MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

R15 MODEL QUESTION BANK

B.Tech II year – I Semester
Department of Electronics and Communication Engineering

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
II B.TECH – I SEM EXAMINATIONS, MODEL PAPERS

CONTENTS

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester supplementary Examinations, May 2017

Probability Theory and Stochastic Process

(ECE)

Roll No									

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART - A (25 Marks)

1. (a) What is sample space? Explain the Discrete sample space and Continuous sample space each with a suitable example. [3M]

(b) What is the probability of getting 53 Sundays in a leap year? [2M]

(c) Explain Gaussian random Variable. [3M]

(d) Define the moment generating function(MGF). [3M]

(e) What is Central Limit theorem? [2M]

(f) What is correlation co efficient and write its significance. [3M]

(g) What is meant by Correlation ergodic process? [3M]

(h) What is strict sense stationary process? [2M]

(i) Write the properties of power density spectrum. [2M]

(j) .Find the mean value of Random variable Y= -3X+22 where the mean of X is 3. [3M]

PART - B (50 Marks)

SECTION - I

2.a)Define   i)ConditionalProbability(ii)Independentevents(iii)MutuallyExclusiveEvents (iv)Joint Probability

b)When two dice are thrown find the probability of getting

(i){sum>7}(ii){2<sum<=5}iii){sum>10}

OR

3. a) A batch of 50 items contains 10 defective items. Suppose 10 items are selected at random and tested. What is the probability that exactly 5 of the items tested are defective?

b) State and prove Baye's theorem.

SECTION – II

4. a) Define probability density function and write its properties

b) If random variable X is transformed to the new random variable $Y = CX^2$, find the density function of Y.

OR

5. a) What is Probability distribution function? Explain its properties.

b) A random variable has probability density function
$$f_x(x) = c\, x(1-x) \qquad 0 \le x \le 1$$
$$0 \qquad\qquad\qquad \text{else where}$$
Find i) c ii. $p(1/2 \le X \le 3/4)$ iii) $F_x(x)$

SECTION – III

6. a) Explain about joint moments & how they are generated.
   b) Mean values of random variables X ,Y are 0.5, 2. Mean square values are 1.5, 5.5 and covariance of X and Y is -0.25. Find cross correlation and correlation coefficient.

OR

7. a) Find the conditional density functions for the joint distribution
   $$Fx,y(x,y)=4xy\exp(x^2+y^2)u(x)u(y)$$
   b) Let X and Y be the random variables defined as X=cos θ and Y=sin θ, where Φ is a uniform random variable over $(0,2\pi)$. Are X and Y uncorrelated? Are X and Y independent?

SECTION – IV

8. a) Write and prove properties of cross correlation function

   b) Find the mean and Auto correlation function of the Random process X(t) = Acos(wt+ θ) where A and w are constants, θ is random variable uniformly distributed on the interval $(0,2\Pi)$

OR

9. a) a) State and prove Wiener Khinchin theorem.
   b) X (t) is a WSS process and Y (t) = A cos $(\omega_c t + \theta)$ is a random process which is independent of X(t). Here, θ is a uniform random variable over $(-\pi, \pi)$. If the auto-correlation function of X (t) is $R_{XX}(\tau)$, Find the auto correlation of Z(t)=X(t)Y(t).

SECTION – V

10.a) Derive the relationship between cross correlation function and cross power density spectrum.   b) Find the power spectral density (P.S.D) of X(t)=cos(wt+θ) where θ is a uniform random variable over $(0,\pi/2)$ and also find the average power.

OR

11. a) Find the relation between input and output power spectral density in a LTI System.

b) Check whether the following functions are valid power spectral density (PSD)

i) $\dfrac{cos8\omega^4}{2+\omega^4}$ ii) $e^{-(\omega-1)^2}$

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R15

(Autonomous Institution – UGC, Govt. of India)

B.Tech. III Semester Regular Examinations, NOV 2016

PROBABILITY THEORY AND STOCHASTIC PROCESS

(ECE)

Roll No	1	5	N	3						

Time: 3 hours   Max. Marks: 75

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART - A   (25 Marks)

1. (a) When do you say that two events are independent?   [2M]

   (b) A card is drawn from a pack of 52 cards. Find the probability of getting a king or a heart or a red card.   [3M]

   (c) Discuss the conditions for a function to be a random variable.   [2M]

   (d) A discrete random variable X has possible values which occur with probabilities 0.4, 0.25, 0.15, 0.1 and 0.1 respectively. Find the mean value X.   [3M]

   (e) Explain the physical significance of variance of a random variable.   [2M]

   (f) Define joint central moments for the random variables X and Y.   [2M]

   (g) What is meant by Mean Ergodic process?   [3M]

   (h) Explain the classification of random processes   [3M]

   (i) Is power density spectrum an even function of 'ω' or odd function of 'ω'? Justify.   [2M]

   (j) Find the mean value of exponential random variable.   [3M]

PART - B   (50 Marks)

SECTION - I

2.a) Four cards are drawn from a well shuffled pack of playing cards. Find the probability that i) All are clubs ii) Two are spades & two are hearts iii) Four cards are from different suits.

   b) Show that Conditional probability satisfies the three axioms of probability

OR

3. a) Telephone calls are initiated through an exchange at the average rate of 75 per minute and are described by a Poisson process. Find the probability that more than 3 calls are initiated in any 5-second period.

   b) Explain the terms Joint probability and Conditional probability.

SECTION – II

4. a) Determine E[X] and VAR[X] of Poisson random variable X.

b) List the properties of conditional density function & conditional distribution function.

OR

5. a) A random variable has probability density function

$f_X(x) = cx(1-x) \quad 0 \leq x \leq 1$

$\qquad 0 \qquad$ else where

Find a) c   b) $P(1/2 \leq X \leq 3/4)$ c) $Fx(x)$

b) Determine the cumulative distribution function and probability density function of Y

given that $Y = 2X+3$ and that $f_X(x) = 2e^{-X} u(x)$.

SECTION – III

6. a Define joint central moments for two random variables X and Y and explain the covariance of two random variables.

b) The joint probability density function of two random variables X and Y is given by

$f(x,y) = c(2x+y) ; 0 \leq x \leq 1, 0 \leq y \leq 2 \quad 0;$ else where

Find: i) The value of 'c'. ii) Marginal distribution function of x and y.

OR

7. a) Derive the expressions for the distribution and density functions of sum of two statistically independent random variables.

b) The density function of two random variables X and Y is

$fxy(x, y) = u(x) u(y) 4e^{-2(x+y)}$.Find the mean value of the function $e^{-(x+y)}$.

SECTION – IV

8. a) Write and prove the properties of Auto correlation function

b) Find the mean and Auto correlation function of the Random process $X(t) = Acos(wt+ \theta)$ where A and w are constants, θ is random variable uniformly distributed on the interval $(0,2\Pi)$.

OR

9. a) X (t) is a WSS process and $Y(t) = A \cos(\omega ct + \theta)$ is a random process which is independent of X(t). Here, θ is a uniform random variable over $(- \pi, \pi)$. If the auto-correlation function of X (t) is $R_{XX}(\tau)$, Find the auto correlation of $Z(t)=X(t)Y(t)$.

b) For a stationary Ergodic process X(t) with the periodic components the Auto correlation is $R_{XX}(\tau)= 36+4/(1+5\tau^2)$. Find $E[X(t)]$, $E[X^2(t)]$ and Power in the process X(t).

SECTION – V

10. a)Derive an expression for Auto correlation function of response of a linear system with random input.

b) Write about power density spectrum of Response of Linear system

OR

11. a Find the power density spectrum of a random process whose autocorrelation Function is

$R_{XX}(\tau) = A \cos(\omega\tau)$.

b) State and prove properties of power spectral density of random process.

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
B.Tech II year – I Semester Examinations, Model Paper-1
PROBABILITY THEORY AND STOCHASTIC PROCESSES

Time: 3 hours   **Max. Marks: 75**

PART- A (25 Marks)

1. a) Define probability using the axiomatic approach.   (2 marks)

     b) Show that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.   (3 marks)

     c) Define Probability density and distribution function.   (2 marks)

     d) Define various types of transformation of Random variables.   (3 marks)

     e) Define point conditioning & interval conditioning distribution function.   (2 marks)

     f) Show that $var(X+Y) = var(x) + var(Y)$, if X&Y are independent random variables.   (3 marks)

     g) Define wide sense stationary random processes.   (2 marks)

     h) Prove that the ACF has maximum value at the origin i.e $\left| R_{XX}(\tau) \right| = R_{XX}(0)$ (3 marks)

     i) Define spectrum Band width and RMS bandwidth.   (2 marks)

     j) If the Auto correlation function of wide sense stationary X(t) is $R_{XX}(\tau) = 4 + 2e^{-2|\tau|}$.

     Find the area enclosed by the power spectrum density curve of X(t).   (3 marks)

Part-B (5*10=50 Marks)

2. a) State and Prove Bayes' theorem.
    b) Explain the the Mathematical model of experiment.

<div align="center">OR</div>

3. a) An experiment consists of observing the sum of the outcomes when two fair dice are thrown. Find the probability that the sum is 7 and find the probability that the sum is greater than 10.
    b) In a factory there are 4 machines produce 10%,20%,30%,40% of an items respectively. The defective items produced by each machine are 5%,4%,3% and 2% respectively. Now an item is selected which is to be defective, what is the probability it being from the 2nd machine. And also write the statement of total probability theorem?

4. a) The exponential density function given by
        $fx(x) = (1/b)e^{-(x-a)/b}$ $x > a$
                $= 0$ $x < a$ Find the mean and variance.
    b) Define Moment Generating Function and write any two properties.

<div align="center">OR</div>

5. Derive the Binomial density function and find mean & variance.

6. a) State and prove the density function of sum of two random variables.
   b) The joint density function of two random variables X and Y is

   $$f_{XY}(x,y) = \begin{cases} \dfrac{(x+y)^2}{40} & ; -1 < x < 1 \ and -3 < y < 3 \\ 0; & otherwise \end{cases}$$

   Find the variances of X and Y.

OR

7. a) Let Z=X+Y-C, where X and Y are independent random variables with variance σ^2_X, σ^2_Y and C is constant. Find the variance of Z in terms of σ^2_X, σ^2_Y and C.
   b) State and prove any three properties of joint characteristic function.

8. a) Define Wide Sense Stationary Process and write it's conditions.
   b) A random process is given as X(t) = At, where A is a uniformly distributed random variable on (0,2). Find whether X(t) is wide sense stationary or not.

OR

9. X(t) is a stationary random process with a mean of 3 and an auto correlation function of 6+5 exp (-0.2 $|\tau|$). Find the second central Moment of the random variable Y=Z-W, where 'Z' and 'W' are the samples of the random process at t=4 sec and t=8 sec respectively.

10. a) Check the following power spectral density functions are valid or not
    i) $\dfrac{cos8(\omega)}{2+\omega^4}$ ii) $e^{-(\omega-1)^2}$
    b) Derive the relation between input PSD and output PSD of an LTI system

OR

11. Derive the relationship between cross-power spectral density and cross correlation function.

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
B.Tech II year – I Semester Examinations, Model Paper-2
PROBABILITY THEORY AND STOCHASTIC PROCESSES

Time: 3 hours   **Max. Marks: 75**

PART- A (25 Marks)

1. a. Define subset and state its properties.   (2 marks)

   b. Define sample space and classify the types of sample space.   (3 marks)

   c. Define the expected value of Discrete and Continuous Random Variables.   (2 marks)

   d. Derive the expression for the density function of Discrete Random variable.   (3 marks)

   e. Define the statistical Independence of the Random variables.   (2 marks)

   f. If E[X]=2, E[Y]=3, E[XY]=10, E[X^2]=9, and E[Y^2]=16 then find variance &

   Covariance of X&Y.   (3 marks)

   g. Give the statement of ergodic theorem.   (2 marks)

   h. Differentiate between Random Processes and Random variables with example   (3 marks)

   i. Define Power Spectrum Density.   (2 marks)

   j. Show that $S_{XX}(-\omega) = S_{XX}(\omega)$. i.e., Power spectrum density is even function of ω.   (3 marks)

Part-B (5*10=50 Marks)

2. In a box there are 100 resistors having resistance and tolerance values given in table. Let a resistor be selected from the box and assume that each resistor has the same likelihood of being chosen. Event A: Draw a 47Ω resistor, Event B: Draw a resistor with 5% tolerance, Event C: Draw a 100Ω resistor. Find the individual, joint and conditional probabilities.

Resistance (Ω)	Tolerance		Total
	5%	10%	
22	10	14	24
47	28	16	44
100	24	8	32
Total	62	38	100

OR

3. a)Two boxes are selected randomly. The first box contains 2 white balls and 3 black balls. The second box contains 3 white and 4 black balls. What is the probability of drawing a white ball?

   b) An aircraft is used to fire at a target. It will be successful if 2 or more bombs hit the target. If the aircraft fires 3 bombs and the probability of the bomb hitting the target is 0.4, then what is the probability that the target is hit?

4. Derive the Poisson density function and find its mean & variance.

OR

5. If X is a discrete random variable with a Moment generating function of $M_x(v)$, find the Moment generating function of

   i) Y=aX+b ii)Y=KX   iii) $Y=\frac{X+a}{b}$

6. a) State and explain the properties of joint density function
   b) The joint density function of random variables X and Y is
   $$f_{XY}(x,y) = \begin{cases} 8xy; & 0 \le x < 1, 0 < y < 1 \\ 0, & otherwise \end{cases}$$
   Find f(y/x) and f(x/y)

OR

7. The input to a binary communication system is a RV X, takes on one of two values 0 and 1, with probabilities ¾ and ¼ respectively. Due to the errors caused by the channel noise, the output random variable Y, differs from the Input X occasionally. The behavior of them communication system is modeled by the conditional probabilities $P\left(\frac{Y=1}{X=1}\right) = \frac{3}{4}$ and $P\left(\frac{Y=0}{X=0}\right) = \frac{7}{8}$ Find
   a) The probability for a transmitted message to be received as 0
   b) Probability that the transmitted message is a1. If the received is a 1.

8. Explain the following
   i) Stationary
   ii) Ergodicity
   iii) Distribution & density functions of random processes

OR

9. a) Given the RP X(t) = A cos(w_0t) + B sin (w_0t) where ω_0 is a constant, and A and B are uncorrelated Zero mean random variables having different density functions but the same variance σ^2. Show that X(t) is wide sense stationary.
   b) Define Covariance of the Random processes with any two properties.

10. A stationery random process X(t) has spectral density $S_{XX}(\omega)$=25/ (ω^2+25) and an independent stationary process Y(t) has the spectral density $S_{YY}(\omega)= \omega^2/ (\omega^2$+25). If X(t) and Y(t) are of zero mean, find the:
    a) PSD of Z(t)=X(t) + Y(t)
    b) Cross spectral density of X(t) and Z(t)

OR

11. a) The input to an LTI system with impulse response h(t)= $\delta(t) + t^2 e^{-at}$. U(t) is a WSS process with mean of 3. Find the mean of the output of the system.
    b) Define Power Spectral density with three properties.

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
B.Tech II year – I Semester Examinations, Model Paper-3
PROBABILITY THEORY AND STOCHASTIC PROCESSES

**Time: 3 hours**   **Max. Marks: 75**

PART- A (25 Marks)

1. a. Give the classical definition of Probability with example. (2 marks)
    b. Define Joint and Conditional Probability (3 marks)
    c. Define Moment generating function and Characteristic Function of a RV's (2 marks)
    d. Find the variance of X for uniform density function. (3 marks)
    e. Give the statement of central limit theorem. (2 marks)
    f. The joint probability density function of X&Y is

    $$f_{X,Y}(x,y) = \begin{cases} c(2x+y); & 0 \le x \le 2, 0 \le y \le 3 \\ 0; & \text{else} \end{cases}$$

       Then find the value of constant c. (3 marks)
    g. Define the auto covariance & cross covariance functions of Random processes X(t). (2 marks)
    h. A stationary ergodic random processes has the Auto correlation function with the periodic

    components as $R_{XX}(\tau) = 25 + \dfrac{4}{1+6\tau^2}$ (3 marks)
    i. Give the statement of Wiener-Khinchin relation. (2 marks)
    j. If the Power spectrum density of x(t) is $S_{XX}(\omega)$, find the PSD of $\frac{d}{dt}x(t)$. (3 marks)

PART-B (5*10=50 Marks)

2. Determine probabilities of system error and correct system transmission of symbols for an elementary binary communication system shown in below figure consisting of a transmitter that sends one of two possible symbols (a 1 or a 0) over a channel to a receiver. The channel occasionally causes errors to occur so that a '1' show up at the receiver as a '0? And vice versa. Assume the symbols '1' and '0' are selected for a transmission as 0.6 and 0.4 respectively.
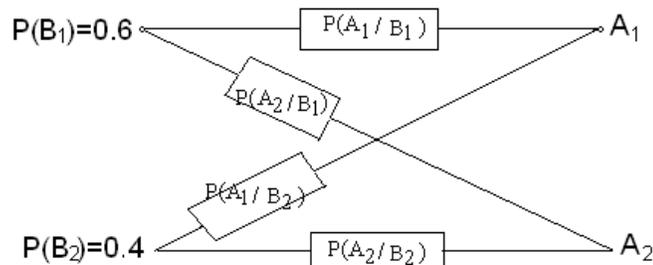
OR

3. In a binary communication system, the errors occur with a probability of "p", In a block of "n" bits transmitted, what is the probability of receiving
   i) at the most 1 bit in error
   ii at least 4 bits in error

4. A random variable X has the distribution function
   $$F_X(x)= \sum_{n=1}^{12} \frac{n^2}{650} u(x-n)$$
   Find the probability of a) $P\{-\infty < X \le 6.5\}$ b)$p\{X>4\}$ c) $p\{6< X \le 9\}$

OR

5. Let X be a Continuous random variable with density function
   $$f(x)= \begin{array}{ll} \frac{x}{9} + K & 0 \le x \le 6 \\ 0 & \text{otherwise} \end{array}$$
   Find the value of K and also find $P\{2 \le X \le 5\}$

6. Let X and Y be the random variables defined as $X=\cos\theta$ and $Y=\sin\theta$ where θ is a uniform random variable over $(0, 2\pi)$
   a) Are X and Y Uncorrelated?
   b) Are X and Y Independent?

