Hall Ticket No: **Question Paper Code :**

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES

(AUTONOMOUS)

II/IV B. Tech II- Semester Regular Examinations April – 2017

Control Systems

(ECE)

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

Answer ONE Question from each Unit

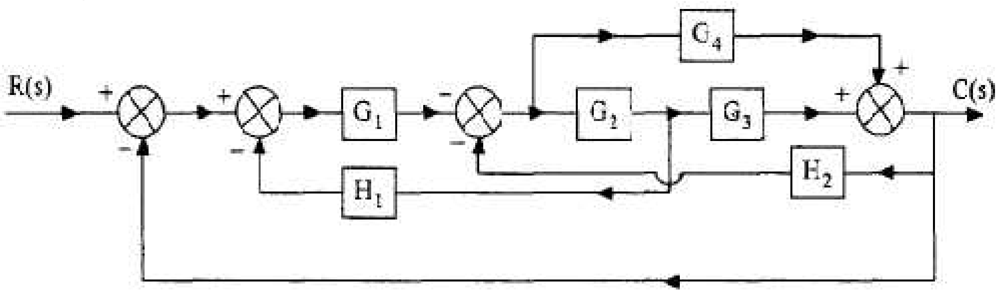
All Questions Carry Equal Marks

All parts of the question must be answered at one place only

UNIT - I

1. a) Explain the Mason's gain formula. 6 M

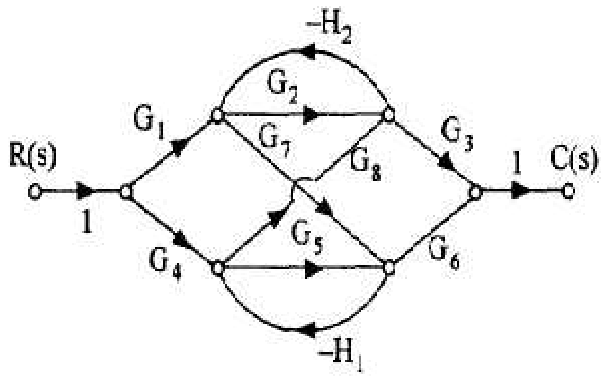
   b) By using block diagram reduction techniques, obtain the transfer function $\frac{C(s)}{R(s)}$ for the system shown below. 6 M



(OR)

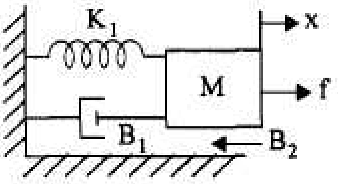
2. a) Explain the block diagram reduction rules. 6 M

   b) By using signal flow graph techniques, obtain the transfer function $\frac{C(s)}{R(s)}$ for the system shown below. 6 M

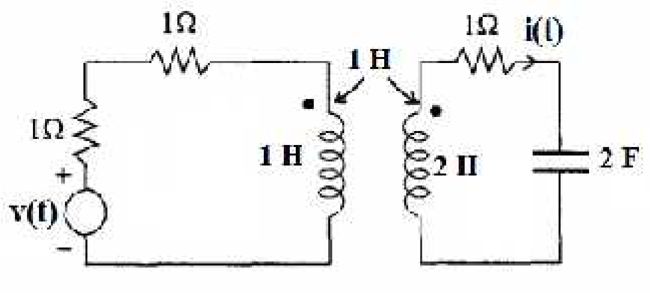


UNIT – II

3. a) Obtain the transfer function $\frac{X(s)}{F(s)}$ for the Mechanical system shown in figure. 6 M

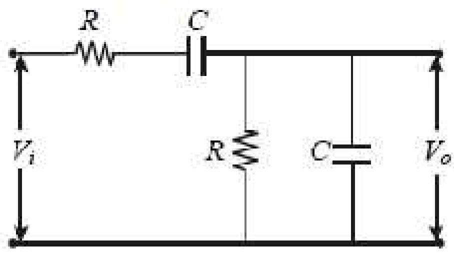


b) Obtain the transfer function $\frac{I(s)}{V(s)}$ for the Electrical system shown in figure. 6 M

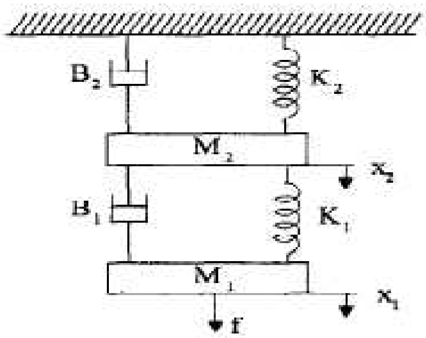


(OR)

