Code No.: **70403** **MR17**

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 REGULAR END EXAMINATIONS, DECEMBER-2018

Subject: **SIGNALS AND SYSTEMS**

Branch: **ECE**

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

PART – A

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

1. Define and sketch unit step signal.
2. Obtain Fourier transform of unit impulse function $\delta(t)$.
3. Define LTI system.
4. Write any two properties of ROC of Laplace Transform?
5. Define one sided and two sided Z transform.

PART-B

Answer ALL questions of the following **5x 10 Marks= 50Marks**

1. a) Define orthogonal signal space and approximate a function by set of mutually orthogonal functions

   b) A rectangular function defined as

$$f(t) = \begin{cases} A & \text{for } 0 < t < \pi/2 \\ -A & \text{for } \pi/2 < t < 3\pi/2 \\ A & \text{for } 3\pi/2 < t < 2\pi \end{cases}$$

   Approximate the above function by A cos(t) between the intervals $(0,2\pi)$ such that the mean square error is minimum.

(OR)

2. a) Derive an expression for computing mean square error in approximating a function f(t) by a set of n orthogonal functions.

   b) Find whether the following signals are periodic (or) not?

   i) $x(t) = \cos(2t)+\sin(3t)$. ii) $x(t) = \sin(2\pi n)+ \sin(6\pi n)$.

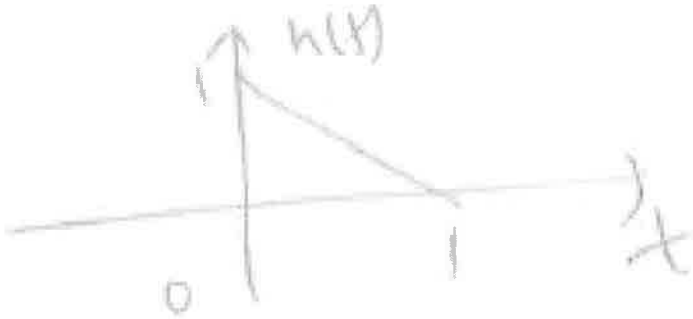
3. Discuss the following with neat waveforms: Impulse sampling, Natural sampling and Flat top sampling.

(OR)

4. State and prove following properties of Fourier Transform

   i) Duality ii) Parseval's theorem iii)frequency shifting

5. A filter has an impulse response h(t) as shown in figure. The input to the network is a pulse of unit amplitude extending from t = 0 to t = 2 by graphical means determine the output of the filter.



(OR)

6. a) Explain difference between causal and non casual systems. (5M)

   b) Prove the Properties of Cross correlation function. (5M)

7. Find the Transfer Function and Impulse Response of a System described by the following differential equation using Laplace Transform.

$$\frac{d^2y(t)}{dt^2}+3\frac{dy(t)}{dt}+2y(t)=x(t)$$

(OR)

8. a) Find the Laplace transform and ROC of the signal (5M)

   $x(t)=3e^{-2t}u(t)+4e^{3t}u(-t)$.

   b) State and prove initial value theorem of Laplace transform. (5M)

9. a) Give the distinction between Fourier, Laplace and Z transform.

   b) Explain the properties of ROC of Z transform

(OR)

10. Using long division method, Determine the inverse Z-Transform of

$$\frac{z^2+2z}{z^3-3z^2+4z+1} \quad ; \text{ROC: } |z|>1$$

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II B.TECH I SEMESTER REGULAR END EXAMINATIONS, NOVEMBER-2018

Subject: **Probability Theory & Stochastic Processes**

Branch: **ECE**

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

PART – A

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

1. Define statistically independent events and when two events are said to be statistically independent.
2. Write the conditions to be satisfied by a function to be a random variable.
3. Give the statement of central limit theorem
4. Define Auto covariance function.
5. Write any three properties of cross-power density spectrum.

PART-B

Answer ALL questions of the following **5x 10 Marks= 50Marks**

1. a) State and prove the total probability theorem?

   b) A single card is drawn from a 52 card deck. What is the probability that (i) the card is a jack (ii) the card will be 5 or smaller.

OR

2. a) Define probability and explain axioms of probability

   b) A box contains white and black balls. When two balls are drawn without replacement, suppose the probability that both are white is (1/3).

   (i) Find the smallest number of balls in the box, (ii) How small can the total number of balls be if black balls are in even number?

3. a) Define conditional distribution function and its properties.

   b) Find the mean value of exponential random variable.