OR

7. a) Define and State the properties of joint cumulative distribution function of two random variables X and Y.
   b) A joint probability density function is $f_{x,y}(x,y) = \frac{1}{24}$ $0 < x < 6, 0 < y < 4$
                                                        0 else where

   Find the expected value of the function $g(X,Y)= (XY)^2$

8. a) A Gaussian RP has an auto correlation function $R_{XX}(\tau)=\frac{6 \sin(\pi\tau)}{\pi\tau}$. Determine a covariance matrix for the Random variable X(t)
   b) Derive the expression for cross correlation function between the input and output of a LTI system.

OR

9. a) Derive the mean and mean square value of response of LTI system.
   b)Discuss in detail about first order stationary random process.

10. a) A random process Y(t) has the power spectral density $S_{YY}(\omega)=\frac{9}{\omega^2+64}$
    Find i) The average power of the process
    ii) The Auto correlation function
    b) State the properties of power spectral density

OR

11. a) A random process has the power density spectrum $S_{YY}(\omega)=\frac{6\omega^2}{1+\omega^4}$. Find the average power in the process.
    b) Find the auto correlation function of the random process whose psd is $\frac{16}{\omega^2+4}$

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
B.Tech II year – I Semester Examinations, Model Paper-4
PROBABILITY THEORY AND STOCHASTIC PROCESSES

Time: 3 hours   **Max. Marks: 75**

PART- A (25 Marks)

1. a. Write the statement of multiplication theorem.   (2 marks)

    b. Define Equally likely events, Exhaustive events and Mutually exclusive events.   (3 marks)

    c. Define moments about origin and central moments.   (2 marks)

    d. Write the properties of Gaussian density curve.   (3 marks)

    e. Define correlation and covariance of two random variables X& Y.   (2 marks)

    f. Define correlation coefficient with two properties.   (3 marks)

    g. When two random processes X(t)& Y(t) are said to be independent.   (2 marks)

    h. Define mean ergodic random processes & correlation ergodic Random processes. (3 marks)

    i. Write any two properties of Power Spectrum Density   (2 marks)

    j. Define linear system and impulse response.   (3 marks)

PART-B (5*10=50 Marks)

2. Let A and B are events in a sample space S. Show that if A and B are independent, then so are
    a) A and $\bar{B}$ b) $\bar{A}$ and B c) $\bar{A}$ and $\bar{B}$

OR

3. In the experiment of tossing a die, all the even numbers are equally likely to appear and similarly the odd numbers. An odd number occurs thrice more frequently than an even number. Find the probability that
    a) An even number appears
    b) A prime number appears
    c) An odd numbers appears

4. a) Verify the Characteristic function of a random variable is having its maximum magnitude at ω=0 and find its maximum value.
    b) Find the Moment generating function of exponential distribution?

OR

5. The probability density function of a random variable X is given by f(x) =$\frac{x^2}{81}$ for -3<x<6 and equal to zero otherwise. Find the density function of Y=$\frac{1}{3}$(12-x)

6. State and prove the central limit theorem

OR

7. Two random variables X and Y have zero mean and variance $\sigma_X^2 = 16$ and $\sigma_Y^2 = 36$ correlation coefficient is 0.5 determine the following
   i) The variance of the sum of X and Y
   ii) The variance of the difference of X and Y

8. The function of time $Z(t) = X_1\cos\omega_0 t - X_2\sin\omega_0 t$ is a random process. If X_1 and X_2 are independent Gaussian random variables, each with zero mean and variance σ^2, find $E[Z]$. $E[Z^2]$ and var(z).

OR

9. Briefly explain the distribution and density functions in the context of stationary and independent random processes.

10. a)Find the cross correlation function corresponding to the cross power spectrum

$$S_{XY}(\omega)=\frac{6}{(9+\omega^2)(3+j\omega)^2}$$

   b) Write short notes on cross power density spectrum.

OR

11. a) Consider a random process $X(t)=\cos(\omega t + \theta)$ where ω is a real constant and θ is a uniform random variable in $(0, \pi/2)$. Find the average power in the process.
    b) Define and derive the expression for average power of Random process.

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
B.Tech II year – I Semester Examinations, Model Paper-5
PROBABILITY THEORY AND STOCHASTIC PROCESSES

Time: 3 hours   **Max. Marks: 75**

PART- A (25 Marks)

1. a. What are the conditions for a function to be a random variable?   (2 marks)
   b. Define Random variable and Write the classifications of Random variable   (3 marks)
   c. Show that $Var(kX)=k^2 \, var(X)$, here k is a constant.   (2 marks)
   d. In an experiment when two dice are thrown simultaneously, find expected value of
   the sum of number of points on them.   (3 marks)
   e. Define the joint Gaussian density function of two random variables.   (2 marks)
   f. Define Marginal distribution & Density functions.   (3 marks)
   g. Define the cross correlation function between two random processes X(t) & Y(t).   (2 marks)
   h. Find the mean value of Response of a linear system.   (3 marks)
   i. Define linear system.   (2 marks)
   j. If X(t) & Y(t)are uncorrelated and have constant mean values $\bar{X}$&$\bar{Y}$ then show that
   $S_{XX}(\omega)= 2\Pi\bar{X}\bar{Y}\delta(\omega)$ (3 marks)

PART-B (5*10=50 Marks)

2. a) An experiment consist of rolling a single die. Two events are defined as A = { 6 shows up}: and
   B= {2 or 5 shows up}
   i) Find P(A) and P(B)
   ii) Define a third event C so that P(C) = 1-P(A)-P(B)
   b) The six sides of a fair die are numbered from t to 6. The die is rolled 4 times. How many
   sequences of the four resulting numbers are possible?

OR

3. a) State and prove the total probability theorem?
   b) Explain about conditional probability

4. a) Write short notes on Gaussian distribution and also find its mean?
   b) Consider that a fair coin is tossed 3 times, Let X be a random variable, defined as
   X= number of tails appeared, find the expected value of X.

OR

5. a) Find the characteristic function and first moment for
           $f_X(x)=(1/b)exp(-(x-a)/b)$ $x\geq a$
               $=0$ else
   b) Find the probability of getting a total of 5 or 11, when tossing a pair of fair dice.

6. A certain binary system transmits two binary states X = +1 and X = -1 with equal probability.
   There are three possible states with the receiver, such as Y = +1, 0 and -1. The performance of
   the communication system is given as
   P(y = +1/X = +1) =0.2;
   P(Y= +1/X= -1) = 0.1; P(Y = 0/X = +1) = P(Y = 0/X = -1) = 0.05. Find

a) P(Y = 0)   b) P(X = +1/Y = +1)
c) P(X = -1/Y = 0).

OR

7. Two random variables X and Y have the joint pdf is

$$f_{x,y}(x,y)= \begin{cases} Ae^{-(2x+y)} & x,y \geq 0 \\ 0 & \text{elsewhere} \end{cases}$$

i. Evaluate A
ii. Find the marginal pdf's
iii. Find the marginal pdf's
iv. Find the joint cdf
v. Find the distribution functions and conditional cdf's.

8. Explain about the following random process
   (i) Mean ergodic process
   (ii) Correlation ergodic process
   (iii) Gaussian random process

OR

9. State and prove the auto correlation and cross correlation function properties.

10. a) The power spectrum density function of a stationary random process is given by

$$S_{XX}(\omega)= \begin{cases} A, & -K< \omega< K \\ 0, & \text{other wise} \end{cases}$$

Find the auto correlation function.
b) Derive the expression for power spectrum density.

OR

11. a) Define and derive the expression for average cross power between two random process X(t) and Y(t).

b) Find the cross power spectral density for $R_{XX}(\tau)=\frac{A^2}{2} \sin(\omega_0 \tau)$.

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester supplementary Examinations, May 2017

Electronic Devices and Circuits

(ECE, CSE)

Roll No										

Time: 3 hours   **Max. Marks: 75**

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE

Questions, Choosing ONE Question from each SECTION and each Question carries

10 marks.

PART - A   (25 Marks)

1.   a) Write the PN junction diode applications.   [2M]
   b) Explain the temperature dependence of V-I characteristics of PN diode   [3M]
   c) Define Transformer utilization factor (TUF) of a rectifier.   [2M]
   d) What is a rectifier and how a PN junction diode used as a rectifier.   [3M]
   e) Draw the hybrid parameter model for BJT.   [2M]
   f) A transistor has I_B=100µA, I_{CO}=5 µA, α=0.95, Calculate I_C.   [3M]
   g) What is biasing.   [2M]
   h) Explain early effect.   [3M]
   i) Draw the symbols of Depletion MOSFET and Enhancement MOSFET for both
      n channel and p channel.   [2M]
   j) Compare BJT and JFET.   [3M]

PART - B   (50 Marks)

SECTION - I

2 a)   Write the volt-ampere equation for PN junction diode. Draw and explain the V-I
characteristics of PN junction diode under forward and reverse bias   .[5M]
   b) Explain about breakdown mechanisms in semiconductor devices.   [5M]

                                        OR

3. a) Explain the principle and operation of Tunnel diode and draw its V-I characteristics.
                                                                            [6M]
   b) Discuss about Zener Diode characteristics.   [4M]

SECTION – II

4. a) Draw a neat diagram and explain working principle of full wave bridge rectifier.[5M]
   b) Draw the circuit for a half wave rectifier and derive the expression for
      i) DC load voltage   ii) RMS current iii) Ripple factor   [5M]
                                        OR
5. a) What are different types of filters? Compare them.   [5M]

b) A HWR circuit supplies 100mA DC current to a 250ohms load. Find the DC output voltage, PIV rating of a diode and the RMS voltage for the transformer supplying the rectifier. [5M]

SECTION – III

6. a). Explain the operation of transistor with current components in detail. [6M]
   b) Explain the operating modes of BJT. [4M]

OR

7. a) Explain the input and output V-I characteristics of common base configuration of BJT. [5M]
   b) Explain how the BJT can be used as an amplifier [5M]

SECTION – IV

8. a) Explain in detail about Thermal Runaway and how to avoid it. [5M]
   b) In a Self bias circuit containing R_1=50KΩ, R_2=25KΩ, R_e=1KΩ, R_C=3KΩ, β=90, V_{CC}=12V, V_{BE}=0.7V. Find the operating point, Stability factor S [5M]

OR

9. a) Give the advantages of h-parameter analysis. [4M]
   b) The h-parameters of a Transistor used in a CE circuit are h_{ie}=1KΩ, h_{re}=2×10^{-4}. h_{fe}=50, h_{oe}=25μA/V. The load resistance for the transistor is 1KΩ in the collector circuit. Determine R_i, R_o, A_v, A_i in the amplifier stage (Assume R_s= 1KΩ). [6M]

SECTION – V

10. a) Explain in detail the working of JFET and draw its drain and transfer characteristics.[5M]
    b) Explain the construction and working of Enhancement MOSFET. [5M]

OR

11. a) Derive the expressions for Z_i, Z_o and A_v for common source J-FET amplifier [6M]
    b) Compare BJT and MOSFET [4M]

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MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY, HYDERABAD

B.Tech II Year I Semester Examinations, Model Paper I -2016

Electronic Devices and Circuits

(Common to EEE, ECE, CSE, EIE, BME, IT, MCT, ETM, ECOMPE)

Time: 3 hours   Max. Marks: 75

PART-A

Answer all the following questions:

1. (a) What is a pn junction? How is it formed?   (2M)

   (b) Sketch the energy-band Diagrams for intrinsic and extrinsic semiconductors   (3M)

   (c) What is meant by rectifier?   (2M)

   (d) Compare the performance measure of different filters.   (3M)

   (e) Why Transistor is called Current Controlled Device?   (2M)

   (f) What is early effect? How does it modify the V-I characteristics of a BJT?   (3M)

   (g) What is meant by operating point? Explain its significance   (2M)

   (h) What is the condition for thermal stability and thermal resistance?   (3M)

   (i) Explain when a FET acts as a voltage variable resistor.   (2M)

   (j) Explain the drain and transfer characteristics of a JFET in details   (3M)

PART-B

Answer all the following questions   10x5=50

2. (a) Draw the V-I characteristics of a diode with zero cut-in voltage and equivalent resistance of 100Ω. Draw the load line if RL is also 100 Ω.

   (b) Explain V-I characteristics of pn junction Diode.

(OR)

3. (a) Explain the constructional and principal operations of SCR and PHOTO diode.

4. Draw and explain the circuit diagram of full-wave rectifier with inductor filter. Derive the Ripple factor equation.

(OR)

5.   Derive expressions for ripple factor, regulation and rectification efficiency of a
        Center tapped Transformer Full wave rectifier.

6. (a) Explain different current components in a transistor.
   (b) Explain how Transistor acts as an Amplifier

(OR)

7.   Draw the circuit diagram of Common Emitter amplifier using accurate h-parameter
        model. Derive expressions for A_V, A_I, R_I & R_O.

8.   What are the compensation techniques used for V_{BE} and I_{CO}? Explain with the help of
        suitable circuits

(OR)

9. (a) Design a collector to base bias circuit using silicon transistor to achieve a stability factor
        of 20, with the following specifications: $V_{CC}=16V$, $V_{BE}= 0.7V$, $V_{CEQ}= 8V$, $I_{CQ}= 4mA$ &
        $\beta= 50$
   (b) Derive condition for thermal stability?

10. (a) With the help of neat sketches and characteristic curves explain the construction &
         operation of a JFET and mark the regions of operation on the characteristics.
    (b) Derive expression for transconductance in a field effect transistor.

(OR)

11. (a) Explain the construction and principle of operation of Depletion type N-channel
         MOSFET
    (b) Compare BJT and FET

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY, HYDERABAD

B.Tech II Year I Semester Examinations, Model Paper II -2016

Electronic Devices and Circuits

(Common to EEE, ECE, CSE, EIE, BME, IT, MCT, ETM, ECOMPE)

Time: 3 hours   **Max. Marks: 75**

PART-A

Answer all the following questions:

1. (a)   What do you mean by potential barrier for a p-n junction?   (2M)

   (b)   What is the significance of negative resistance of a tunnel diode   (3M)

   (c)   Define peak inverse voltage (PIV).   (2M)

   (d)   Explain FWR working principle with circuit and waveforms.   (3M)

   (e)   What are the three regions of a Transistor?   (2M)

   (f)   What is thermal runway? How can it avoid?   (3M)

   (g)   What is faithful amplification?   (2M)

   (h)   Derive relation between α, β and γ?   (3M)

   (i)   Define the pinch off voltage (V_p) sketch the depletion region before and after

         Pinch-off?   (2M)

   (j)   Derive Expression for saturation drain current   (3M)

PART-B

Answer all the following questions: **5x10= 50 marks**

2. (a)   Explain the effect of temperature on V-I characteristics of a diode.

   (b)   Distinguish between drift and diffusion current in a semiconductor.

OR

3.   Explain the working of Tunnel diode with help of energy band diagrams and Draw V-I
         Characteristics

4. (a)   A Full wave single phase rectifier makes use of 2 diodes, the internal forward resistance
         of each is considered to be constant and equal to 30Ω. The load resistance is 1KΩ. The
         transformer secondary voltage is 200-0-200V (rms).Calculate V_{DC}, I_{DC}, and Ripple factor

(b)   A Zener voltage regulator circuit is to maintain constant voltage at 60 V, over a current range from 5 to 50 mA. The input supply voltage is 200 V. Determine the value of resistance R to be connected in the circuit, for voltage regulation from load current $I_L = 0$ mA to I_L max, the maximum possible value of I_L. What is the value I_L max?

OR

5. (a)   Derive expression for FWR Rectifier i) DC load current ii) DC output voltage iii) Peak Inverse Voltage of each diode IV) Efficiency v) Ripple factor

6. (a)   Compare the three transistor amplifier configurations with related to A_I, A_V, R_i and R_O.

   (b)   For the emitter follower with $R_S = 0.5K$, $R_L = 50K$, $h_{fe} = -50$, $h_{re} = 1K$, $h_{oe} = 25\mu A/V$, $h_{re} = 1$. Calculate A_V, A_I, Z_i and Z_O

(OR)

7).(a) Draw the circuit diagram of a transistor in CB configuration and explain the output characteristics with the help of different regions.