4. a) Obtain the transfer function $\frac{V_0(s)}{V_i(s)}$ for the Electrical system shown in figure. 6 M



b) Obtain the transfer function $\frac{X_1(s)}{F(s)}$ for the Mechanical system shown in figure. 6 M



UNIT – III

5. a) Derive the expression for the unit step-response of a second-order under damped system. 6 M

b) Find the steady state error for unit step, unit ramp and unit acceleration inputs for the following unity feedback system $G(S) = \frac{10}{s(0.2s+1)(0.5s+1)}$ 6 M

(OR)

6. a) The open loop transfer function of a unity feedback system is $G(s) = \frac{K}{s(1+sT)}$. By what factor the gain 'K' should be multiplied so that the damping ratio is increased from 0.2 to 0.8. 6 M

b) Explain the effect of PD controller of a typical second order system in terms of the time response specifications.. 6 M

UNIT – IV

7. a) The open loop TF of a unity feedback system is $G(S) = \frac{K}{S(1+S)(1+2.5S)}$. Find the restriction on 'K', So that the closed loop system is stable. 6 M

b) Explain about Relative stability of a system. 6 M

(OR)

8. a) Apply Routh criterion to check the stability of system with characteristic equation $S^6 + 9S^6 + 20S^4 + 12S^3 + 8S^2 + 16S + 16 = 0$ Also determine the number of roots on left and right of s-plane. 6 M

b) Sketch the Root locus and comment upon stability of the system whose open loop transfer function is given below: 6 M

$$G(S)H(S) = \frac{K}{S(4+S)(5+S)}$$

UNIT – V

9. a) Distinguish between time and frequency domain analysis. 6 M

b) Draw the Bode plot for a unity feedback system characterized by the open loop T/F, $G(s) = \frac{100}{S(1+0.5S)(1+0.1S)}$. Also determine gain and phase cross over frequencies and margins. 6 M

(OR)

10. a) Explain briefly about All Pass and Minimum Phase Systems. 6 M

b) Explain the Nyquist plot. How do you obtain the stability of a system using it? 6 M

Hall Ticket No: **Question Paper Code :**

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)
II/IV B. Tech II- Semester Regular Examinations April – 2017
Digital Electronics
(ECE)

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

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered at one place only

UNIT-I

1. A 8-bit data is encoded using Hamming code and is then transmitted. The received bit stream is 000011101010. Find the error in the code and correct it. What are the data bits? (12M)

(OR)

2. (a). Find the complement of the following expression and then simplify it.
   $(x + y'z')\ (y + x'z')\ (z + x'y')$ (6M)
   (b).Simplify the given expression
   Y=(a+b)(a'+c)(b+c')(a+d)(c+d') (6M)

UNIT-II

3. (a) Draw the circuit of two-input CMOS NAND gate and explain its operation. (6M)
   (b). Define i) Fan-in ii) Fan-out iii)Noise Margin iv) Propagation delay with respect to logic families

(OR)

4. (a). Explain about Transistor Transistor Logic (6M)
   (b). Give the comparison performance of logic families (6M)

UNIT-III

5. (a). Use the tabulation method to determine the prime implicants and obtain the all minimal and irredundant expressions for the following function from prime implicant chart.
   f(v,w,x,y,z) = Σ(0,1,3,4,7,13,15,19,20,22,23,29,31) (9M)
   (b). Simplify the following Boolean function using map method.
   f(w,x,y,z) = w'z + xz + x'y + wx'z (3M)

(OR)

6. (a) Explain the principle of operation of carry look-ahead adder. Draw the logic diagram of 4-bit adder
   with carry look-ahead. (8M)
   (b) Design a Full subtractor circuit using minimum number of 4X1 multiplexers. (4M)

UNIT-IV

7. (a) Explain D-flipflop using NOR gateswith the help of characterstic equation (6M)
   (b) Convert D- flipflop to JK,D and T flipflops (6M)

(OR)

8 (a)Draw the schematic of universal shift register and explain its operation (8M)

(b)Design a Synchronous counter that steers through a state sequence given by 0,1,3,2,6,7,5,4,and repeats. Use J-K flip-flops and logic gates in your implementation (4M)

UNIT-V

9. (a) Design a sequence detector to detect the sequence 0101(overlapping sequences are allowed). (6M)

(b) A sequential circuit has two J-K flip-flops A and B; two inputs x and y; and one output Z. The flip-flop input functions and the circuit output function Z are as follows:

J_A= Bx+B'y' K_A=B'xy'

J_B= A'x K_B=A+xy' Z= Axy + Bx'y'

(i) Draw the logic diagram of the circuit.

