for the circuit shown below?