   (b)   Calculate the collector current and emitter current for a transistor with $\alpha_{D.C.} = 0.99$ and $I_{CBO} = 50$ μA when the base current is $20\mu A$..

8.   Draw a Fixed bias circuit and explain its operation. Calculate the Stability factor S, S^1.

(OR)

9.   Define stability factors for a BJT with Self biasing method. Suggest how this method to effects on operating point of a BJT circuit

10. (a) Sketch the drain characteristics of MOSFET for different values of V_{GS} & mark different regions of operation.

(b)   Give the construction details of JFET and explain its operation.

(OR)

11. (a) Write short notes on applications of FET as a voltage variable resistor.

(b)   Explain the principle of CS FET amplifier with the help of circuit diagram. Derive the expressions for A_V, input impedance and output impedance

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY, HYDERABAD

B.Tech II Year I Semester Examinations, Model Paper III -2016

Electronic Devices and Circuits

(Common to EEE, ECE, CSE, EIE, BME, IT, MCT, ETM, ECOMPE)

Time: 3 hours   Max. Marks: 75

PART-A

Answer all the following questions:

1.(a)	What is mean by zener breakdown	(2M)
(b)	Explain the effect of temperature on the V-I characteristics of pn junction diode	(3M)
(c)	What is meant by filter in rectifier circuits	(2M)
(d)	Bridge rectifier is becoming more and more popular, why?	(3M)
(e)	Write B.J.T specifications and limitations	(2M)
(f)	Explain how transistor acts as an Amplifier?	(3M)
(g)	What is meant by stabilization	(2M)
(h)	What is thermal runway? How can it avoid?	(3M)
(i)	State the application of JFET and compare MOSFET	(2M)
(j)	When FET acts as a voltage variable resistor (V.V.R)?	(3M)

PART-B

Answer all the following questions: 5x10= 50 marks

2.   Explain in detail, the reason for exponential rise in forward characteristic of a diode with suitable mathematical expression.

(OR)

3) a)   Explain the construction and working principal of photo diode.

b)   Draw the equivalent circuits of diode

4.   Draw the circuit diagram of a Full wave bridge rectifier. Explain the operation of circuit with relevant waveforms

(OR)

5 a)   Compare the performance of Inductor filter and capacitor filter.

b)   Explain Full wave rectifier with neat diagram?

6.   Define the hybrid parameters for a basic transistor circuit and give CE hybrid model.

(b)   Explain input and output characteristics of C.E Configuration

(OR)

7. (a)   Summarise the salient features of the characteristics of BJT operatives in CE, CB and CC configurations?

(b)   Calculate the collector current and emitter current for a transistor with $\alpha_{D.C.} = 0.99$ and $I_{CBO} = 20$ μA when the base current is 50μ A.

8.   Draw a Collector feedback bias circuit and explain its operation. Calculate the Stability factor S

(OR)

9. (a)   What is a load line? Explain its significance.

(b)   Find the Q-point of self-bias transistor circuit with the following specifications: $V_{CC} = 22.5V$, $R_L = 5.6k\Omega$, $R_C = 1k\Omega$, $R_1 = 90k\Omega$, $R_2 = 10k\Omega$, $V_{BE} = 0.7V$ and $\beta = 55$. Assume $I_B >> I_{CO}$.

10(a)   Bring out comparison between JFET and MOSFET.

(b)   Draw the circuit's diagram of common drain amplifier and derive expression for voltage gain

(OR)

11. (a) Compare Depletion MOSFET and enhancement MOSFET

(b)   Explain in detail about generalized FET amplifier

R15

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY, HYDERABAD

B.Tech II Year I Semester Examinations, Model Paper IV -2016

Electronic Devices and Circuits

(Common to EEE, ECE, CSE, EIE, BME, IT, MCT, ETM, ECOMPE)

Time: 3 hours   Max. Marks: 75

PART-A

Answer all the following questions:

a)   What is diode equation?   (2M)

b)   Draw the V-I characteristics of SCR & define all related terms.   (3M)

c)   What is the purpose of bleeder resistance in a rectifier circuit using LC filter?   (2M)

d)   Write short note on Full wave rectifier (FWR) along with input output waveforms.(3M)

e)   Why hybrid parameters are called so? Define those   (2M)

f)   What factors are to be considered for selecting the operating point Q for an

amplifier?   (3M)

g)   Why does potential divider method of biasing become universal?   (2M)

h)   Why FET is unipolar and BJT is Bipolar Device   (3M)

i)   Draw the symbols of JFET (N Channel/P channel) MOSFET (Depletion MOSFET

(n-channel/p-channel) and Enhancement MOSFET (n-channel/p-channel)   (2M)

j)   Draw the low frequency hybrid equivalent circuit for CE,CB and CC   (3M)

PART-B

Answer all the following questions: **5x10= 50 marks**

2. (a) Explain the V-I characteristics of Zener diode and distinguish between Avalanche and

Zener Break downs.

(b)   In a Zener diode regulator, the supply voltage = 300V, V_z = 220V, I_z = 15mA and load

current = 25mA. Calculate the value of resistor required to be connected in series with the

Zener diode.

(OR)

3.   Draw the basic structure of Varactor diode and explain its operation and V-I

Characteristics.

4.   A 230 V, 60Hz voltage is applied to the primary of a 5:1 step down, center tapped transformer used in a full wave rectifier having a load of 900Ω .If the diode resistance and the secondary coil resistance together has a resistance of 100Ω, determine

i) Dc voltage across the load. ii) Dc current flowing through the load.

 iii) Dc power delivered to the load. iv) PIV across each diode.

(OR)

5. (a)   Design ripple factor of LC filter for a Full wave rectifier

(b)   In a full-wave rectifier using an LC − filter L-10mH, C=100µF and $R_L = 500\Omega$.

Calculate I_{DC} , V_{DC} for an input Vi=300sin (100 t)

6. (a) Draw the circuit diagram of a transistor in CB configuration and explain the output characteristics with the help of different regions.

(b)   In a germanium transistor collector current is 51mA, when base current is 0.4mA. If h_{fe} = β_{dc} = 125, Calculate cut off current, I_{CEO}.

(OR)

7.   Explain the input and output characteristics of a transistor in CC configuration

(b)   Calculate the values of I_E, α_{dc} and β_{dc} for a transistor with I_B=13µA,

I_C=200mA,I_{CBO}=6µA. Also determine the new level of I_C which will result from reducing I_B to   100mA

8.   Draw a Self bias circuit and explain its operation. Calculate the Stability factor S,S^I,S^{II}

(OR)

9 (a)   what is a load line? Explain its significance.

(b)   Find the Q-point of self-bias transistor circuit with the following specifications: V_{CC}= 22.5V, R_L=5.6kΩ,R_C=1kΩ,R_I=90kΩ,R_2=10kΩ,V_{BE}= 0.7V and $\beta = 55$. Assume $I_B>>I_{CO}$.

10)   The field effect transistor is called a voltage-sensitive electronic control device. Explain why is the case?

b)   Name and define the circuit parameters of the JFET. How are they related to each other?

(OR)

11.(a) Explain the construction and principle of operation of Enhancement mode N-channel MOSFET.

b) Compare BJT & FET.

ALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY, HYDERABAD

B.Tech II Year I Semester Examinations, Model Paper V -2016

Electronic Devices and Circuits

(Common to EEE, ECE, CSE, EIE, BME, IT, MCT, ETM, ECOMPE)

PART-A

Time: 3 hours   **Max. Marks: 75**

Answer all the following questions: **5x2= 10 marks**

(a)   Sketch the V-I characteristics of p-n junction diode for forward bias?   (2M)

(b)   Explain zener diode as a voltage regulator.   (3M)

(c)   Distinguish between the incremental resistance and the apparent resistance of

the diode   (2M)

(d)   Derive efficiency of FWR.   (3M)

(e)   In a filter circuit, why capacitor is a parallel combination and series combination

for inductor.   (2M)

(f)   Define Transformer Utilization Factor (TUF).   (2M)

(g)   What is transistor?   (3M)

(h)   Draw voltage divider bias circuit; derive an expression for its stability factor.   (2M)

(i)   Explain transfer characteristics of JFET with its non-linear relations   (3M)

(j)   Explain tunneling effect   (2M)

PART-B

Answer all Answer all the following questions: **5x10= 50 marks**

2. (a) Explain the concept of diode capacitance. Derive expression for transition capacitance?

(b) Find the value of D.C. resistance and A.C resistance of a Germanium junction diode at 25^0 C with reverse saturation current, $I_o = 25\mu A$ and at an applied voltage of 0.2V across the diode.

(OR)

3.   With neat energy band diagrams, explain the V-I characteristics of Tunnel diode in detail. Also explain the negative-resistance region in the characteristics and applications of Tunnel diode.

4.   Draw the circuit diagram of full-wave rectifier with inductor filter. Explain its operation with necessary equations.

(OR)

5.   Derive the expression for the ripple factor of π-Section filter when used with a Full-wave-rectifier. Make necessary approximations.

6.(a)   Based on the currents flowing through a BJT illustrate the amplification process.

(b)   Compare CB, CC, and CE configurations

(OR)

7.   Draw the circuit diagram, AC equivalent & small signal equivalent of Common Emitter amplifier using accurate h-parameter model. Derive expressions for A_V, A_I, R_I & R_O.

8.   Explain the basic requirements of transistor biasing. Verify these requirements in collector to base bias circuit.

(OR)

9.   Design a fixed bias circuit using silicon transistor, with the following specifications: V_{CC} = 16V, V_{BE} = 0.7V, V_{CEQ} = 8V, I_{CQ} = 4 mA & β= 50.

10. (a) A self biased P-channel JFET has a pinch-off voltage of V_P=5V and I_{DSS}=12mA .the supply voltage is 12V .Determine the values of R_D and R_S so that I_D=5ma and V_{DS}=6V

(b)   List the advantages and disadvantages of FET over MOSFET

(OR)

11. (a) Explain self biasing of Common source JFET

(b)   Explain the significance of threshold voltage of an E-MOSFET.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester supplementary Examinations, May 2017
Signals and Systems
(ECE)

Roll No									

Time: 3 hours   Max. Marks: 75

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART - A   (25 Marks)

(a) Sketch the following signals.

         i. $x(t) = 3t$ for all t.

         ii. $x(n) = 2n-3$ for all n.   [2M]

(b) Define orthogonality with reference to signals and give any two examples.[3M]

(c) Define Gibb's phenomenon.   [2M]

(d) State Sampling Theorem for band limited signals.   [3M]

(e) Find the Fourier Transform of a constant function $f(t) = A$. [2M]

(f) Draw and explain Ideal LPF, HPF and BPF characteristics?   [3M]

(g) Write the relation between Convolution and Correlation.   [2M]

(h) State the properties of Laplace Transforms.   [3M]

(i) Write the relation between Laplace transform and Fourier Transform   [2M]

(j) Write Final and Initial value theorems in Laplace Transforms. [3M]

PART - B   (50 Marks)

SECTION - I

1. How a function is approximated by a set of orthogonal functions ? Explain and Derive the expression for Mean Square Error.

                                        OR

3. Find the Exponential Fourier series for the function shown in fig 1
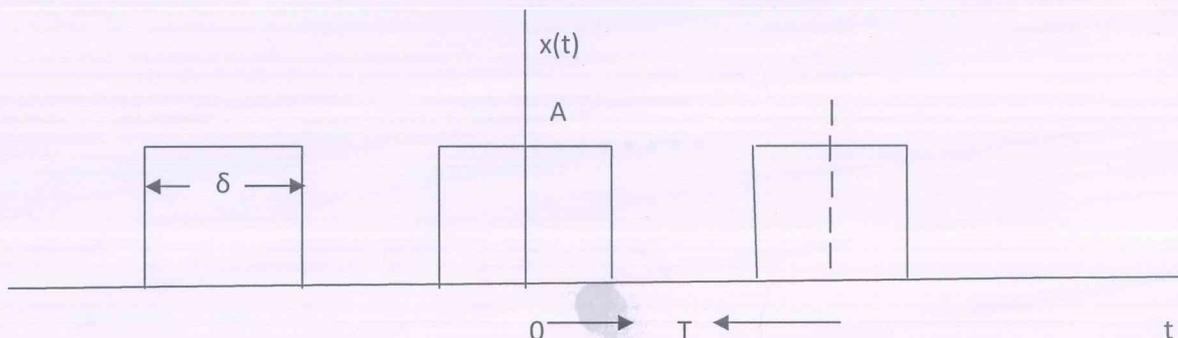
Fig : 1

SECTION – II

4. Find the Fourier Transforms of the following signals and draw magnitude and phase Spectrum
      i) x(t)=A rect(t/T)
      ii) x(t)= t exp(-at)u(t)

OR

5. Compare the Impulse, Natural & Flat- top sampling techniques

SECTION – III

6. Define LTI system? Explain its properties and derive an expression for transfer function of an LTI system

OR

7. The System produces the output of $y(t)= e^{-t}u(t)$ for an input of $x(t)= e^{-2t}u(t)$. Determine the impulse response and frequency response of the system

SECTION – IV

8. Find the convolution of signals $x(t)= e^{-at}$ and $h(t)=u(t)$ using graphical method .

OR

9. Derive any two properties of Autocorrelation function

SECTION – V

10) Find the Z-Transform of the following discrete signal

$$x(n) = \frac{1}{2}(n(n-1))u(n)$$

OR

11. Find the inverse Laplace Transforms of the following signal

$$F(s) = \frac{s}{(s+2)(s+1)}, \ (-2< \sigma <-1)$$

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
II B.TECH – I SEM EXAMINATIONS, NOVEMBER -2014
SIGNALS AND SYSTEMS
(Common to BME, ICE, ETM, EIE, ECE)

Time: 3 hours   Max Marks: 75

PART-A

Answer the following Questions

(1)

(a)Define a signal and what is one dimensional signal?   (2M)

(b)Write about orthogonal vector space.   (3M)

(c)Write about existence of Fourier transform.   (2M)

(d)State & prove parsvel's theorem in Fourier Transform   (3M)

(e)What is importance of impulse response? Does the impulse response of a non linear system characterize the system?   (2M)

(f)Write a short note on properties of LTI system.   (3M)

(g)What is convolution and correlation?   (2M)

(h)State & prove time convolution theorem with Fourier Transform   (3M)

(i)Find the Laplace Transform of (i) δ (t) (ii) $t\,e^{-t}\,u$ (t)   (2M)

(j)What is Region of Convergence (ROC) of Z-Transforms?   (3M)

PART-B

Answer the following Questions   **5x10=50**

(2) a) Explain the analogy between vectors and signals in terms of Orthogonality and evuation of component.

b) Derive the condition for Orthogonality between two complex Signals f_1 (t) & f_2 (t)

(Or)

(3) Approximate the rectangular function shown in figure below is orthogonal set of Sinusoidal signals and show that mean square error is minimum.
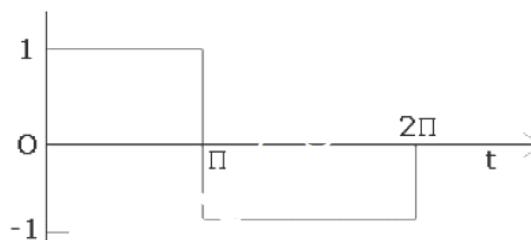
(4) Obtain the Fourier transform of the following:

i. $x(t) = A \sin(2\pi f_c t) \cdot u(t)$.

ii. $x(t) = f(t) \cdot \cos(2\pi f_c t + \Phi)$.

(Or)

(5) State and prove the following properties of Fourier transform.
  i. Multiplication in time domain.
  ii. Convolution in time domain.

(6) a) A continuous time signal is given as: $x(t) = 8 \cos200\pi t$ Determine
  i) Minimum sampling rate
  ii) If fs=400Hz what is discrete time signal obtained after sampling.
  iii) If fs=150Hz what is discrete time signal obtained after sampling.
  b) Discuss the effect of under sampling.

(Or)

(7) a) Define Nyquist rate. Compare the merits and demerits of performing sampling using impulse, Natural and Flat-top sampling techniques.
  b) Discuss the process of reconstructing the signal from its samples.

(8) State and Prove Properties of auto correlation and cross correlation functions?

(Or)

(9) a) Prove that for a signal, auto correlation function and power spectral density Forms a Fourier transform pair.
  (b) A filter with $H(\omega) = 1/1+jw$ is given an input $x(t) = e^{-2}t\, u(t)$. Find Energy density spectrum of the output.

(10)   Find the Laplace transform of the function
  (i) $f(t) = A \sin \omega_0 t$ for $0 < t < T/2$
  (ii) $f(t) = e^{-at} \cos(\omega_c t + \theta)$

(Or)

(11) (a) Explain the concept of Stability in s - domain.
  (b) Find the Laplace transform of the periodic square wave of amplitude range (-A, A) and time period 2T.