(ii) Tabulate the state table.

Derive the next state equations for A and B. (6M)

(OR)

10. (a) Reduce the number of states in the following state table and tabulate the reduced state table. (6M)

Present state	Next state		Output	
	x = 0	x = 1	x = 0	x = 1
a	f	b	0	0
b	d	c	0	0
c	f	e	0	0
d	g	a	1	0
e	d	c	0	0
f	f	b	1	1
g	g	h	0	1
h	g	a	1	0

(b) Design an asynchronous sequential circuit with two inputs x_1 and x_2, and one output z . The initial input state is $x_1 = x_2 = 0$. The circuit output is to be 1 if and only if the input state is $x_1 = x_2 = 1$ & the preceding input state is $x_1 = 0$ and $x_2 = 1$. (6M)

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Hall Ticket No: **Question Paper Code :**

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES

(AUTONOMOUS)

II/IV B. Tech II- Semester Regular Examinations April – 2017

Electromagnetic Field Theory & Transmission Lines

(ECE)

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

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered at one place only

Unit –I

1. (a) Obtain the expression for the capacitance of a (i) parallel plate capacitor; (ii) a coaxial capacitor
(b) Explain the terms (i) equipotential surface (ii) lossy and lossless medium . [6+6]

(Or)

2. (a) A volume charge density inside a hollow sphere is $\rho = 10e^{-20r}$ c/m^3. Find the total charge enclosed within the sphere also find electric flux density on the surface of the sphere
(b) Evaluate the coulomb's force, Electric field intensity and potential due to a line charge 'ρ_l' [6+6]

Unit –II

3. (a) Find **H** on the axis of a circular loop of radius 1.2cm. Also find **H** at the centre of the Loop
(b) Derive the relation between the magnetic flux density and vector magnetic potential. [6+6]

(Or)

4. (a) State and prove Ampere's circuit law.
(b) Find the vector magnetic field intensity at P(1,2,3) in Cartesian coordinates caused by a current filament carrying a current of 10 Amp along Z-axis, if the filament is extended from z = 0 to 3 and z = - inf to inf. [4+8]

Unit –III

5. (a) Determine D, if H=85e $^{j(wt+\beta z)}$ $\mathbf{a_x}$ in free space. Find E & B
(b) Derive the boundary conditions of the magnetic field at the boundary of the two media [6+6]

(Or)

6. (a) Define and derive the Maxwell's curl equation involving Faraday's Law. Explain the concept of displacement current. [6+6]
(b) If **H** =10cos(10^8t-z)$\mathbf{a_y}$ **mA/M,** find the corresponding electric field in air, and the displacement current density. [6+6]

Unit –IV

7. (a) Derive the wave equation for a general medium with ε, μ and σ solve the same 'ϒ' the propagation constant.
(b) A uniform plane wave in free space is having a E=200$e^{(-j0.1z)}$$\mathbf{a_z}$. Find the instantaneous value of power at t = 0 & z =1 mts. [6+6]

(Or)

8. (a) Explain in detail the condition to be satisfied for Brewster angle, Critical angle.
(b) Obtain the expression for the reflection and transmission coefficients of uniform waves between two media for normal incidence. [6+6]

Unit –V

9. (a) Name the different applications of short circuited loss lines of various lengths in transmission line problems.
(b) Explain the terms (i) quarter wavelength matching; (ii) Single stub matching in detail [6+6]

(Or)

10. (a) what are frequency distortion and phase (delay) distortions in transmission lines? What is the condition for a distortion less lines? Derive an expression for the same.
(b) A Tx line has primary constants R= 0.1Ω/mt, G = 0.01mhos/mt, L=0.01μH/mt; C= 100pF/mt. If the line is connected to a load impedance of (10+j20)Ω, find reflection coefficient at the
i. Load end
ii. 20cm from load.