OR

4. a) What is a Poisson randomvariable. Explain in brief.

   b) X and Y are two statistically independent random variables related to W as W= X + Y. Obtain the probability density function of W in terms of probability density functions of Xand Y.

5. a) Obtain the expression for conditional density $f_X(X/B)$ where event B is defined as $\{ y_a \le Y \le y_b \}$.

   b) The joint pdf is given by

$$f_{X,Y}(x, y) = \begin{cases} Kxy; & 0 < x < y, 0 < y < 1 \\ 0, & otherwise \end{cases}$$

   (i) Find the value of constant K.

   (ii) Are X and Y independent?

OR

6. The joint distribution for two random variables X and Y is

$$F_{X,Y}(x,y) = u(x)u(y)[1 - e^{-ax} - e^{-ay} + e^{-a(x+y)}],\ a > 0$$

If a = 0.5 in each case, find the probabilities

i) $P\{X \le 1, Y \le 2\}$

ii) $P\{-1.5 < X \le 2, 1 < Y \le 3\}$

7. Statistically independent, zero mean random processes X(t) &Y(t) having auto correlation functions $R_{xx}(\tau) = \exp(-|\tau|)$ and $R_{yy}(\tau) = \cos(2\pi\tau)$, respectively

Find (a) Auto correlation function of X(t)+Y(t)

(b) Auto correlation function of X(t)-Y(t)

OR

8. a) A random process $X(t) = A\cos(\omega_0 t)$, where ω_0 is a constant and A is a uniformly distributed random variable over the interval (0, 1). Find its auto-correlation function.

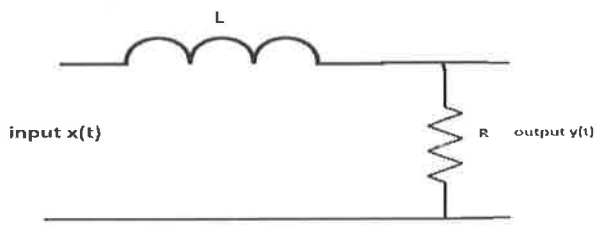
b) A random process is described by X (t) =A, where A is a continuous random variable uniformly distributed on (0, 1). Show that X (t) is a stationary process.

9. a) State and prove any 3 properties of cross-PSD.

b) If $Y(t) = A\cos(\omega_0 t+\theta)+N(t)$, where ω_0 is a constant and 'θ' is a uniform random variable over $(-\pi,\pi)$, and N(t) is a band limited Gaussian white noise process with PSD=K/2. If 'θ' and N(t) are independent, find the PSD of Y(t).

OR

10. a) Find the power spectrum and average power of the response of the network shown in below fig. when x(t) is white noise.



b) The PSD of a stationary random process is

$$S_{xx}(\omega) = \begin{cases} A; & -1 < \omega < 1 \\ 0; & otherwise \end{cases}$$

where A is a constant, find the autocorrelation function.

Code No.: **70B02** | **MR17**

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

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II B.TECH I SEMESTER REGULAR END EXAMINATIONS, NOVEMBER-2018

Subject: **Computational Mathematics**

Branch: **ECE (Readmitted Students)**

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

PART – A

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

1. Write the Newton-Raphson iterative formula to find the reciprocal of a number N(N > 0)
2. Show that $(1+\Delta)(1-\nabla)=1$
3. Write the normal equations for fitting of curve $y = a+bx+cx^2$ for the given data by method of least squares.
4. Find the approximate value of y (0.2)for the initial value problem $y' = x+y, y(0)=1$ by Euler's method with step size h=0.1.
5. Classify PDE $2u_{xx}+4u_{xy}+3u_{yy}=2$

PART-B

Answer ALL questions of the following **5x 10 Marks= 50Marks**

1. (a) Find the positive root of the equation $x^3 = 2x+5$ by using iteration method.
   (b) Explain Newton-Raphson method to solve the equation f(x)=0. Using this method find an approximate root of $e^{-x} - \sin x = 0$.