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II B.TECH – I SEM EXAMINATIONS, NOVEMBER -2014
SIGNALS AND SYSTEMS
(Common to BME, ICE, ETM, EIE, ECE)

Time: 3 hours   Max Marks: 75

PART-A

(1)

   a) Write properties of unit Impulse function   (2 M)
   b) Evaluate Mean Square Error in approximating of two signals   (3 M)
   c) Prove frequency shifting property for continuous time Fourier Transform (2 M)
   d) State Sampling theorem   (3 M)
   e) Define transfer function of a system   (2 M)

   f) Let the system function of an LTI system be $^{1}/(j\omega + 2)$. What is the
      output of system for an input $(0.8)^t \, u(t)$?   (3 M)
   g) What are incoherent signals? And write conditions.   (2 M)
   h) Define auto correlation and cross correlation of two signals   (3 M)
   i) Define Bilatoral Laplace Transform of a signal   (2 M)
   j) What is study state response of a system & what is forced response?   (3 M)

PART-B

Answer the following Questions   **5x10=50**

(2) (a) Explain Orthogonality property between two complex functions $f_1(t)$ and $f_2(t)$ for a real variable t.

   (b) Discuss how an unknown function f(t) can be expressed using infinite mutually orthogonal functions

(Or)

(3) (a) Write short notes on "Orthogonal functions".

   (b) Obtain the condition under which two signals $f_1(t)$ & f2(t) are said to be Orthogonal to each other. Hence, prove that Sin $n\omega_0 t$ and Cos $m\omega_0 t$ are orthogonal to each other for all integer values of m, n.

(4) (a) Find the Fourier transform of a gate pulse of unit height, unit width and centered at t=0
   (b) Find the Fourier Transform of f(t) = t Cos 2t.

(Or)

(5) (a) Determine the Fourier transform of the sinusoidal pulse shown below:
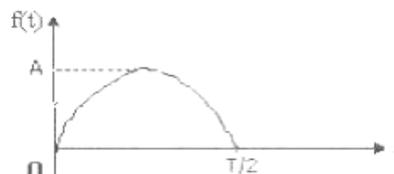
(b) Determine the Fourier transform of $f(t) = e^{-a|t|}$ sgn (t) .

(6) a) Explain flat top sampling.
b) Determine the Nyquist sampling rate and Nyquist sampling interval for the signals.
(i) sinc(100πt)
(ii) sinc2(100πt)
(iii) sinc(100πt) + sinc(50πt)
(iv) sinc(100πt) + 3 sinc2(60πt)

(Or)

(7) (a) With the help of graphical example explain sampling theorem for Band limited
Signals.
(b) Explain briefly about Band pass sampling

(8) (a) If $V(t) = \text{Sin } \omega_o t$.
i. find R(τ)
ii. Find energy spectral density GE (f) = Fourier transform of R (τ)
(b) Use the convolution theorem to find the spectrum of x (t) = A Cos2 ω_ct.

(Or)

(9) (a) The signal $V(t) = \cos \omega_0 t + 2\sin 3 \omega_0 t + 0.5 \sin 4\omega_0 t$ is filtered by an RC
Low pass filter with a 3 dB frequency. fc =2f₀. Find the output power S₀
(b) State Parsvel's theorem for energy and power signals.

(10) (a) Explain the Frequency differentiation and Time convolution properties of
Laplace transforms
(b) Find the Inverse Laplace transform of

i. $\dfrac{s^3 + 1}{s(s+1)(s+2)}$

ii. $\dfrac{s-1}{(s+1)(s^2 + 2s + 5)}$

(Or)

(11) (a) Find the initial values and final values of the function

$$F(s) = \frac{17s^3 + 7s^2 + s + 6}{s^5 + 3s^4 + 5s^3 + 4s^2 + 2s}$$

(b) Explain the Step and Impulse responses of Series R-C circuit using Laplace
Transforms.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
II B.TECH – I SEM EXAMINATIONS, NOVEMBER -2014
SIGNALS AND SYSTEMS
(Common to BME, ICE, ETM, EIE, ECE)

Time: 3 hours   Max Marks: 75

PART-A

Answer the following Questions

(1)

a) Write a short note on Exponential Fourier series. (2 M)
b) Obtain Exponential Fourier series from Trigonometric Fourier series (3 M)
c) Find Fourier Transform of Impulse function. (2 M)
d) Find Fourier Transform of (i) $e^{3t} u(t)$ (ii) $\cos \omega_o t\, u(t)$ (3 M)
e) What is Distortion less transmission& condition on magnitude and phase? (2 M)
f) Write about signal bandwidth & system bandwidth (3 M)
g) Write the expression for cross correlation of power(periodic) signals (2 M)
h) Explain the extraction of signal from noise by filtering (3 M)
i) When does the Laplace Transform of a function x (t) exist? (2 M)
j) How is Laplace transform is useful in the analysis of LTI system (3 M)

PART-B

Answer the following Questions   **5x10=50**

(2) Prove the Orthogonality condition in the case of a signal represented by orthogonal signal space consisting of exponential functions, $\{e^{jnwot}\}$ for 'n' integer.

(Or)

(3) (a) A rectangular function defined by f(t) , approximate f(t) by a single sinusoid sin t, and Evaluate Mean square error in this approximation. Also show what happens when more number of sinusoidals is used for approximations.

$$f(t)= \begin{cases} 1 & 0 < t < \pi \\ -1 & \pi < t < 2\pi \end{cases}$$

(b) Discuss GIBB'S Phenomena in the above problem.

(4) (a) State and Prove Modulation theorem.
   (b) Using the modulation theorem find out the Fourier transform of RF pulse
Given as y (t) = A rect (t/ τ) Cos 2π f_ct.

(Or)

(5) (a) with the help of graphical example explain sampling theorem for Band limited Signals.
   (b) Explain briefly Band pass sampling

(6) (a) Explain causality and physical reliability of a system and hence give Paley- Wiener criterion.
 (b) Obtain the relationship between the bandwidth and rise time of ideal low pass Filter

<div align="center">(Or)</div>

(7) (a) Distinguish between linear and non linear systems with examples.
    (b) Consider a stable LTI System characterized by the differential equation
      $dy(t)/dt + 2y(t) = x(t)$. Find its impulse response

(8) (a) The waveform $V(t) = e^{-t}/T\ u(t)$ is passed through a high pass RC circuit having a time constant T.
      i. Find the energy spectral density at the output of the circuit.
      ii. Show that the total output energy is one half the input energy.
    (b) Find the cross correlation of the functions sin ωt and cos ωt.

<div align="center">(Or)</div>

(9) (a) Write the Procedure to find the convolution of two signals graphically.
    (b) Find the convolution of the following signals by graphical method.
      $x(t) = e^{-3t} u(t), h(t) = u(t+3)$

(10) Determine the function of time x(t) for each of the following Laplace transforms
And their associated regions of convergence

$$\text{(a) } \frac{1}{s^2+9} \qquad \text{Re}\{S\} > 0$$
$$\text{(b) } \frac{S}{S^2+9} \qquad \text{Re}\{S\} < 0$$
$$\text{(c) } \frac{s+1}{(s+1)^2+9} \qquad \text{Re}\{S\} < -1.$$

<div align="center">(Or)</div>

(11) (a) Using the Power Series expansion technique, find the inverse Z-transform of
The following X (Z)

$$\text{i. } X(Z) = \frac{Z}{2Z^2-3Z+1} \qquad |Z| < \frac{1}{2}$$
$$\text{ii. } X(Z) = \frac{Z}{2Z^2-3Z+1} \qquad |Z| > 1$$

(b) Find the inverse Z transform of
$$X(Z) = \frac{Z}{Z(Z-1)(Z-2)^2} \qquad |Z| > 2$$

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
II B.TECH – I SEM EXAMINATIONS, NOVEMBER -2014
SIGNALS AND SYSTEMS
(Common to BME, ICE, ETM, EIE, ECE)

Time: 3 hours   Max Marks: 75

PART-A

Answer the following Questions

(1)

    a) Why the Mean Square Error criterion and not the Average error criterion is chosen for minimizing the error over an interval? (2 M)

    b) Write a short note on Gibb's phenomenon. (3 M)

    c) State sampling theorem (2 M)

    d) Write about Natural sampling technique. (3 M)

    e) What is the frequency domain criterion for physical realization of a system? (2 M)

    f) Show that for liner phase systems, the impulse response is symmetrical about $t = t_d$ (3 M)

    g) Write a short note on Spectral Density? (2 M)

    h) Find convolution of following signals by using Fourier Transform
        $x_1(t) = e^{-at} u(t)$ and $x_2(t)= e^{-bt} u(t)$ (3 M)

    i) How are discrete time systems analyzed using Z- transform (2 M)

    j) Find inverse Laplace Transform of (i) $1/(s+1)^2$ (ii) $s^2/(s-1)^4$ (3M)

PART-B

Answer the following Questions   **5x10=50**

(2) (a) Explain how a function can be approximated by a set of orthogonal Functions

    (b) Show that the functions $\sin nw_o t$ and $\sin mw_o t$ are orthogonal to each Other for all integer values of m and n.

(Or)

(3) Find the exponential Fourier series for the saw tooth waveform shown in figure. Plot the magnitude and phase spectrum.
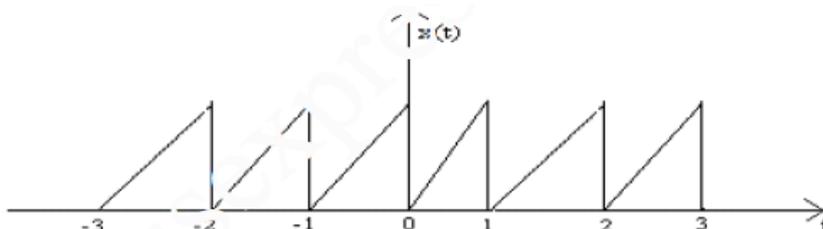
(4) Obtain the Fourier transform of the following functions.
   i. Impulse function f(t).
   ii.DC Signal.
   iii. Unit step function
   iv) Signum Function

(Or)

(5) (a) Explain he reconstruction of the signal from its samples
   (b) Explain Flat Top Sampling Method

(6) (a) What is an LTI system? Explain its properties. Derive an expression for the Transfer function of an LTI system.
   (b) Obtain the conditions for the distortion less transmission through a system.
      What do you understand by the term signal bandwidth?

(Or)

(7) (a) Explain how input and output signals are related to impulse response of a LTI System.
   (b) Find the impulse response for the RL filter shown figure
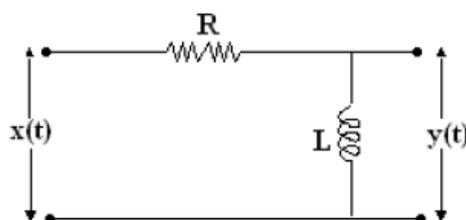
(8) (a) Derive Relation between Auto Correlation Function and Energy spectral density Function
   (b) Compare ESD and PSD

(Or)

(9) (a) A signal $x(t)=e^{-2t}u(t)$ is passed through an idle LPF with cut off frequency of one radian /sec .
   (i) Test whether the input is an energy signal.
   (ii) Find the input and Output Energy

(10) (a) Derive relationship between Fourier Transform and Laplace Transform
   (b) Explain the properties of the region of convergence of X (z).

(Or)

(11) (a) Consider the sequence Find X[Z].

$$x[n] = \begin{cases} a^n & 0 \le n \le N-1, a > 0 \\ 0 & otherwise \end{cases}$$

(b) Find the Z-transform of x(n) = cos(nω)u(n).

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
II B.TECH – I SEM EXAMINATIONS, NOVEMBER -2014
SIGNALS AND SYSTEMS
(Common to BME, ICE, ETM, EIE, ECE)

Time: 3 hours   Max Marks: 75

PART-A

Answer the following Questions

(1)

   a) Define and discuss the conditions for Orthogonality   (2 M)

   b) Write about power representation using Fourier series.   (3 M)

   c) Determine Nyquist rate and interval for $x(t) = 1 + \cos(2000\pi t) + \sin(4000\pi t)$
$1 + \cos(2000\pi t) + \sin(4000\pi t)$ (2 M)

   d) State sampling theorem for Band passes Signals.   (3 M)

   e) What is the relation between Bandwidth and Rise time?   (2 M)

   f) What is a filter? Write about LPF, HPF, and BPF.   (3 M)

   g) Write properties of Energy Spectral Density (ESD)   (2 M)

   h) Write about properties of cross correlation function for energy signals.   (3 M)

   i) Write about Inverse Z- Transform.   (2 M)

   j) Find Z- Transform of (i) x(n) = u(n) - u(n-4)
              1. (ii) x(n) = {2,1,3,-4,1,2}   (3 M)

PART-B

Answer the following Questions   5x10= 50 M

(2) (a)State the Dirichlet's condition for Fourier series.

  (b) Find Trigonometric Fourier series for a periodic square waveform shown in figure which is symmetrical with respect to the vertical axis.
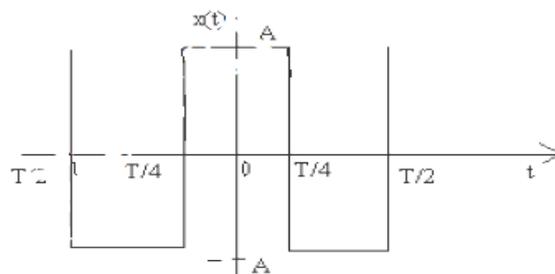
(Or)

(3) (a) Obtain the Fourier series representation of an impulse train given by

$$x(t) = \sum_{n=-\alpha}^{\alpha} \delta(t - n\tau_0).$$

(b) Derive polar Fourier series from the exponential Fourier series representation
And hence prove that Dn = 2 |Cn|

(4) (a) Prove the time scaling property of Fourier transform and hence find the Fourier Transform of f (t) = e$^{-0.5t}$.

(b) Obtain the Fourier transform of Rectangular pulse of duration T and amplitude A as shown in figure

(Or)

(5) (a) Explain the concepts of Impulse function and Sinc function.

(b) Find the Fourier transform of the Rectangular Pulse and plot its amplitude and phase

(6) (a) Explain the difference between a time invariant system and time variant system? Write some practical cases where you can find such systems. What do you understand by the filter characteristics of a linear system. Explain the condition for causality of a LTI System?

(b) Differentiate between linear and non-linear system

(Or)

(7) (a) What is an LTI system? Explain its properties. Derive an expression for the transfer function of an LTI system.

(b) Obtain the conditions for the distortion less transmission through a system.
What do you understand by the term signal bandwidth?

(8) (a) State and Prove Properties of auto correlation and cross correlation functions?

(Or)

(9) (a) Prove that for a signal, auto correlation function and power spectral density
Forms a Fourier transform pair.

(b) A filter with H (ω) = 1/1+jw is given an input x (t) = e^{-2}t u (t). Find
Energy density spectrum of the output.

(10) (a) Find the Z-transform of $x[n] = \left(\frac{1}{2}\right)^{?} u[n] + \left(\frac{1}{3}\right)^{n} u[-n-1]$.

(b) Derive relationship between z and Laplace Transform

(Or)

(11) (a) Explain the properties of the region of convergence of X (z).

(b) Discuss in detail about the double sided and single sided Ztransform. Correlate Laplace transform and Ztransform in their end use

8-5-17

Roll No									

Time: 3 hours   Max. Marks: 75

Note: This question paper contains two parts A and B
        Part A is compulsory which carriers 25 marks and Answer all questions.
        Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE
        Questions, Choosing ONE Question from each SECTION and each Question carries 10
        marks.

<div align="center">

PART- A   **(25 Marks)**

</div>

1. a) Define Beta function.   [2M]

   b) Evaluate $\int_0^1 \dfrac{dx}{\sqrt{1-x^2}}$ [3M]

   c) Write orthogonal property of Legendre polynomials.   [2M]

   d) Find the value of $\left[J_{\frac{1}{2}}(x) + J_{-\frac{1}{2}}(x) \right]$ [3M]

   e) State Cauchy's integral theorem.   [2M]
   f) Show that the function $u(x,y) = e^x \cos y$ is harmonic.   [3M]

   g) Find the poles of $f(z) = \dfrac{1}{e^z - 1}$ [2M]

   h) State Laurent's theorem.   [3M]
   i) Find the points at which $w = \cosh z$ is not conformal.   [2M]

   j) Find the fixed points of the transformation $w = \dfrac{6z-9}{z}$. [3M]

<div align="center">

PART- B   **(50 Marks)**

</div>

2. a) Show that $\Gamma(n) = \int_0^1 \left(\log \dfrac{1}{x} \right)^{n-1} dx$; n > 0.

   b) Show that $\beta(m,n) = \int_0^\infty \dfrac{x^{m-1}}{(1+x)^{m+n}} dx$

<div align="center">

OR

</div>

3. a) Prove that $\beta(m,n) = 2 \int_0^{\frac{\pi}{2}} \sin^{2m-1}\theta \cos^{2n-1}\theta \, d\theta$.

   b) Evaluate $\int_0^\infty x^3 e^{-2x} dx$.

4. a) Show that $x J_n^{'}(x) = n J_n(x) - x J_{n+1}(x)$.

   b) Express the polynomial $1+x-x^2$ in terms of Legendre polynomials.

<div align="center">OR</div>

5. a) State and prove generating function for $P_n(x)$.

   b) Show that $\cos(x\sin\theta) = J_0 + 2[J_2\cos2\theta + J_4\cos4\theta + ...]$.

6. a) Find the analytic function in terms of z, whose real part is
   $u = e^{2x}(x\cos2y - y\sin2y)$.

   b) Evaluate $\int_c \dfrac{1}{e^z(z-1)^3}dz$. where c is $|z| = 2$.

