Code No.: **50405**

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)
(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad

II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, JUNE-2018

Subject: **Probability Theory and Random Processes**

Branch: ECE

Time: **3 hours**   Max. Marks: 60

PART – A

Answer ALL questions of the following   **5x2Mark=10 Marks**

1. A discrete random variable X has possible values 0,1,2,3 and 4 which occur with probabilities 0.4, 0.25, 0.15, 0.1 and 0.1 respectively. Find the mean value of X.
2. Determine the cumulative distribution function and probability density function of Y given that Y = 2X+3 and that $f_X(x) = 2e^{-x} u(x)$.
3. What is Ergodicity?
4. Is power density spectrum an even function of 'ω' or odd function of 'ω'? Justify.
5. What is the mean value of response of an LTI system for the given random input?

PART-B

Answer any FIVE Questions of the following   **5x10 Marks= 50Marks**

1. 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? **[3M]**
   b) When two dice are thrown find the probability of getting
       i){sum > 7}(ii){2 < sum ≤ 5}iii){sum > 10} **[3M]**
   c) In an experiment, one card is selected from ordinary 52 card deck. Define events A as "Select a King", B as "Select a Jack or Queen" and C as "Select a Heart". Find the probabilities of A, B and C. Discuss which events are independent events. **[4M]**

2. a) The joint density function for X and Y is $f_{x,y}(x,y) = \begin{cases} xy/9 \; ; \; 0 < x < 2, 0 < y < 3 \\ 0; \text{ elsewhere} \end{cases}$

   Show that X and Y are uncorrelated. **[5M]**
   b) Write short notes on Conditional distribution function **[5M]**

3. Define Cross Correlation function of two random processes and find cross correlation between the following two random processes.
              $X(t) = A \cos(w_0 t) + B \sin(w_0 t)$
              $Y(t) = B \cos(w_0 t) - A \sin(w_0 t)$
   When A and B are zero mean uncorrected random variables. With equal variance and w_0 is a constant. **[10M]**

4. Explain the classification of random processes with neat sketches. **[10M]**

5. a) Explain the concept of Mean and Mean-Squared value of system response of Linear System **[5M]**
   b) Derive power density spectrum of Response of Linear system **[5M]**

6. a) A random variable X is uniformly distributed on (0, 6). If X is transformed to a new random variable $Y = 2(X-3)^2 - 4$, find E[Y], Var[Y].   **[5M]**

   b) Write short notes on Conditional Probability   **[5M]**

7. a) Prove that the density function of sum of two statistically independent random variables is the convolution of their individual density functions.   **[3M]**

   b) Define the joint distribution function. Explain how marginal density functions are computed given their joint distribution functions   **[3M]**

   c) When two random variables are said to be independent.   **[4M]**

8. a) Write short notes on Ergodic process   **[5M]**

   b) Find the mean and Auto correlation function of the Random process $X(t) = A\cos(wt + \theta)$ where A and w are constants, θ is a random variable uniformly distributed on the interval $(0, 2\Pi)$ **[5M]**

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II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2018

Subject: <u>Signals And Systems</u>
Branch: ECE

Time: 3 hours   Max. Marks: 60

PART – A

Answer ALL questions of the following   5x2Mark=10 Marks

1. Give the condition of orthogonality of two signals $f_1(t)$ and $f_2(t)$
2. Derive frequency-shifting property of Fourier Transform.
3. Find auto correlation of the sequence x (n) = [2, 1, -2, -1, 4, -1].
4. Write any four properties of Laplace Transforms.
5. Find Z-transform of sequences $x_1(n)$ = [1 0 3 4 6], $x_2(n)$ = [2 3 4].