OR

2. Using regula-falsi method, compute the real root of $3x+\sin x- e^x = 0$ correct to three decimal places

3. a) Consider the following data for $g(x)=\dfrac{\sin x}{x^2}$

x	0.1	0.2	0.3	0.4	0.5
g(x)	9.9833	4.9696	3.2836	2.4339	1.9177

Calculate g(0.25) accurately using Newton's forward method of interpolation

b) Using Lagrange's formula fit a polynomial to the data

x	-1	0	2	3
y	-8	3	1	12

and hence find y(1)

OR

4. a) Find y(30) given that y(20) = 24, y(24) = 32, y(28) = 35, y(32) = 40 using Gauss backward difference formula.
   b) Find f(22), from the following data using Newton's Backward formula.

x	20	25	30	35	40	45
y	354	332	291	260	231	204

5. a) Fit the curve $y = ax^2 + bx + c$ to the data:

x	0	1	2	3	4
y	1	1.8	1.3	2.5	2.3

b) Evaluate $\int_0^6 \frac{1}{1+x} dx$

(i) Simpson's 1 /3 Rule (ii) Trapezoidal Rule. (iii) Simpson's 3 /8 Rule.

OR

6. a) The pressure and volume of a gas are related by the equations $pv^{m} = k$ where k is a constant, p and v are pressure and volume of a gas. Fit the -curve to the following data taking p to be independent variable.

p(kg/cm^2:	0.5	1.0	1.5	2.0	2.5	3
V(litres) :	1.62	1.00	0.75	0.62	0.52	0.46

b) Compute $f'(4)$ from the following table

x	1	2	4	8	10
f(x)	0	1	5	21	27

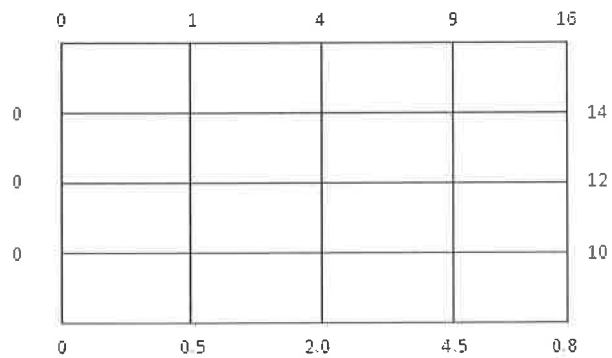
7. Find y(0.8) using Milne's predictor corrector method given that $\frac{dy}{dx} = x - y^2$ by evaluating the y(0.2), y(0.4), y(0.6) by Euler's method (take h = 0.2)

OR

8. a) Solve $y' = y - x^2$, y(0) =1, by Picard's method upto the third approximation. Hence, find the value of y (0.1), y (0.2).

b) Given $y' = x^2(1+y)$ and $y(1) = 1, y(1.1) = 1.233, y(1.2) = 1.548, y(1.3) = 1.974$ estimate $y(1.4)$ using Milne's predictor-corrector method.

9. Solve Laplace equation $\nabla^2 u = 0$ at interior points of the square



OR

10. Solve the poisson equation u_{xx} = -10 ($x^2 + y^2$ +10) over the square with sides x=0=y, x=3=y, with u= 0 on the boundary and mesh length h =1.

Code No.: **70237**

MR17

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II B.TECH I SEMESTER REGULAR END EXAMINATIONS, NOVEMBER-2018

Subject: **Electrical Technology**

Branch: **ECE**

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

PART – A

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

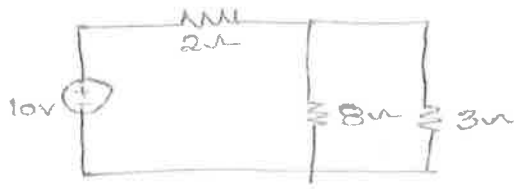
1. State Super position theorem
2. Distinguish between transient response and forced response.
3. What are the types of DC motors?
4. Define pitch factor?
5. Write the expression for g- parameters

PART-B

Answer ALL questions of the following **5x 10 Marks= 50Marks**

1. a) Explain the Steps in Millman's theorem

   b) Determine the current flowing in ammeter having internal resistance of 1 ohm in series with 3 ohms resistor



OR

2. Using Superposition Theorem, find the current i_3 in Fig2 (b)

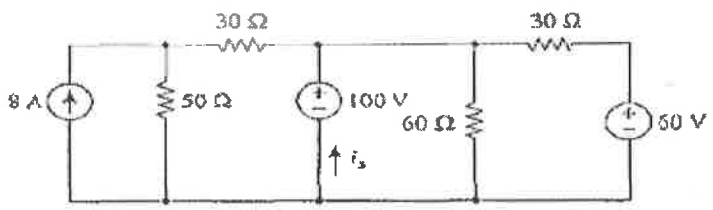


Fig 2 (b)

3. Explain the transient response for series RL circuit using laplace transform approach. Derive the equations for I, V_R, V_L , P_R and P_L for a RL series circuit and sketch the wave forms.