<div align="center">OR</div>

7. a) Evaluate $\int_c (x^2 + ixy)dz$. where C is the curve joining $A(1,1)$ and $B(2,8)$.

   b) Evaluate $\int_c \dfrac{z-3}{z^2+2z+5}dz$. Where C is the circle $|z+1+i| = 2$.

8. a) Expand $f(z) = \dfrac{1}{z^2-3z+2}$ in the region $0 < |z-1| < 1$.

   b) Using Residue theorem, evaluate $\int_c \dfrac{2e^z}{z(z-3)}dz$. Where C is the circle $|z| = 2$.

<div align="center">OR</div>

9. Evaluate $\int_0^\infty \dfrac{1}{x^6+1}dx$ using Residue theorem.

10. a) Find the bilinear transformation that maps th points ($1-2i$, $2+i$, $2+3i$) into the points ($2+i$, $1+3i$, 4).

    b) Show that the image of the hyperbola $x^2-y^2 = 1$ under the transformation $w = \dfrac{1}{z}$ is the lemniscates $\rho^2 = \cos2\phi$.

<div align="center">OR</div>

11. a) Find the image of the circle $|z-2i| = 2$ under the transformation $w = \dfrac{1}{z}$.

    b) Show that the transformation $w = \dfrac{z-i}{z+i}$ maps the real axis in the z- plane in to the unit circle $|w| = 1$ in the w- plane.

<div align="center">*********</div>

TIME: 3hours   **Max Marks: 75**

Note: This question paper contains two parts A and B.
Part A compulsory which carries is 25 marks. Answer all questions in Part A.
Part B contains of 5 units. Answer any one full question from each unit. Each
Question carries 10 marks and may have a, b, c as sub questions.

PART-A (25 Marks)

1.   a. Define Cauchy's Homogeneous Linear Equation.

        b. Define Indicial Equation.

        c. Write Rodrigue's Formula.

        d. Prove That $J_{-n}(x) = (-1)^n . J_n(x)$, where $n \in z^+$.

        e. Define Complex Potential Function, Velocity Potential Function and Stream Function.

        f. State Cauchy's Theorem.

        g. State Maclaurin's Series.

        h. Find the Residue of $\frac{ze^z}{(z-1)^3}$ at its Pole.

        i. Write Standard Transformations.

        j. Find the Fixed Points of the Transformation (i). $w = \frac{2i-6z}{iz-3}$ (ii). $w = \frac{z-1}{z+1}$.

PART-B (50 Marks)

2.   Solve $(x + 1)^2 \frac{d^2y}{dx^2} - 3(x + 1)\frac{dy}{dx} + 4y = x^2 + x + 1$.

                                        OR

3.   Solve in Series the equation $y^{11} + xy^1 + y = 0$ about x = 0.

4.   a. If $f(x) = \begin{cases} 0, & if -1 < x < 0 \\ 1, & if\ 0 < x < 1 \end{cases}$

        Then Show That $f(x) = \frac{1}{2}P_0(x) + \frac{3}{4}P_1(x) - \frac{7}{16}P_3(x) + - - - - - - - - -$.

        b. Prove That $(2n + 1)xP_n(x) = (n + 1)P_{n+1}(x) + nP_{n-1}(x)$.

OR

5.   a. Show That $J_4(x) = \left(\frac{48}{x^3} - \frac{8}{x}\right)J_1(x) + (1 - \frac{24}{x^2})J_0(x)$.

b. Show That $J_n(x)$ is an even function when n is even & odd function when n is odd.

6.   a. If f(z) = u+iv is analytic in a domain D and uv is constant in D, then

Prove That f(z) is Constant.

b. If $w = \Phi + i\psi$ represents the Complex Potential for an Electric Field and
$\psi = x^2 - y^2 + \frac{x}{x^2+y^2}$, Determine Φ.

OR

7.   a. Evaluate $\int_C \frac{z^3+z^2+z+1}{(z-1)^3} \, dz$ where c is $|z| = 3$.

b. Evaluate $\int_C \frac{z^4}{(z+1)(z-i)^2} \, dz$ where c is the Ellipse $9x^2 + 4y^2 = 36$.

8.   State and Prove Taylor's Theorem of Complex Function f(z)

OR

9.   a. Evaluate $\int_C \frac{4-3z}{z(z-1)(z-2)} \, dz$ where c is $|z| = \frac{3}{2}$ using Residue Theorem.

b. Evaluate $\int_0^\infty \frac{dx}{1+x^2}$

10.   a. Show That the image of the Hyperbola $x^2 - y^2 = 1$ under the

Transformation $w = \frac{1}{z}$ is the Lemniscates $\rho^2 = Cos\, 2\Phi$.

b. Find the image of the infinite strip $0 < y < \frac{1}{2}$ under the mapping function $w = \frac{1}{z}$.

OR

11.   Find the Bilinear Transformation which maps the points (2, i, -2) into the points (1, i, -1).

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
R13 MODEL QUESTION PAPER-2
B.TechII - I End Examinations, November - 2014
MATHEMATICS - III

TIME: 3hours   **Max Marks: 75**

Note: This question paper contains two parts A and B.
Part A compulsory which carries is 25 marks. Answer all questions in Part A.
Part B contains of 5 units. Answer any one full question from each unit. Each
Question carries 10 marks and may have a, b, c as sub questions.

PART-A (25 Marks)

1.   a. Define Legendre's Linear Equation

        b. Define Ordinary Point and Singular Point.

        c. Write Orthogonality of Legendre's Polynomials

        d. Write the Relation between $J_{-n}(x)$ and $J_n(x)$ where nϵz^+.

        e. Define Harmonic Function and Show That u $= e^x Cos y$ is Harmonic

        f. Evaluate $\int_C \frac{z^2-z+1}{(z-1)} dz$, where c: $|z| = \frac{1}{2}$.

        g. Find Taylor's Series of Sinz about $z = \frac{\pi}{4}$.

        h. Define Removable, Essential and Pole Singularities.

        i. Find the image of the Circle $|z - 1| = 1$ under the mapping $w = \frac{1}{z}$.

        j. Define Critical Point and Bilinear Transformation.

PART-B (50 Marks)

2.   Solve $x^2 \frac{d^2 y}{dx^2} - 3x \frac{dy}{dx} + 4y = (1 + x)^2$.

                                OR

3.   Obtain the Series solution of the equation $x(1 - x)y^{11} - 3xy^1 - y = 0$.

4.   a. Prove That $\frac{1+z}{z\sqrt{1-2xz+z^2}} - \frac{1}{z} = \sum_{n=0}^{\infty}[P_n(x) + P_{n+1}(x)]z^n$.

        b. $P_n^{~1}(-1) = (-1)^{n-1}.\frac{n(n+1)}{2}$

                                OR

5.   a. Express $J_2(x)$ in terms of $J_0(x)$ and $J_1(x)$.

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

6.   a. If f(z) = u + iv is an analytic function of z and $u - v = e^x(Cosy - Siny)$,

        find f(z) in terms of z.

        b. Find k such that $f(x, y) = x^3 + 3kxy^2$ is Harmonic and find its Conjugate.

<div align="center">OR</div>

7.   a. State and Prove Cauchy's Integral Formula.

        b. Evaluate $\int_0^{1+i}(x^2 - iy)\,dz$ along (i). y = x, (ii). $y = x^2$

8.   State and Prove Laurent's Theorem.

<div align="center">OR</div>

9.   Evaluate $\int_{-\infty}^{\infty}\frac{x^2-x+2}{x^4+10x^2+9}\,dx$.

10.   Show That Every Bilinear Transformation maps the Circles in the z-plane onto the Circles in the w-plane.

<div align="center">OR</div>

11.   Find the Bilinear Transformation which maps the points z = -1, i, 1 into w = 0, i, ∞.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
R13 MODEL QUESTION PAPER-3
B.Tech II - I End Examinations, November - 2014
MATHEMATICS - III

TIME: 3hours   **Max Marks: 75**

Note: This question paper contains two parts A and B.
Part A compulsory which carries is 25 marks. Answer all questions in Part A.
Part B contains of 5 units. Answer any one full question from each unit. Each
Question carries 10 marks and may have a, b, c as sub questions.

PART-A (25 Marks)

1.   a. Solve $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} = 0$.

b. Find the roots of Indicial Equation of the Differential Equation $4x \frac{d^2y}{dx^2} + 2 \frac{dy}{dx} + y = 0$.

c. Write Orthogonality of Bessel Functions.

d. Find the value of x^3 in terms of Legendre Polynomials.

e. Find the value of k such that $f(z) = e^x(Cosky + i\ Sinky)$ is analytic.

f. Find the value of $\int_{(0,0)}^{(1,1)} x^2 y\, dx + (x^2 - y^2)dy$ along the line y = 3x.

g. Show That $(1 + z)^{-1} = \sum_{n=0}^{\infty} (-1)^n z^{-n-1}, if\ |z| > 1$.

h. Define Residue at a Pole and Residue at Infinity.

i. Write Cross-Ratio of four points $z_1,\ z_2,\ z_3,\ z_4$.

j. Find the image of the line x = 4 in z-plane under the transformation w = z^2

PART-B (50 Marks)

2.   Solve $\frac{d^2y}{dx^2} + \frac{1}{x}\frac{dy}{dx} = \frac{12\ logx}{x^2}$.

<p style="text-align:center">OR</p>

3.   Find the Power Series solution of the equation $y^{11} + (x - 3)y^1 + y = 0$

in powers of (x-2).

4.   a. Prove That $\int_{-1}^{1} xP_n(x)P_{n-1}(x)dx = \frac{2n}{4n^2-1}$

b. Prove That $(1 - x^2)P_n^{1}(x) = (n + 1)[xP_n(x) - P_{n+1}(x)]$.

OR

5. a. Prove That $\frac{d}{dx}[x^{-n}J_n(x)] = -x^{-n}J_{n+1}(x)$.

    b. Show That $Cos(xSin\theta) = J_0 + 2(J_2 Cos2\theta + J_4 Cos4\theta + \cdots\cdots\cdots)$.

6. a. Find the analytic function whose real part is $e^{2x}(xCos2y - ySin2y)$.

    b. Show That $f(z) = z + 2\bar{z}$ is not analytic anywhere in the complex plane.

OR

7. a. State and Prove Cauchy's Integral Theorem.

    b. Evaluate $\int_0^{1+i}[x^2 + 2xy + i(y^2 - x)]dz$ $along$ $y = x^2$.

8. a. Find the Laurent's Series of $\frac{1}{z^2-4z+3}$ for $1 < |z| < 3$.

    b. Find the Taylor's Series of e^z about z = 3.

OR

9. a. Find the Residue at z = 0 of the function $f(z) = \frac{1+e^z}{Sinz+zCosz}$.

    b. Evaluate $\int_C \frac{z-3}{z^2+2z+5} dz$, where c is the Circle given by

    (i). $|z| = 1$,   (ii). $|z + 1 - i| = 2$,   (iii). $|z + 1 + i| = 2$.

10. a. Find the image of $|z| = 2$ under the transformation w = 3z.

    b. Under the Transformation $w = \frac{1}{z}$ find the image of the Circle $|z - 2i| = 2$.

OR

11. Find the Bilinear Transformation that maps the points $(\infty, i, 0)$ into the points $(0, i, \infty)$.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
R13 MODEL QUESTION PAPER-4
B.Tech II - I End Examinations, November - 2014
MATHEMATICS - III

TIME: 3hours   **Max Marks: 75**

Note: This question paper contains two parts A and B.
Part A compulsory which carries is 25 marks. Answer all questions in Part A.
Part B contains of 5 units. Answer any one full question from each unit. Each
Question carries 10 marks and may have a, b, c as sub questions.

PART-A (25 Marks)

1.   a. Find the Particular Integral of $x^2 \frac{d^2y}{dx^2} - x\frac{dy}{dx} + y = \log x$.

         b. Define Regular Singular Point and Irregular Singular Point.

         c. If $P_4(x) = k(x^4 - \frac{30}{35}x^2 + \frac{3}{x})$, then find k.

         d. Evaluate $\int J_3(x)$.

         e. Write C-R equations in Cartesian and Polar Forms.

         f. Sate Cauchy's Integral Formula.

         g. State Laurent's Series.

         h. Find Zeros and Poles of $\left(\frac{z+1}{z^2+1}\right)^2$.

          i. Define Conformal Mapping.

          j. S.T. Bilinear Transformation is Conformal.

PART-B (50 Marks)

2.   Solve in Series the equation $x^2 \frac{d^2y}{dx^2} + \frac{dy}{dx} + xy = 0$

                            OR

3.   Solve $x^4 \frac{d^3y}{dx^3} + 2x^3\frac{d^2y}{dx^2} - x^2\frac{dy}{dx} + xy = 0$.

4.   a. S.T $\int_{-1}^{1} x^2 P_{n+1}(x)P_{n-1}(x)dx = \frac{2n(n+1)}{(2n-1)(2n+1)(2n+3)}$.

         b. Express $x^3 + 2x^2 - x - 3$ in terms of Legendre polynomials.

                            OR

5.   a. Prove That $xJ_n^1(x) = -nJ_n(x) + xJ_{n-1}(x)$.

      b. Write $J_{5/2}(x)$ in finite form.

6.   a. Find analytical function whose real part is $r^2 Cos2\theta + rSin2\theta$.

      b. If f(z) is an analytic function of z, Prove That $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4|f^1(z)|^2$.

<div align="center">OR</div>

7.   a. Evaluate $\int_C \frac{z^2 - z + 1}{z - 1} dz$, where $c: |z| = \frac{1}{2}$.

      b. Evaluate $\int_C \frac{logz}{(z-1)^3} dz$, where $c: |z - 1| = \frac{1}{2}$ using Cauchy's Integral Formula.

8.   a. Expand $\frac{7z-2}{(z+1)z(z-2)}$ about the point z = -1 in the region $1 < |z + 1| < 3$

      as Laurent's Series

      b. Expand f(z) = Cosz in Taylor's Series about $z = \frac{\pi}{4}$.

<div align="center">OR</div>

9.   a. State and Prove Cauchy's Residue Theorem

      b. Evaluate $\int_{-\infty}^{\infty} \frac{x^2}{(1+x^2)(x^2+4)} dx$.

10.   a. Show That the function $w = \frac{4}{z}$ Transforms the line x = c in the z- plane into a Circle

      in the w- plane.

      b. Under the Transformation $w = \frac{z-i}{1-iz}$ find the image of the Circle

      (i). $|w| = 1$, (ii). $|z| = 1$.

<div align="center">OR</div>

11.   Find the Bilinear Transformation which maps 1 + i, - i, 2 - i of the z- plane into the points

      0, 1, i respectively of the w-plane. Find the Fixed and Critical Points of this

      Transformation.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
R13 MODEL QUESTION PAPER-5
B.Tech II - I End Examinations, November - 2014
MATHEMATICS - III

TIME: 3hours   **Max Marks: 75**

Note: This question paper contains two parts A and B.
Part A compulsory which carries is 25 marks. Answer all questions in Part A.
Part B contains of 5 units. Answer any one full question from each unit. Each
Question carries 10 marks and may have a, b, c as sub questions.

PART-A (25 Marks)

1.   a. Find the Complementary Function of $x^2 \frac{d^2y}{dx^2} + 4x \frac{dy}{dx} + 2y = e^x$.

        b. Find the Recurrence Relation of the Differential Equation $\frac{d^2y}{dx^2} - xy = 0$.

        c. Write the values of $J_{1/2}(x)$, $J_{-1/2}(x)$.

        d. Show That $P_n(1) = 1$, $P_n(-1) = (-1)^n$.

        e. Define Analytic Function and Entire Function.

        f. Evaluate $\int_C \frac{dz}{(z^2+4)^2} \, dz$, where $c: |z - i| = 2$.

        g. State Taylor's Series.

        h. Determine the Poles of the function (i). $\frac{z}{Cosz}$ (ii). Cotz.

        i. State Conformal Mapping Theorem.

        j. Find the Critical Points of (i). $w = z + \frac{1}{z}$ (ii). w = Cosz.

PART-B (50 Marks)

2.   Solve $(1 + x)^2 \frac{d^2y}{dx^2} + (1 + x) \frac{dy}{dx} + y = sin2[\log(1 + x)]$.

                                    OR

3.   Solve in Series the equation $4x \frac{d^2y}{dx^2} + 2 \frac{dy}{dx} + y = 0$.

4.   a. State and Prove Rodrigue's Formula.

b. S.T. $x^3 = \frac{2}{5}P_3(x) + \frac{3}{5}P_1(x)$.

<div align="center">OR</div>

5.   State and Prove Generating Function for $J_n(x)$.

6.   Show That the function is defined by $f(z) = \frac{x^3(1+i)-y^3(1-i)}{x^2+y^2}$ at $z \neq 0$, and f(0) = 0 is

     continuous and satisfies C-R equations at the origin but $f^1(0)$ does not exist.

<div align="center">OR</div>

7.   a. Evaluate $\oint \frac{z-1}{(z+1)^2(z-2)} dz$ $where$ $c: |z - i| = 2$ by Cauchy's Integral Formula.

     b. Evaluate $\int_C \frac{z+4}{z^2+2z+5} dz$, $where$ $c: |z + 1 - i| = 2$.