PART-B

Answer any FIVE Questions of the following   5x10 Marks= 50Marks

1. a) Show that the functions Sin ($n\omega_0 t$) and Sin ($m\omega_0 t$) are orthogonal over any interval
   (t_0, $t_0 + 2\pi/\omega_0$) for integer values of n and m.   [5]
   b) Determine whether the following signals are periodic or not. If periodic find the
   fundamental period.
   $$f(t) = 6\ e^{j[4t+\frac{\pi}{3}]} + 8\ e^{j[3\pi t+\frac{\pi}{4}]}$$ [5]

2. a) Determine Fourier Transform of a signum function.   [4]
   b) Explain under, critical, over sampling with neat sketches.   [6]

3. a) Write short notes on Parseval's Theorem.   [5]
   b) Find the impulse response of the system shown in figure. Find the transfer function.
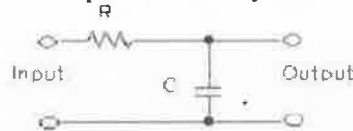
                                                                        [5]
4. a) Derive the relation between Laplace transform and Fourier transform of signal.   [5]
   b) Write short notes on initial and final value theorems in Laplace transform.   [5]

5. a) Determine the inverse z transform, using power series expansion technique
   X (z)=z/2z^2-3z+1 |z|<1/2   [5]
   b) Find z transform of x (n) = a^n u(n) – b^n u(-n-1)   [5]

6. a) Derive coefficients of Trigonometric Fourier series.   [5]
   b) Find the rms value and power of signal x(t) = A cos(wt)   [5]

7. a) Determine Fourier Transform of g(t)=A rect(t/T).   [6]
   b) Consider a signal m (t) =10cos1000πt cos4000πt. Find the minimum sampling rate
   based on Sampling theorem for band pass signals   [4]

8. a) Find the convolution of r(t)=u(t+1)-u(t-1) & s(t)=u(t+2)-u(t-2) and interpret
   graphically.   [8]
   b) If sin (ω) is the input PSD, what is the PSD of the output of an ideal differentiator?   [2]

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II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2018

Subject: **Electronic Circuit Analysis**
Branch: ECE

Time: 3 hours   Max. Marks: 60

PART – A

Answer all the questions   5×2= 10M

1. Draw the circuit diagram of Darlington pair and what is the use of it?
2. What are the different types of mixer circuits?
3. What are the advantages and disadvantages of RC phase shift oscillator?
4. What are the advantages and disadvantages of Push-Pull configuration?
5. What are the requirements of tuned amplifier?

PART-B

Answer any 5 questions   5×10= 50M

1. a) Write short notes on Cascode Amplifier.   [5]
   b) Explain the variation of Hybrid π parameters of the transistor in CE configuration with I_C and temperature.   [5]

2. a) The gain of an amplifier with feedback is (A_f) 20 and variation of 5% is permissible. If the magnitude of the return ratio ($A\beta$) is 1000. Determine the value of open of the open loop gain and the maximum permissible variation.   [5]
   b) Write short notes on Stability of feedback amplifiers   [5]

3. a) Explain the operation of Wein bridge oscillator with neat circuit diagram.   [5]
   b) Write short notes on Crystal Oscillators   [5]

4. a) Explain the distortions in power amplifiers.   [5]
   b) Discuss about conversion efficiency of class B Amplifier and derive the necessary equation [5]

5. a) Discuss the necessity of stabilization circuits in tuned amplifiers?   [5]
   b) Given a single stage transistor amplifier with h – parameters as h_{ie}=1.1kΩ, h_{re}= 2x10^{-4},h_{fe}= 50, h_{oe}= 25μA/V for the common collector configuration with R_S=1kΩ , R_L=5kΩ [5]

6. a) For a single stage CE amplifier find the expression for short circuit current gain, bandwidth and Gain Bandwidth product.   [6]
   b) Derive the expressions for f_H^n and f_L^n for band pass of n identical non interacting stages. [4]

7. a) Draw the circuit diagram of a current shunt feedback amplifier, Derive the expression to show the effect of negative feedback on input and output impedances.   [5]
   b) Explain the effect of negative feedback on the amplifier characteristics.   [5]

8. a) An amplifier has an open loop gain of 200 and cut off frequencies 50Hz and 40 KHz. If 2% of the output is returned to the input in opposition .Calculate the values gain and cut off frequencies.   [5]
   b) In a Colpitts oscillator L = 50 mH , C_1=300pF C_2= 100pF,Caclulate i) frequency of oscillation ii) Gain of amplifier required for oscillations.   [5]

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II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, JUNE-2018

Subject: **Principles of Electrical Engineering**

Branch: ECE

Time: 3 hours   Max. Marks: 60

PART – A

Answer ALL questions of the following   5x2Mark=10 Marks

1. Write the initial conditions for R, L and C elements?
2. Write the expressions for Impedance and admittance parameters.
3. Define Stop Band Filters.
4. State and briefly explain Norton's Theorem
5. Explain the principle of operation of three-phase induction motor?