OR

4. Explain the transient response for series RC circuit using laplace transform approach. Derive the equations for I, V_R, V_c , P_R and P_c for a RC series circuit and sketch the wave forms.
5. Explain the different types of DC generator and write the current and voltage equations.

OR

6. (a) A 220 V shunt motor takes a total current of 80A and runs at 800 rpm. Shunt field resistance and armature resistance are 50 Ω, and 0.1 Ω respectively. If iron and friction losses amount to 1600W, find

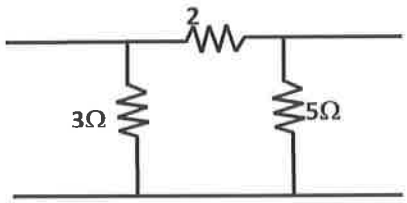
   (i) Copper losses (ii) Torque (iii) Efficiency

   (b) An 8-pole lap connected armature has 960 conductors, a flux of 40 m Wb per pole and a speed of 400 rpm. Determine the emf generated.
7. a) A single phase transformer with 50 Hz has area of cross section 0.036 m^2 the permissible maximum flux density in the core is 1 wb/m^2 . Calculate the number of turns per limb on the high and low voltage sides for a 3000/200 V ratio.

   (b) Write down the applications of transformer.

OR

8. An ideal 25 KVA transformer has 500 turns on the primary winding and 40 turns on the secondary winding. The primary is connected to 3000 V, 50Hz supply. Calculate (i) Primary and secondary turns on full load. (ii) Secondary emf (iii) maximum core flux
9. Determine the H parameters for the circuit shown below.



OR

10. Determine the relationship between Z and Y parameters for a given network and also derive the conditions for reciprocity and symmetry conditions.

Code No.: **70B03** | **MR17**

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Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad

II B.TECH I SEMESTER REGULAR END EXAMINATIONS, NOVEMBER-2018

Subject: **Advanced Calculus**

Branch: **Common to CE, ME, EEE, ECE, CSE, IT**

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

PART – A

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

1. Obtain the Taylor series expansion of e^x about x = -1
2. Evaluate $\int_0^1\int_0^y xye^{-x^2}\,dxdy$
3. Find a unit normal to the surface $xy^3z^2 = 4$ at the point $(-1,-1,2)$
4. Evaluate $\int_0^1[ti + (t^2 - 2t)j + (3t^2 + 3t^3)k]\,dt$
5. Write the auxiliary equations of Charpit's Method

PART-B

Answer ALL questions of the following **5x 10 Marks= 50Marks**

1. a) Determine the functions $u = xy + yz + zx,\ v = x^2 + y^2 + z^2$ *and* $w = x + y + z$ are functionally dependent or not? If so find the relation between them.
   b) Find the extreme values of the function $f(x,y) = x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$

OR

2. Verify Rolles theorem for f(x) = $x^{2m-1}(a-x)^{2n}$ in [0, a] where a>0.

3. a) Evaluate $\int_0^1\int_0^{1-x}\int_0^{1-x-y} dz\,dy\,dx$

   b) Using spherical polar co-ordinates find the volume of the sphere $x^2 + y^2 + z^2 = a^2$

OR

4. Change the order of integration and evaluate $\int_0^b\int_{\frac{a}{b}}^{\sqrt{b^2-y^2}} xydxdy$

5. a) Find the directional derivative of $f = x^2 - y^2 + 2z^2$ at the point P(1,2,3) in the direction of the line PQ where Q is the point (5, 0, 4). Also calculate the magnitude of the maximum directional derivative.

   b) Find the constant a so that the vector field is solenoidal. $\vec{f} = (x+3y)\vec{i} + (y-2z)\vec{j} + (x-az)\vec{k}$

OR

6. Show that the vector field A = $(x^2 + xy^2)i + (y^2 + yx^2)j$ is irrotational, and find scalar potential Function

7. Prove that $\vec{f} = (4xy - 3x^2z^2)\vec{i} + 2x^2\,\vec{j} - 2x^3z\,\vec{k}$ is **a)** conservative field **b)** find the scalar potential of $\vec{f}$ **c)** find the work done in moving an object in this field from (0,0,0) to (1, 1, 1)

OR

8. Verify Greens theorem $in\ the\ xy - plane\ for \int_c e^x(\sin y\,dx + \cos y\,dy)$ where c is rectangle with vertices (0, 0), (1, 0), (1, π/2), (0, π/2)

9. (a) Form a partial differential equation by eliminating the arbitrary constants a, b from $(x-a)^2 + (y-b)^2 = r^2$

   (b) Solve $z^2(p^2 + q^2 + 1) = 1$

OR

10. (a) Form the partial differential equations by eliminating the arbitrary function z = f(sin x + cos y).