8.   a. Define (i) Removable singularity, (ii) Essential singularity, (iii) Pole Singularity.

     b. Find the Laurent's Series of $f(z) = \frac{z^2-6z-1}{(z-1)(z-3)(z+2)}$ in the region $3 < |z + 2| < 5$.

<div align="center">OR</div>

9.   a. Evaluate by Residue Theorem $\int_C \frac{z-1}{(z+1)^2(z-2)} dz$, $where$ $c: |z - i| = 2$.

     b. Evaluate $\int_0^{2\pi} \frac{d\theta}{5-3Cos\theta}$ by Contour Integration.

10.   State and Prove Conformal Mapping Theorem.

<div align="center">OR</div>

11.   a. Find the Fixed Points of the Transformation.

     (i). $w = \frac{2i-6z}{iz-3}$ (ii). $w = \frac{6z-9}{z}$ (iii). $w = \frac{z-1}{z+1}$ (iv). $w = \frac{2z-5}{z+4}$.

     b. Define Bilinear Transformation and Show That Every Bilinear Transformation is

     Conformal.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester supplementary Examinations, May 2017

Electrical Technology

(ECE)

Roll No										

Time: 3 hours   **Max. Marks: 75**

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART - A   (25 Marks)

1. a) A series RL circuit is excited by a step excitation. Then find the circuit response i(t) in the circuit   (3M)

b) Write down the time constant of Series RC and RL circuits   (2M)

c) Define odd function symmetry   (2M)

d) Obtain the Laplace Transform of "t cos at".   (2M)

e) Obtain the current response of RC parallel circuit for unit step input using Laplace transformation   (3M)

f) Define Transfer function and its Limitations   (3M)

g) Define Self-inductance and mutual inductance   (3M)

h) Define Resonance. Explain Series and Parallel resonance circuit   (3M)

i) Explain principle of DC Motor?   (2M)

j) Explain various types of losses in DC Generator?   (2M)

PART-B

SECTION-I   (50 Marks)

2) Find i(t) for t>0 in the figure shown below . The initial conditions of inductor and capacitor are as shown
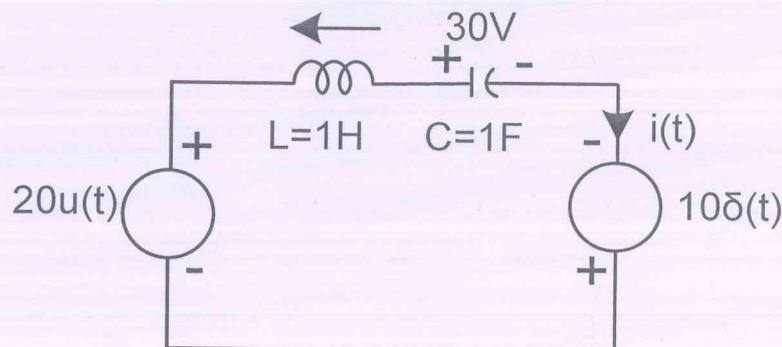
OR

3a) Explain clearly the method of waveforms synthesis using Laplace transforms

b)Explain the transient analysis of series R-L circuit with sinusoidal DC excitation (first order circuit)

SECTION-II

4) Represent h- parameters in terms of Z –parameters and ABCD parameters

OR

5) Explain the concept of series, parallel and cascaded configurations of two port networks?

SECTION-III

6a) Explain the analysis of Proto type band pass filter

b) Design a T-section constant K-high pass filter section have cut-off frequency of 10kHz and design impedance of 600 Ω find its characteristics impedance and phase constant at 25kHz

OR

7a) Write a short note on filters? Explain different types of filters?

b) Explain symmetrical attenuators i) Bridged T-type Attenuator ii) Lattice Attenuator

SECTION-IV

8)Explain about series resonance and parallel resonance

OR

9a) what is Dot convection and Coefficient of Coupling

b) Two inductively coupled coils have self-inductance L_1=25mH L_2=15mH if the coefficientof coupling is 0.5 find i) mutual inductancebetween the coils

SECTION-V

10a) Derive an expression for the induced emf in the armature of a DC machine?

b)A 4 pole Lap wound ,DC Shunt Generator has a useful flux per pole of 0.06wb The armature winding consists of 220 turns each off 0.0004ohms resistance Calculate the terminal voltage when running at 900 rpm if the armature current is 50 amps

OR

11a) Explain the working principle of DC motor

b) A 250V DC shunt motor takes 4A when running unloaded its armature and field resistance are 0.3Ω and 250 Ω respectively. Calculate the efficiency when DC Shunt motor taking a current of 60A?

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTROINICS AND COMMUNICATION ENGINEERING
B. Tech. II Year - I Semester Examinations
ELECTRICAL TECHNOLOGY

Time: 3 hours   **Max. Marks: 75**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE
Questions', Choosing ONE Question from each SECTION and each Question carries 10
Marks.

PART – A   (25 marks)

1. a) What is transient response in the electrical circuit?   (2Marks)

   b) The switch is opened for a long time and closed at t=0 in the given circuit.   (3Marks)

   Find. (i) v_c(0-) (ii) v_c(0+) (iii) i_c(0-) (iv) i_c(0+).
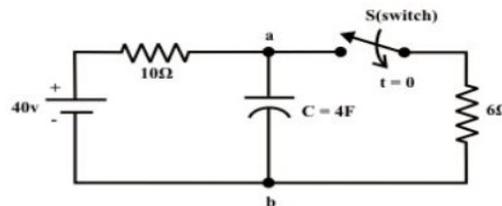
   c) What is a symmetrical and reciprocal network?   (2Marks)

   d) Determine ABCD parameters for the given network.   (3Marks)
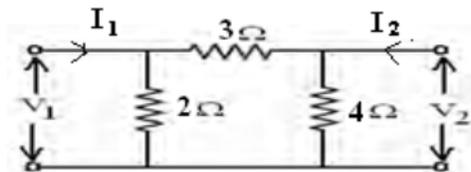
   e) Define a filter and what is the characteristic impedance in the filter?   (2Marks)

   f) Design a constant-k low pass filter terminated in 500 ohms and having the

   Cut off frequency of 2 kHz.   (3Marks)

g) Define DC generator and DC motor? (2Marks)

h) A 6 – pole dc shunt generator with a wave – wound armature has 800 conductors. It runs at a speed of 600 rpm. A load of 10Ω is connected to the generator at a terminal voltage of 220V. The armature and field resistances are 0.4Ω and 200Ω respectively. Find the armature current and the induced EMF. (3Marks)

i) What is magnetic circuit? Give example (2Marks)

j) Draw the locus diagram of series R-L circuit when R is variable. (3Marks)

PART – B (50 marks)

SECTION – I

2. a) In the given circuit the switch is opened at t=0.Find (i) $V_{ab}(0-)$ (ii) $i_x(0-)$ (iii) $i_x(0+)$ (iv) $V_{ab}(0+)$ (v) $i_x(t=\infty)$ (vi) $i_x(t)$ for t>0.
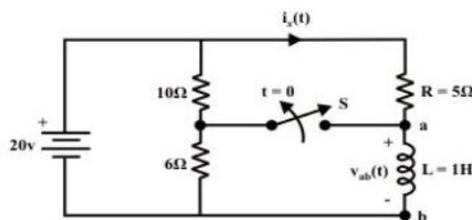
b) Explain the DC response of series R-C circuit with neat waveforms.

(OR)

3. a) For the circuit shown below Figure, find the current equation when switch S is opened at t = 0.
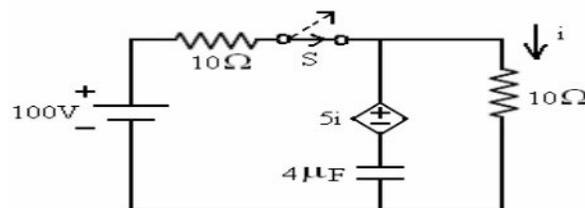
b) In the given circuit the switch is shifted from position 1 to 2 at t=0.Determine i(t) for t>0.
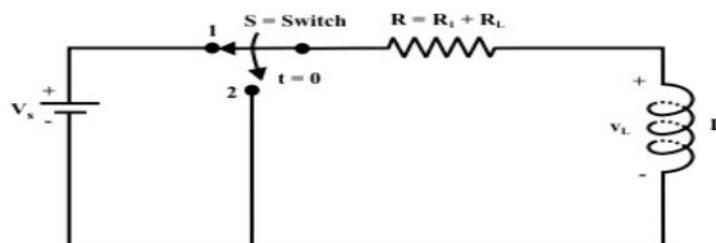
SECTION – II

4. a) Find Z and Y parameter of the network shown below figure.
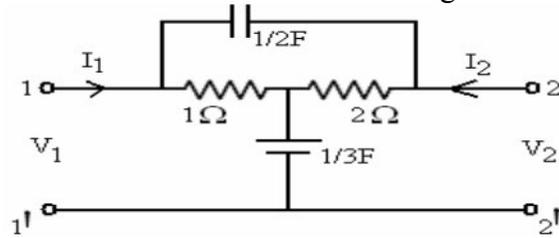
b) Explain about the Y –parameters and derive the condition for symmetry and reciprocity.

(OR)

5. a) Determine the transmission parameter and hence determine the short circuit admittance parameters for the below circuit
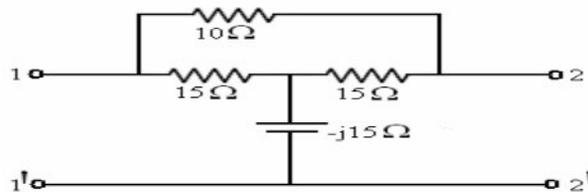
b) Determine the Z- parameters. Hence determine the h-parameters for the given network.
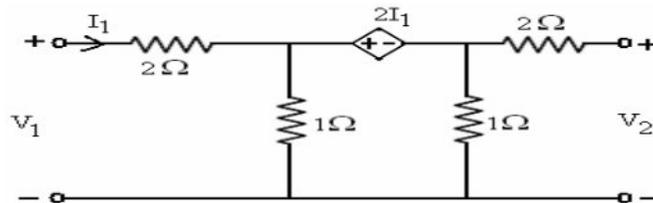
SECTION – III

6. a) Design a band elimination filter having a design impedance of 500Ω and cut – off frequencies $f_1 = 3$ KHz and $f_2 = 8$ KHZ.

   b) Design a m – derived high pass filter with a cut – off frequency of 8KHz; design impedance of 5Ω and m = 0.5.

(OR)

7. a) Explain T – type attenuator and also design a T – type attenuator to give an attenuation of 40dB and to work in a line of 400Ω impedance.

b) Explain the lattice attenuator and also design a lattice attenuator to have a characteristic impedance of 600Ω and attenuation of 10dB.

SECTION – IV

8. a) Explain the principle of operation and operation of DC generators.

   b) A 4 – pole dc shunt generator with a wave – wound armature has 960 conductors. It runs at a speed of 500 rpm. A load of 20Ω is connected to the generator at a terminal voltage of 240V. The armature and field resistances are 0.3Ω and 240Ω respectively. Find the armature current, the induced emf and flux per pole.

(OR)

9. a) Derive the torque equation of a dc motor.

   b) A 4 pole, 500V dc shunt motor has 700 wave connected armature conductors. The full load armature current is 60 A and the flux per pole is 30mWb. Calculate the full load speed if the motor armature resistance is 0.2Ω and brush drop is 1V per brush.

SECTION – V

10. a) Explain about the series resonance in detail with necessary equations and waveforms.

    b) An impedance coil having R = 20Ω and a 50Hz inductive reactance of 22 Ω is connected to 110V, 60Hz source. A series circuit consisting of resistor, R = 10 Ω and variable capacitor is then connected in parallel with coil.

i) For what value of 'C' will the circuit be in resonance?

ii) Calculate two line currents at resonance.

(OR)

11. a) State and explain the Faraday's laws of electromagnetic induction.

    b) A cast steel ring is wound with 500 turns. The cross section of the core is 2×10^{-3} m^2 and the mean length is 0.16 m.

i) Find the value of I required to develop a magnetic flux of $\varphi = 4 \times 10^{-4}$ Wb.

ii) Determine the values of μ and μ_r for the material under these conditions. Assume H for cast steel is 170 AT/m.

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ELECTRICAL TECHNOLOGY

Time: 3 hours   **Max. Marks: 75**

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Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE
Questions', Choosing ONE Question from each SECTION and each Question carries 10
Marks.

<div align="center">

PART – A   **(25 marks)**

</div>

1. a) Define the steady state time in the electrical circuit?   (2Marks)

b) Find out the i(t) for t>0 in the given circuit.   (3Marks)
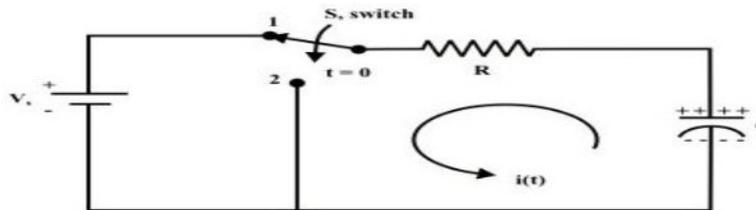
c) Define the Image parameters?   (2Marks)

d) Determine the h-parameters for the given circuit.   (3Marks)
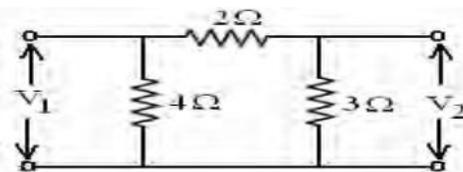
e) What is a constant-k filter?   (2Marks)

f) Design a symmetrical π-type attenuator to give 30dB attenuation and to have a characteristic
impedance of 400 ohms.   (3Marks)

g) What is the necessity of back EMF in the motor?   (2Marks)

h) A 250V, 4-pole wave wound DC series motor has 888 conductors on its armature. It has armature and field resistance of 0.88ohms .The motor takes a current of 80A. Determine.
 i) Speed.
ii) Gross torque developed if it has a flux per pole of 28 mw.   (3Marks)

i) Define coefficient of coupling in a magnetic circuit.   (2Marks)

j) Derive the expression for half power frequencies for a RLC series circuit.   (3Marks)

PART – B   (50 marks)

SECTION – I

2. a) In a series RL circuit with R = 3 ohm and L = 1 H, a DC voltage of E = 50 V is

   applied at t = 0. Find the transient response of current and plot the response.

   b) Explain the DC response of series RLC circuit.

(OR)

3. a) What are the initial conditions? Why are they needed? Explain.

   b) The switch S is closed at t = 0 in the below figure. Find the initial conditions at
   t = 0+ for i_1, i_2, Vc, di_1/dt, di_2/dt.
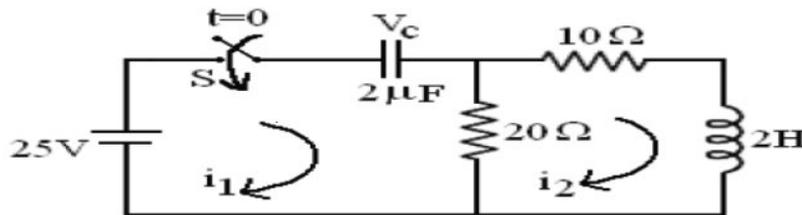
SECTION – II

4. a) Explain about the interconnection of two port networks.

   b) Determine the Z and Y- parameters of the network shown in below Figure.

(OR)
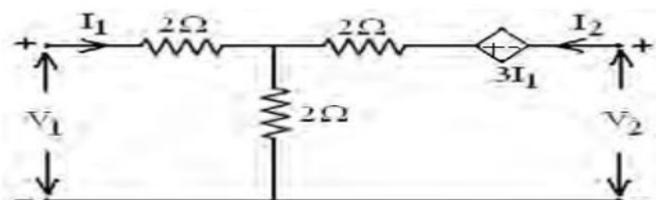
5. a) Derive expressions for Image parameters of a symmetrical two port network.

   b) Obtain Z parameters of the below circuit and from there Z – parameters derive h – parameters.
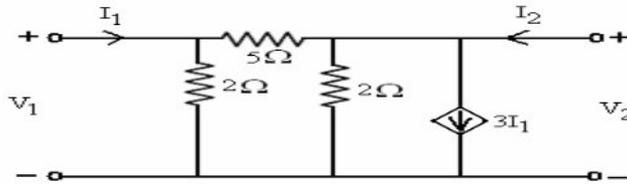
SECTION – III

6. a) A low pass π section filter consists of an inductance of 25 mH in series arm and two capacitors of 0.2μF in shunt arms. Calculate the cut – off frequency, design impedance, attenuation at 5 KHz and phase shift at 2 KHz. Also find the characteristic impedance at 2 KHz

b) What is a constant – K high pass filter, derive the cut off frequency and characteristics impedance.

(OR)

7. a) Explain bridged T – type attenuator and also design it to give 20dB attenuation and to have characteristic impedance of 100Ω.
b) An attenuator is composed of symmetrical T-section having series arm each of 420 ohms and shunt arm of 740 ohms. Derive expression for and calculate the Characteristic impedance of this network and attenuation per section. Draw the circuit diagram for symmetrical T-type attenuator.