PART-B

Answer any FIVE Questions of the following   5x10 Marks= 50Marks

1. a) Derive an expression for the damping ratio(ε) and natural frequency,ω_0 for a series RLC circuit. **[4M]**
    b) Find i(t) in the circuit in Fig. Assume that the circuit has reached steady state at t =0 **[6M]**
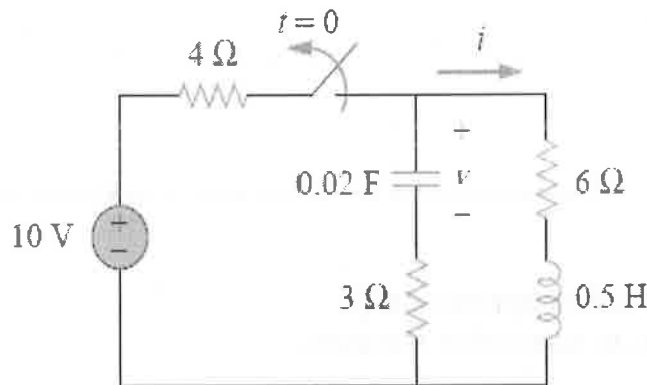

2. a) Explain why admittance parameters are called short circuit parameters
    b) Derive Image parameters in terms of 'Z' parameters.

3. a) Derive the expression for the Band Width and Quality factor of a Band pass filter. **[4M]**
    b) Find the transfer function Vo/Vs of the circuit inFig. Show that the circuit is a low pass filter. **[6M]**
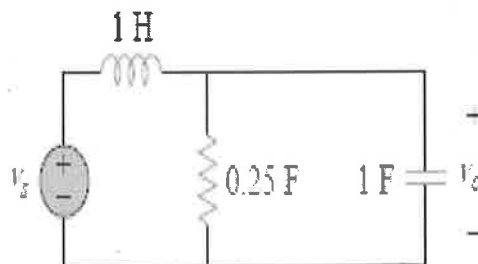
4. State the Thevenin's Theorem and find the Thevenin equivalent looking into terminals a-b of the circuit in Fig. and solve for i_x
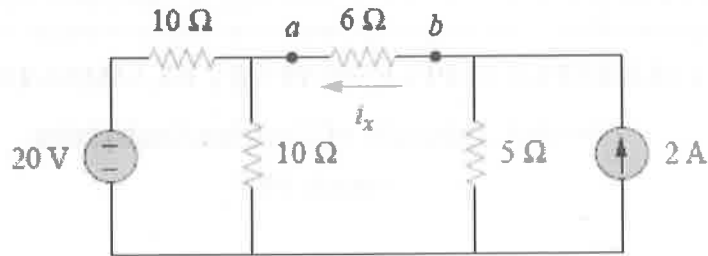
5. a) Explain the concept of Rotating magnetic field with proper diagrams.
   b) Calculate the efficiencies at ½ load, full load and ¾ load of a 100 kVA transformer for power factor of 0.8 lagging. The copper loss is 600 W at full load and Iron loss is 600W.

6. a) Derive the complete solution of RL series circuit in terms of laplace transform.
   b) A series RL circuit R=10Ω and L=10mH. A dc voltage of 50V in applied at t=0.find
      (i) the equation of inductor current.   (ii)Voltage across resistor and inductor.