    (b) Solve the partial differential equation zpq = p+q

Code No.: **70401** | **MR17**

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II B.TECH I SEMESTER REGULAR END EXAMINATIONS, NOVEMBER-2018

Subject: **Electronics Circuits-1**

Branch: **Common to EEE & ECE**

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

PART – A

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

1. What is base width modulation in CB configuration?
2. List 2 advantages of FET over BJT.
3. List the advantages and disadvantages of fixed bias method.
4. Write the voltage and current equation for hybrid parameters.
5. Mention small signal parameters of JFET.

PART-B

Answer ALL questions of the following **5x 10 Marks= 50Marks**

1. a) Explain CE configuration with input and output characteristics. (7M)
   b) Convert β to α and α to β. (3M)

OR

2. a). Explain how transistor works as an amplifier?
   b). Explain the working of pnp transistor.
3. a) Explain the construction of N channel JFET. (6M)
   b) How does the FET behave for small and large values of V_{ds}? (4M)

OR

4. a) Draw the drain characteristics of a n-channel JFET and Explain it.
   b) Derive the relationship between transconductance (gm), drain resistance (rd) and amplification factor (μ).
5. a) Explain about Thermistor and Sensistor Compensation. (7M)
   b) Derive the expression for stability factor of self bias circuit. (3M)

OR

6. (a) What is an operating point? Explain. [6 M]
   (b) Explain the effect of R_S in voltage divider biasing circuit and sketch the Q point plot. [4 M]
7. a) Derive the h-parameters of single stage CE amplifier (8M)
   b) Compare input and output impedances of CE, CB and CC amplifiers (2M)

OR

8. Draw the circuit diagram of CC amplifier using hybrid parameters and derive the expressions for A_I, A_V, R_i and R_O.
9. a) Explain common source amplifier operation with frequency response curve. (8M)
   b) Write short notes on Amplitude distortion. (2M)

OR

10. Draw the small signal hybrid model of CE amplifier and derive the expressions for its Ai, Av, Ri and Ro.

Code No.: **70402** | **MR17**

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II B.TECH I SEMESTER REGULAR END EXAMINATIONS, DECEMBER-2018

Subject: **Switching Theory & Logic Design**

Branch: **Common to EEE & ECE**

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

PART – A

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

1. Convert $(10110.0110)_2 = (?)_8$, $(A6)_{16} = (?)_{10}$, $(1266)_8 = (?)_{10}$.
2. Represent 2 input XOR gate in Standard POS Form?
3. A decoder with an enable input acts like a demultiplexer. Comment on this.
4. Draw the logic diagram of a D Latch with enable?
5. What is a FSM?

PART-B

Answer ALL questions of the following **5x 10 Marks= 50Marks**

1. a) Perform the following addition in Ex-3 Code.

   i) 37+28 ii) 247+359.

   b) What is the Hamming code? How is the Hamming code word detected and corrected?

OR

2. The message below coded in the 7-bit hamming is transmitted through a noisy channel. Decode the message assuming that at least a single error occurred in code word 0011011.

3. a)Simplify the expression $\pi M(2,8,9,10,11,12,14)$ and implement the real minimal expression in universal logic ?

   b) Identify all the Prime implicants and essential prime implicants of the following function using k-map $F(A,B,C,D)=\sum m(0,1,2,5,8,10,13,14,15)$.

OR

4. Use the tabulation procedure to generate the set of prime implicants and to obtain all minimal expressions for the following function

   $F(a,b,c,d,e) = \Sigma(0,1,3,8,9,13,14,15,16,17,19,24,25,27,31)$

5. Design a 3-bit Comparator circuit with neat sketch.

OR

6. a) Design 16:1 mux using 4x1 mux's?

   b) Explain the method of carry look ahead adder circuit with the help of its logic diagrams?

7. Design a 3- bit binary Synchronous Up counter with –T Flip-Flops?

OR

8. a.Convert a JK Flip Flop to a D Flip Flop ?

   b. Implement a 3 bit down counter using D Flip Flops ?

9. Write about the following terms with an example

   a) State Diagram

   b) State Table.

OR

10. Draw the state diagram to detect the sequence 101 from input sequence, design a sequential circuit using JK flip flop for the same?