SECTION – IV

8. a) What are the different types of dc generators? Show the connection diagrams and load characteristics of each type.
b) A short shunt compound generator delivers a load current of 30A at 220V and has a armature, series and shunt field resistances are 0.05 ohms, 0.03 ohms and 200 ohms respectively Calculate the induced EMF and armature current. Allow 1V per brush contact drop.

(OR)

9. a) Explain why Swinburne's test cannot be used to determine the efficiency of DC series motor?
b) A 4 pole series motor has 944 wave-connected armature conductors at a certain load. The flux per pole is 34.6 mWb and the total mechanical torque developed is 209 N-m. Calculate the line current taken by the motor and the speed at which it will run. The applied voltage is 500 V and total motor resistance is 3 ohms.

SECTION – V

10.a) Show that the resonant frequency ω_0 of an RLC series circuit is the geometric mean of ω_1 and ω_2, the lower and upper half power frequencies respectively.

b) A voltage $V = 50\angle 0^0$ V is applied to a series circuit consisting of fixed inductive reactance $X_L = 5$ Ohms and a variable resistance R. Sketch the admittance and current locus diagrams.

(OR)

11. a) Obtain the expression for co - efficient of coupling in magnetic circuit.

b) A cast steel electromagnet has an air gap length of 3 mm and an iron path of length 40 cm. Find the number of ampere turns necessary to produce a flux density of 0.7 Wb/m^2 in the gap. Neglect the leakage and fringing

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Questions', Choosing ONE Question from each SECTION and each Question carries 10
Marks.

PART – A   (25 marks)

1. a) Why does current through the inductor cannot change instantaneously?   (2 Marks)
   b) The switch S is closed at t = 0. Find the initial conditions at
      t = 0+ for i1, Vc, di1/dt.   (3Marks)
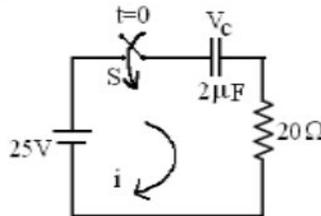
   c) Find Z-parameters for T network.   (2 Marks)
   d) Find the Y parameters of the network shown in figure below.   (3Marks)
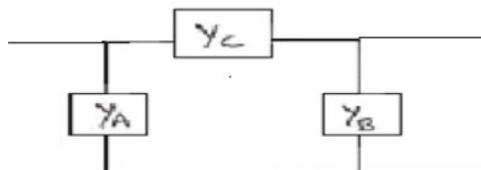
   e) What is propagation constant for a filter?   (2 Marks)

   f) Design a symmetrical lattice type attenuator to give 20dB attenuation and to have a
   characteristic impedance of 200 ohms. ?   (3Marks)
   g) What is the necessity of starter in DC motor?   (2Marks)
   h) A Certain wave wound DC generator running at a speed of 300rpm is to generate an induced
   emf of about 535V, the flux per pole being 0.055 Wb. Determine the number of poles, if the
   number of conductors is 650.   (3Marks)
   i) State and explain Faradays law of electromagnetism.   (2Marks)

j) Determine equivalent impedance for the given network.   (3Marks)

(6+j8)Ω

10Ω

-j7Ω

A

B
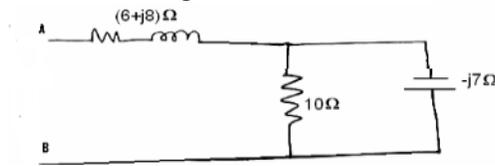
PART – B   (50 marks)

SECTION – I

2. a) In the circuit shown in Figure 4, 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 = 500µsec, the switch is moved to position 2. Obtain the expression for current i(t) in the both intervals sketch i(t).

t=500µSec

S

1

2

100V

50V

i(t)

100Ω

0.2H
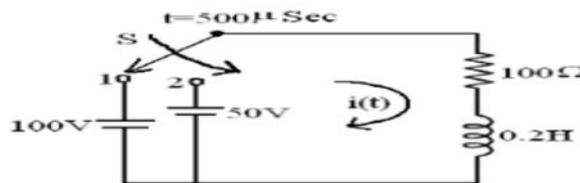
b) Draw the network in Laplace domain and find I(s) shown in figure8 Switch is opened at t = 0.

2Ω

1H

10V

t=0

i(t)

3Ω

1F

v(t)
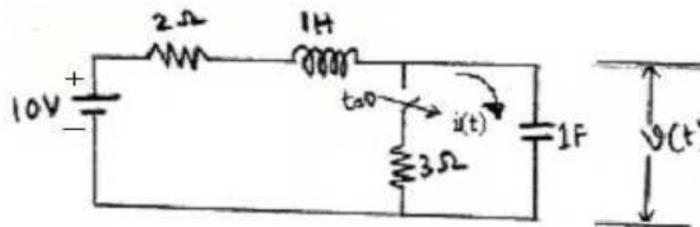
(OR)

3. a) For the below circuit (Fig. 1), find the current equation i(t), when the switch is opened at t = 0.

S

i

30Ω

20Ω

10 V

10i

2H
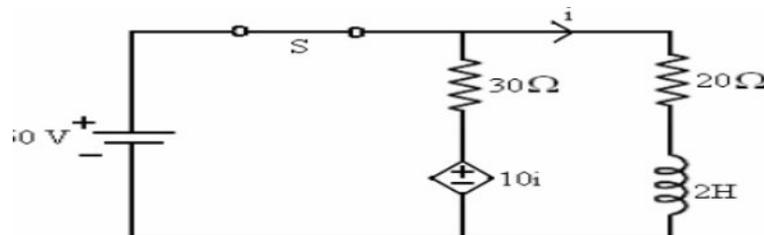
b). Transform the below circuit in to 'S' domain and determine the Laplace transform impedance.
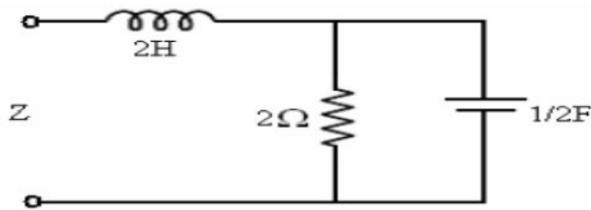
SECTION – II

4. a)Explain about the ABCD parameters for a given two port network.
   b) Determine Y – parameters of the below network. Hence determine the h-parameters.

(OR)
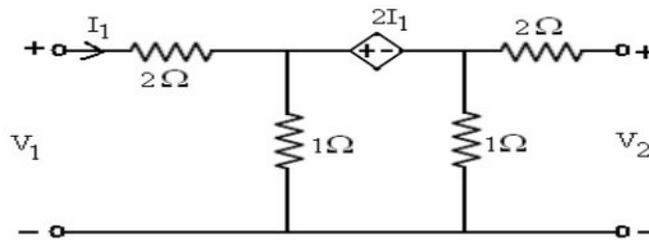
5. a) Determine the transmission parameters of the network shown in figure below.
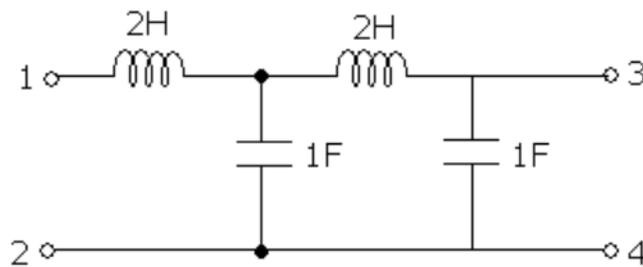
b) Find the Z parameters of the T- network shown in figure below. Verify the network is reciprocal or not.
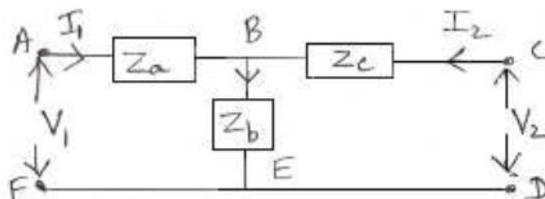
SECTION – III

6. a) Explain π – type attenuator and also design a π – type attenuator to give an attenuation of 60dB and to work in a line of 500Ω impedance.

b) Find the frequency at which a prototype T-section low pass filter having a cut-off frequency.

 (f$_c$) having an attenuation of 15dB.

(OR)

7. An attenuator is composed of symmetrical T-section having series arm each of 420 ohms and shunt arm of 740 ohms. Derive expression for and calculate the characteristic impedance of this network and attenuation per section. Draw the circuit diagram for symmetrical T-type attenuator.

SECTION – IV

8. a) Explain why Swinburne's test cannot be used to determine the efficiency of DC Series motor?

(b) A 200V, 14.92kW, dc shunt motor when tested by Swinburne's method gave the following test results are
Running light: Armature current of 6.5 A and field current = 2.2A
With armature locked: I$_a$ =70A when potential difference of 3V was applied to the brusher.
Estimate efficiency of motor when working under full load.

(OR)

9. a) All general requirements of the electric traction are fulfilled by DC series motors compared to other DC motors". Justify with related equations and characteristics.
b)A Certain wave wound DC generator running at a speed of 300rpm is to Generate an induced emf of about 535V, the flux per pole being 0.055 Wb. Determine the number of poles, if the number of conductors is 650.

SECTION – V

10. a) Draw the locus diagram of the current I for the circuit shown in the figure below when the Reactance X$_C$ is varied fom 0 to infinity
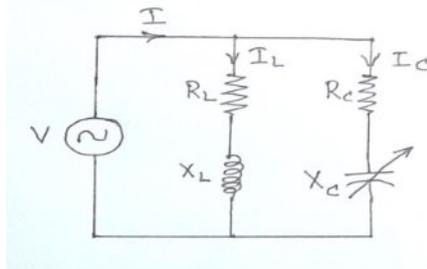
b) Construct the admittance locus diagram and determine the variable inductance values so that the phase angle between the supply voltage and supply current is zero for the Fig. below. ω = 200 rad/s.
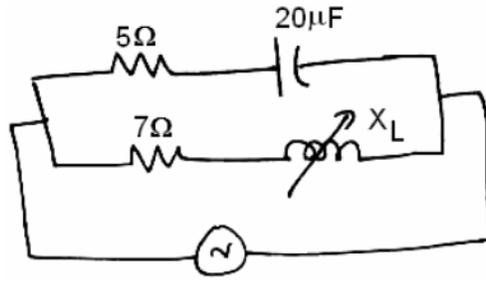
(OR)

11. a) Define coefficient of coupling. Obtain an expression for it.
    b) Find the equivalent inductance of the circuit shown below figure.
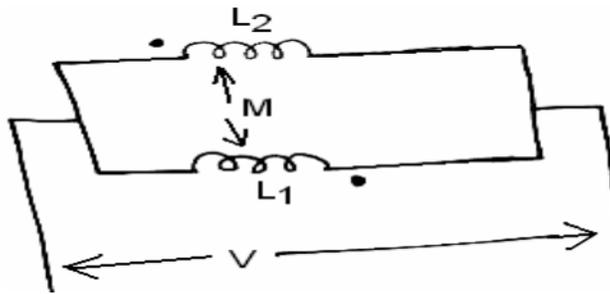
Code No: R15A0202

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTROINICS AND COMMUNICATION ENGINEERING
B. Tech. II Year - I Semester Examinations
ELECTRICAL TECHNOLOGY

Time: 3 hours   **Max. Marks: 75**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE
Questions', Choosing ONE Question from each SECTION and each Question carries 10
Marks.

PART – A   (25 marks)

1. a) why the voltage across the capacitor cannot change instantaneously? Explain.   (2Marks)

   b) A dc voltage of 20V is applied in a RL circuit where R = 5 ohm and   L = 10H. Find

   i. The time constant

   ii. The maximum value of stored energy.   (3Marks)

   c) Explain why Admittance parameters are called as short circuit parameters.   (2Marks)

   d) Determine Z- parameters for the given network.   (3Marks)
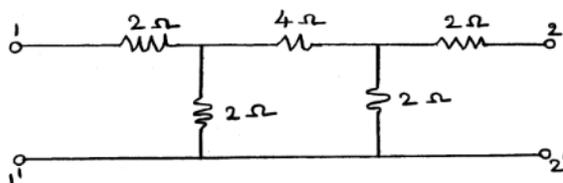
   e) Explain constant K-type low pass and high pass filters?   (2Marks)

   f) Design a low pass T-section filter having a cut-off frequency of 1.5 KHz to operate with a
terminated load resistance of 600 ohms?   (3Marks)

   g) Explain different types of dc generators with neat sketches and give the application of each.

(2Marks)

h) A 250 V, 10KW shunt motor takes 1.5A when running light. The armature and field resistances are 0.3 ohm and 400 ohm respectively. Brush contact drop of 2V. Find the full load efficiency of motor?   (3Marks)

i) State and explain right hand thumb rule   (2Marks)

j) What is series resonance and derive the equation for resonant frequency.   (3Marks)

<center>**PART – B**   **(50 marks)**</center>

<center>**SECTION – I**</center>

2. a) In the circuit shown in the figure below, the switch is put in position - 1 for 1 m sec and then thrown to position - 2. Find the transient current in both intervals.
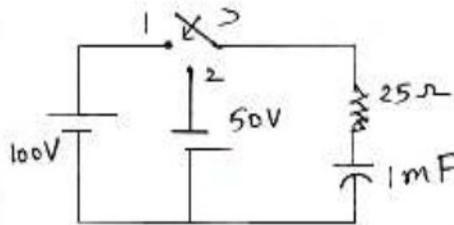
b) Explain the DC response of series R-L circuit with neat waveforms.

<center>**(OR)**</center>

3. a) A dc voltage of 100V is applied in the circuit shown in figure below and the switch is kept open. The switch K is closed at t = 0. Find the complete expression for the current.
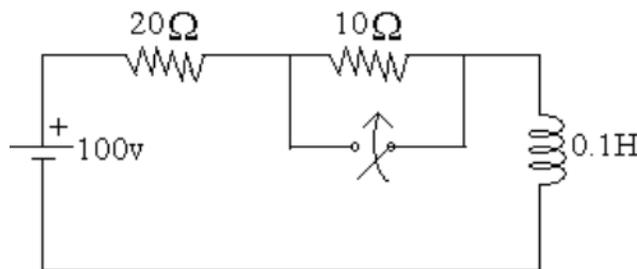
b) Find   c (t) at t = 0 + while the switching is done from x to y at t = 0. As shown in figure below.
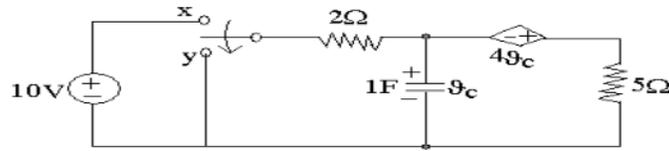
SECTION – II

4. a) Find the Image parameters for the network shown in figure below.
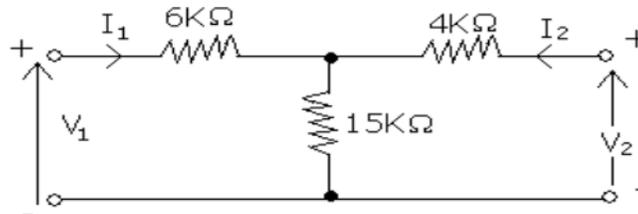
   b) Explain about the ABCD –parameters and derive the condition for symmetry and reciprocity.

(OR)

5. a) Determine the transmission parameters of the network shown in figure below.
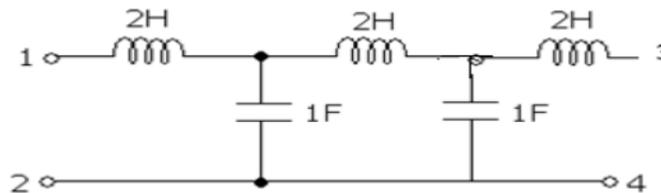
   b) Determine the Y- parameters. Hence determine the   h-parameters for the given network.
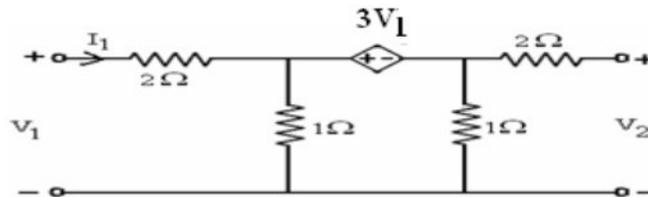
SECTION – III

6. a) Design a band pass filter having a design impedance of 800Ω and cut – off frequencies $f1 = 3$ KHz and $f_2 = 6$ KHZ.

b) Design a m – derived low pass filter with a cut – off frequency of 6KHz; design impedance of 600Ω and $m = 0.4$

(OR)

7. a) An attenuator is composed of symmetrical T-section having series arm each of 185 ohms and shunt arm of 350 ohms. Calculate the characteristic impedance and attenuation per section?

b) Design a low pass π-section filter with a cut-off frequency of 2KHZ to operate with a load resistance of 400 ohms?

SECTION – IV

8. a) Write about the various losses occurring in a dc generator and name the parts of the machine in which these occur.

b) The armature of a 4 – pole lap wound shunt generator has 480 conductors. The flux per pole is 0.05 Wb. The armature and field resistances are 0.05Ω and 50Ω. Find the speed of the machine when supplying 450A at a terminal voltage of 250V.