7. a) Explain hybrid parameters?
   b) Find Z – parameters for the network shown in figure.
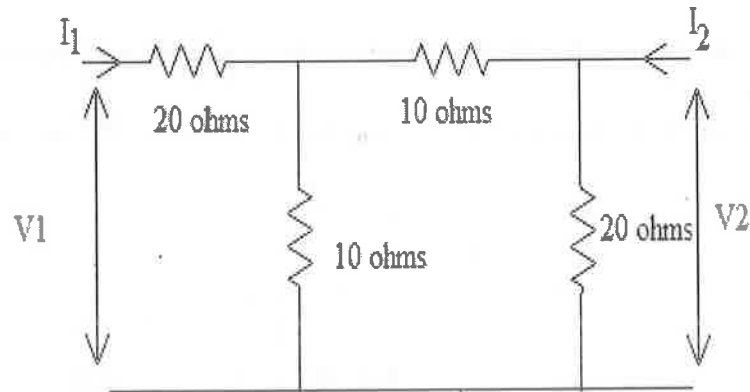
8. a) Design m-derived T section high pass filter?
   b) Explain briefly types of symmetrical attenuators.

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II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2018

Subject: <u>Elementary Calculus and Transforms</u>

Branch: CE, ME, EEE & ECE

Time: 3 hours   **Max. Marks: 60**

PART – A

Answer ALL questions of the following   **5x2Mark=10 Marks**

1. Define Fourier series of function f(x) defined on -L $\leq$ x $\leq$ L
2. State the Convolution theorem for Z transforms.
3. Evaluate $\int_0^2 \int_0^x xy \, dy \, dx$.
4. Expand e^x by Maclaurin's series
5. Write down the expression of : div (grad (f)), where f(x,y,z) is a scalar function.

PART-B

Answer any FIVE Questions of the following   **5x10 Marks= 50Marks**

1. Find the Fourier for the function $f(x) = \begin{cases} 0, & -2 < t < -1 \\ 1+t, & -1 < t < 0 \\ 1-t, & 0 < t < 1 \\ 0, & 1 < t < 2 \end{cases}$

2. a) If $Z[n^2] = \dfrac{z^2 + z}{(z-1)^3}$. Find $Z[n^3]$ and $Z[n^4]$

   b) Form the partial differential equation by eliminating arbitrary functions from

   $u = f(x^2 + 2yz, \, y^2 + 2zx)$

3. Using triple integration find the volume of the sphere $x^2 + y^2 + z^2 = a^2$.

4. Show that $f(x) = x^3 + y^3 - 63(x+y) + 12xy$ is maximum at $(-7,-7)$ and minimum at $(3,3)$

5. Verify Gauss Divergence theorem for $\vec{F} = 4\,x\,z\,\hat{i} - y^2\,\hat{j} + y\,z\,\hat{k}$, taken over the cube bounded by x = 0, x = 1, y = 0, y = 1, z = 0 and z = 1.

6. Find the Fourier series to represent f(x) = x^2 -2, when -2 $\leq$ x $\leq$ 2.

7. a) Find the inverse Z – transform of $\dfrac{2z^2 + 3z}{(z+2)(z-4)}$

   b) If F(z) = $\dfrac{5z^2+3z+12}{(z-1)^4}$ find the values of f(2) and f(3).

8. Graph the curve $r^2 = 4\sin(\theta)$ in polar coordinates

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II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2018

Subject: **Environmental Sciences**

Branch: **Common to ECE & CSE**

Time: **3 hours**   Max. Marks: **60**

PART – A

Answer ALL questions of the following   **5x2Mark=10 Marks**

1. What are carnivores? Give two examples.
2. Define biodiversity.
3. Define pollution? Name various atmosphere pollution.
4. Define Greenhouse effect.
5. Write a short note on over exploitation.

PART-B

Answer any FIVE Questions of the following   **5x10 Marks= 50Marks**

1. a) List the main components of an Ecosystem. And briefly describe the functions of each.
   b) Difference between Food chain & Food web.

2. a) Write short notes on Over utilization of natural resources.

   b) Give brief note about mineral resources.

3. Discuss the adverse effects of costal pollution due to sewage and industrial waste.

4. a) What is global warming and write its impact on environment.
   b) Explain sea level rise. What are its causes and effects?

5. a) Explain about present scenario of urbanization in India
   b) Write short notes on Importance of environmental education.

6. Discuss in detail the Renewable and Non- Renewable resources with examples.

7. Discuss various sources of Marine pollution, How can you prevent pollution of an Ocean.

8. a) Write a short note on desertification.
   b) Write a short note on De-forestation