(OR)

9. a) Discuss in detail the different methods of speed control of a dc motor.

b) A 4-pole 500v dc shunt motor has 700 wave connected armature conductors. The full load armature current is 50 A and the flux per pole is 40mWb. Calculate the full load speed if the motor armature resistance is 0.2 and the brush drop is 1V per brush.

SECTION – V

10. Draw the locus diagram of the current I for the circuit shown in the figure below when the Reactance X_L is varied fom 0 to infinity .
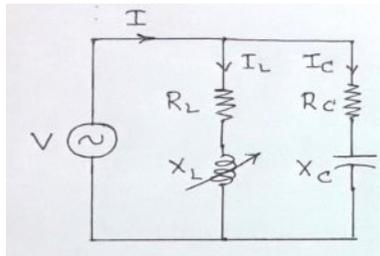
(OR)

11. a) Define and explain self – inductance and mutual – inductance.

b) Two coupled coils of $L_1 = 0.8$ H and $L_2 = 0.2$ H have a coupling coefficient k = 0.9. Find the mutual inductance M.

Code No: R15A0202

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTROINICS AND COMMUNICATION ENGINEERING
B. Tech. II Year - I Semester Examinations
ELECTRICAL TECHNOLOGY

Time: 3 hours   **Max. Marks: 75**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE
Questions', Choosing ONE Question from each SECTION and each Question carries 10
Marks.

<div align="center">

PART – A   **(25 marks)**

</div>

a) What are the initial conditions?   (2Marks)
b) b. The switch S is closed at $t = 0$ Find the initial conditions at
$t = 0+$ (3Marks)

.
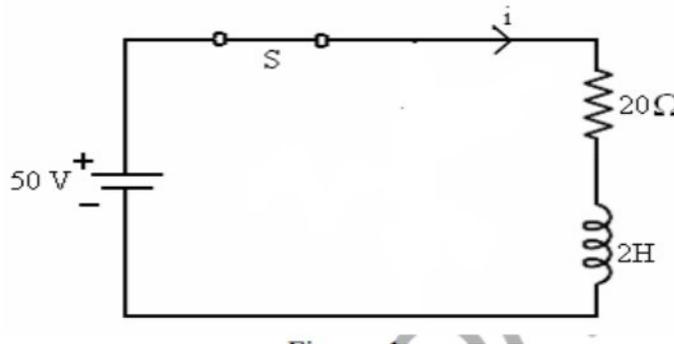
c) Explain why Admittance Parameters are called as short circuit parameters.   (2Marks)

d) Find the Z parameters of the T- network shown in figure below   (3Marks)
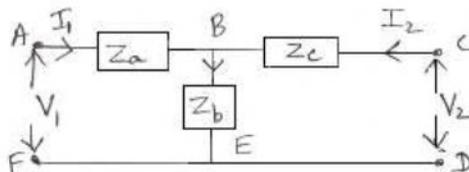
e) What are symmetrical attenuators?   (2Marks)

f) Design π – type attenuator of 20db attenuation and to have characteristic impedance of 100Ω. (3Marks)

g) Derive torque expression of a dc machine (2Marks)

h) Explain the function of a commutator. (3Marks)

i) Explain the concept of self and mutual inductance. (2Marks)

j) Explain dot convention for coupled circuits. (3Marks)

PART – B (50 marks)

SECTION – I

2. a) For the circuit shown below figure 1 .find the current equation when switch S is opened at t=0
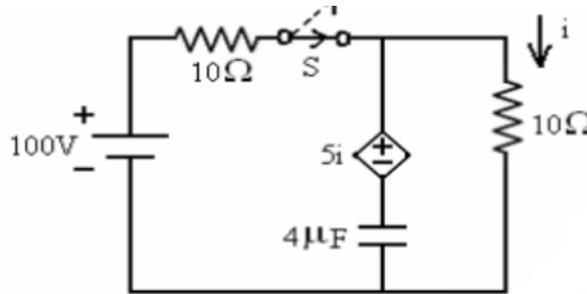

Figure 1

b) Convert the current source shown below figure 2 in to a voltage source in the source in the S domains
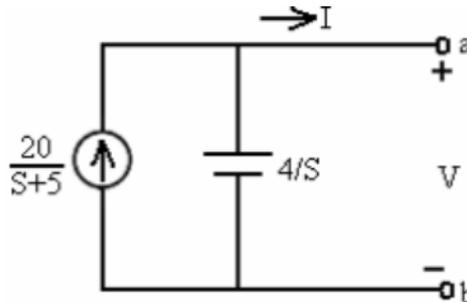
Figure. 2

(OR)

3. In a series RL circuit with R = 3 ohm and L = 1 H, a DC voltage of E = 50 V is applied at t = 0. Find the transient response of current and plot the response.

SECTION – II

4. Find Z and Y parameter of the network shown below figure.
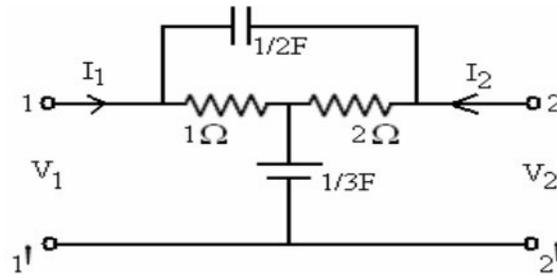
(OR)

5. Obtain Z parameters of the below circuit (Figure. 3) and from there Z – parameters derive h – parameters
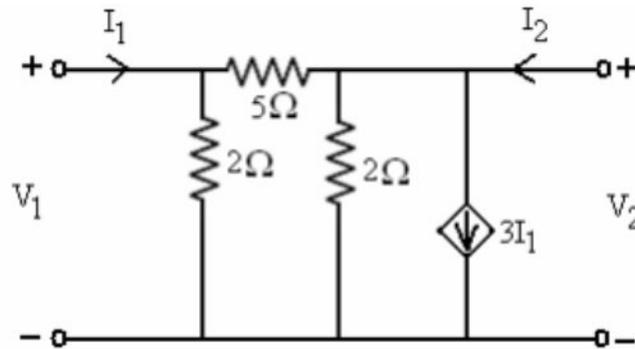

Figure. 3

SECTION – III

6. a) Design constant –k low pass T and π section filters to be terminated in 600 ohms and having cut off frequency 3 kHz. Determine (i) the frequency at which the filters offer attenuation of 17.372 dB. (ii) Attenuation at 6 kHz (iii) the characteristic impedance and phase constant at 2 kHz.

b) Design a constant –k type band-pass filter section to be terminated in 600 ohm resistance and having cut off frequencies of 2 kHz and 5 kHz.

(OR)

7. a) Design a T attenuator to give an attenuation of 10 dB. The characteristics resistance is 600 ohms.

b) Design a symmetrical lattice attenuator to have a characteristics impedance of 100 ohms and attenuation of 12 dB.

SECTION – IV

8. a) Write the expression for induced emf in a dc generator and clearly define all the terms. What happens if a DC generator is operated at a speed below the rated speed?

b) The armature of a 6-pole D.C. generator has a wave winding containing 664 conductors. Calculate the generated emf when the flux per pole is 0.06 wb and the speed is 250 rpm. At what speed must the armature be driven to generate an emf of 250 V if the flux per pole is reduced to 0.058 Wb.

(OR)

9. a) Derive the Torque equation of DC Motor.

b) A 6-pole dc motor has a wave connected armature with 87 slots. Each slot Containing 6 conductors. The flux per pole is 20mWb and the armature has a resistance of 0.13 Ω. Calculate the speed when the motor is connected to a 240 V supply, and taking an armature current of 80A. Calculate also the torque in Newton meters developed by the armature.

SECTION – V

10. a) A series RLC circuit with R =25Ω, L = 0.01H, C = 0.05 μF is energized by a 10V variable frequency source. Find the resonant frequency, Quality factor, band width. Find the frequencies at which voltages across inductor and capacitor are maximum.

b) For the circuit shown in Fig draw the admittance locus diagram and state whether resonance is possible or not.
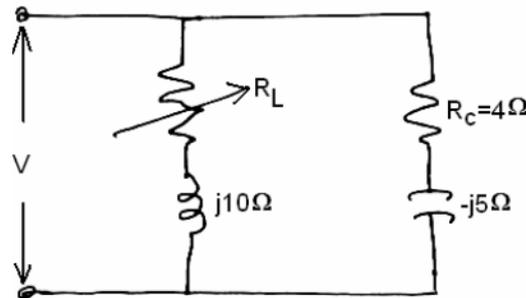

(OR)

11. a) Explain Faraday's laws of electromagnetic induction.

b) A cast steel of d.c electromagnet shown in the Fig has a coil of 1000 turns as its central limb. Determine the current that the coil should carry to produce a flux of 2.5 mWb in air gap. Neglect leakage. Dimensions are given in cm.
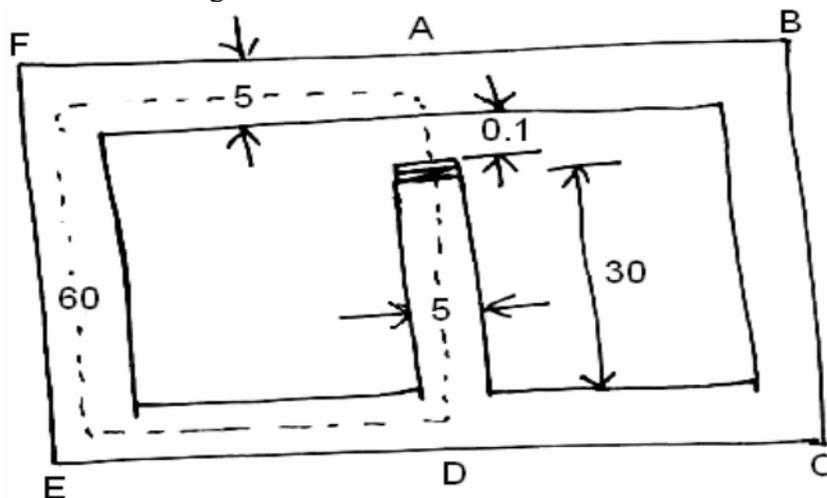
MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester supplementary Examinations, May 2017

Managerial Economics and Financial Analysis

(ECE)

Roll No										

Time: 3 hours   Max. Marks: 75

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART-A   25 Marks

1)   a. Define Managerial Economics. Discuss the importance of Managerial Economics?(2M)
   b. What are the needs for Demand Forecasting? (3M)
   c. Define production function. (2M)
   d. Explain any one type of production function? (3M)
   e. Explain Economies of scale? (2M)
   f. Explain the features of Monopoly? (3M)
   g. What are the Different types of Business organizations? (2M)
   h. What is the importance of capital? (3M)
   i. What is Trial Balance? Why it is prepared? (2M)
   j. Explain the meaning of the Analysis of Financial Statements? (3M)

PART-B   50Marks

SECTION-I

2)   Define Managerial Economics. Explain its Nature And Scope?

Or

3)   a. Define 'Demand' and explain the factors that influence the demand of a product.
   b. What is 'Elasticity of Demand'? Define Income Elasticity of Demand?

SECTION-II

4)   Define production Function. Discuss in detail the different types of production functions.

or

5) a. Discuss the role and importance of cost analysis in managerial decisions.
   b. The information about Raj and Co., are given below.
   i) Profit-Volume Ratio (P/V Ratio) is 20%
   ii) Fixed costs Rs. 36000
   iii) Selling price per Unit Rs. 150
   Calculate: i) BEP (in Rs.) ii) BEP (in Units) iii) Variable Cost per Unit iv) Selling Price per Unit.

SECTION-III

6)   a. What is perfect competition? What are its features?
   b. How is market price determined under conditions of Perfect Market Competition?

Or

7) a. What are the salient features Partnership Firm?
   b. Explain Different kinds of partners.

SECTION-IV

8) Define Capital. Explain the factors determine the working capital requirements of company?

Or

9) Explain the purpose of preparing the following accounts/statements. And Mention various items that appear in each of them.

i) Trading Account   ii) Profit & Loss Account   iii) Balance Sheet

SECTION-V

10) a) What are the merits and limitations of Pay Back Period?

b) What do you understand by time value of money? How is it helpful in Capital Budgeting?

Or

11) Explain the main objectives of Accounting and its important functions?

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

II-B.TECH-MEFA-Model paper-1

Time: 3 hours   **Max. Marks: 75**

PART- A (25 Marks)

Answer the following questions

1. a)What is the scope of managerial economics?
   b) Define the basic law of consumption
   c) What is the angle of incidence
   d) dISOCOST &MRTS
   e) Explicit and implicit cost
   f) Optimum size of firm –explain
   g) Types of the competition markets
   h) What is the significance ratios
   i) Define the different types of companies
   j) Short term sources of finance.

Part-B (5*10=50 Marks)

2. What is the managerial economic role in decision making?

OR

3. Demand function and its determents

4. What is the production function explain the cobbdougls function

OR

5. Explain how cost output relationship helps the enterprenurer in expansion of the decision

6. Different types of the pricing strategies while fixing the price of the product

OR

7. What is the joint stock company discuss the features, advantages & disadvantages?

8. Describe the high lets of 1991 industrial policy

OR

9. What are the various types of the ratios?

10. What is the capital discuss the different sources of capital

OR

11. Write the proframa of final accounts.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

II-B.TECH-MEFA-Model paper-2

Time: 3 hours   **Max. Marks: 75**

PART- A (25 Marks)

Answer the following questions

1.a)Describe the normative statement?

b) Explain changes in Demand

c) What is the law of returns to scale?

d) Difference Between the perfect and Monopoly market?

e) What are the different kinds of partners?

f) List out the accounting concepts?

g) Features of working capital?

h) Limitations of ratio analysis

i) Types of capital budgeting discuss?

j) Explain the concept of privatization?

Part-B (5*10=50 Marks)

2. Explain how managerial economics linked with other disciplinarian?
                                                OR
3. Describe the different methods of demand forecasting?

4. Explain the law of returns with appropriate examples?
                                                OR
5. Define the BEP how do you use this for decision making?

6. What is the price output relation in monopoly competition?
                                                OR
7. Why is pricing significant in the contest of business explain?

8. Explain the need for public enterprise in India?

OR

9. What are the new economic reforms of India after new economic policy?

10. Write about accounting concepts and conventions?

OR

11. Explain the IRR concept with example?

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

II-B.TECH-MEFA-Model paper-3

Time: 3 hours   Max. Marks: 75

PART- A (25 Marks)

Answer the following questions

1.a)What is the importance of investment decision in managerial Economics?

b) Explain the point of elasticity?

c) Describe the features of an ISoquant?

d) What is the impact of short run cost on production?

e) What is the Memorandum of association?

f) Influence of globalization on business environment?

g) List out the different branches of accounting?

h) Write the significance of capital?

i) Explain the profitability index?

j) Significance of liquidity ratios in the firm?

Part-B (5*10=50 Marks)

Answer the following questions

2. Explain the nature and scope of Managerial Economics?

OR

3. Define the price elasticity and its measurements?

4. Explain the different type's costs?

OR

5. Calculate BEP in both volume and units where fixed cost is 20000`, variable cost is 50 per unit selling price 80?

6. Price determination of perfect market in short runs?

OR

7. Discuss the competition oriented pricing?

8. Explain the features and characteristics of sole traders?

OR

9. What are the measures to solve problems arising from business cycles?

10. Write the format of Trail balance and Trading A/c

OR

11. Calculate the liquidity and Turnover ratios?

Liabilities	Amount (000)	Assets	Amount(000)
Preference share capital	100	Land and buioldings	225
Equity share capital	150	Plant and machinery	250
General reserve	250	Furniture and fixture	100
Debentures	400	stock	250
creditors	200	debtors	125
Bills payable	50	Cash at bank	250
Outstanding expenses	50	Cash in hand	125
P&l a/c	100	Prepaid expenses	50
Long-term bank loan	200	Marketable securities	125
	1500		1500

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

II-B.TECH-MEFA-Model paper-4

Time: 3 hours   Max. Marks: 75

PART- A (25 Marks)

Answer the following questions

1.a) what are the determinants of demand?

   b) 1.2) Explain the exceptions of law of Demand?

   c) 1.3) what is the production function with two variable inputs?

   d) 1.4) Define the terms MRTS and Least cost combination of inputs?

   e) 1.5) what are the objectives of pricing?

   f) 1.6) what are the elements of partnership deed?

   g) 1.7) Mention different types of capitals?

   h) 1.8) what is cash budget?

   i) 1.9) Define the accounting and importance?

   j) 1.10) Define the words (a) Payback Period, (b) Average rate of return?

Part-B (5*10=50 Marks)

Answer the following questions

2. What is the Micro and Macro economics significance on managerial economics on decision making?

OR

3.What are the factors governing demand forecasting?

4. How the law of returns to scale play a vital role in decision making of production?

OR

5. What is BEP? What are its assumptions and limitations?

6. How the monopolies form in the market?

OR

7. Discuss the role of cooperative societies in economic growth?

8. How does the firm estimate its fixed and working capital requirements?

OR

9. Show the format for preparation of Profit and Loss A/c?

10. Calculate PB, ARR, NPV for following Initial investment is 15000 and discounting factor 10% p.a

Year	Amount
1	5000
2	7000
3	5000
4	-
5	6000

OR

11. What is capital structure and write different types of leverage ratios' with formulas?