[6+6]

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Hall Ticket No: **Question Paper Code :**

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)

II/IV B. Tech II- Semester Regular Examinations April – 2017

Electronic Circuit Analysis-II

(ECE)

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

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered at one place only

UNIT-I

1. a. Differentiate different types of negative feedback topologies (4M)
   b. Design a current series feedback amplifier for the given specifications: VCC=12V, hfe =150, hie=1.2 KΩ, RS=800Ω, RL=1KΩ, A_V= 30 dB, Rf =100KΩ, Cc=Ce=0.1μf (8M)

(OR)

2. a Explain the basic principle of an Oscillator (4M)
   b. A 1 mH inductor is available. Choose the capacitor values in a Colpitts oscillator so that f = 1 MHz and feedback factor = 0.25. (8M)

UNIT-II

3. a. Differentiate single tuned, double tuned and stagger tuned amplifiers. (4M)
   b. A parallel resonant circuit has a capacitor of 250pF in one branch and inductance of 1.25mH plus a resistance of 10Ω in the parallel branch. Find (i) resonant frequency (ii) impedance of the circuit at resonance (iii) Q-factor of the circuit (8M)

(OR)

4. a. Explain about Transformer coupled audio power amplifier (4M)
   b. Derive the equation for the efficiency of a push-pull Class-B amplifier (8M)

UNIT-III

5. a. Explain about Widlar current source (4M)
   b. Derive the equation for differential and common mode gain, with the help of small signal equivalent circuit. (8M)

(OR)

6. a. Explain about multi transistor current mirrors (4M)
   b. What are the improved source circuits , explain their working (8M)

UNIT-IV

7. a. Differentiate between inverting and non-inverting OP-AMP (4M)
   b. Derive the equations necessary to prove the applications of OP-AMP as differentiator and logarithmic amplifier (8M)

(OR)

8. a. How does an instrumentation amplifier using Op-Amp works? (4M)
   b. Derive the equations of output voltage of an Op-Amp working as logarithmic amplifier (8M)

UNIT-V

9. a. Derive the necessary equations from the small signal model of a FET amplifier (4M)
   b. Differentiate between Common Source FET amplifier and Common Gate FET amplifier (8M)

(OR)

10. a. Consider an N channel MOSFET with V_{tn}=1V,$1/2\mu_n C_{ox}$=20µA/V^2,W/L = 40, I_D=1mA.Calculate the trans conductance of the amplifier (4M)
    b. Explain about NMOS enhancement load and depletion load amplifiers . (8M)

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Hall Ticket No: **Question Paper Code :**

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)

II/IV B. Tech II- Semester Regular Examinations April – 2017

Engineering Mathematics-IV
(ECE, EEE)

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

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered at one place only

UNIT-I

1. (a) Find the regular function, whose imaginary part is $e^x Siny$ [6]

   (b) Apply the calculus of residues to evaluate $\int_{-\infty}^{\infty} \frac{1}{x^4+1} dx$ [6]

(OR)

2. (a) If $f(z)$ is an analytic function then prove that $\nabla^2 |f(z)|^2 = 4|f'(z)|^2$ [6]

   (b) Evaluate $\int_C \frac{z}{z^2+1} dz$, where $C: \left|z+\frac{1}{2}\right| = 2$ [6]

UNIT-II

3. (a) Prove with the usual notations that $(E^{1/2}+E^{-1/2})(1+\Delta)^{1/2} = 2+\Delta$ [6]

   (b) From the following table, estimate the number of students who obtained marks between 40 and 45 [6]

Marks	30-40	40-50	50-60	60-70	70-80
No. of students	31	42	51	35	31

(OR)

4. (a) Show that $\Delta + \nabla = \frac{\Delta}{\nabla} - \frac{\nabla}{\Delta}$ [6]

   (b) Given the values

x	5	7	11	13	17
$f(x)$	150	392	1452	2366	5202

   Evaluate $f(9)$ using Newton's divided difference formula [6]

UNIT-III

5. (a) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's 3/8th rule taking $h=1/6$ [6]

(b) Given that [6]

x	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

find $\frac{dy}{dx}, \frac{d^2y}{dx^2}$ at $x=1.1$

(OR)

6.(a) Use Simpson's 1/3rd rule to find $\int_0^{0.6} e^{-x^2} dx$ by taking seven ordinates. [6]

(b) Evaluate $\int_0^1 \frac{dx}{1+x}$ applying Trapezoidal rule [6]

UNIT-IV

7 (a) If $Z(u_n)=\frac{2z^2+3z+4}{(z-3)^3}$, $|z|>3$, then find u_1, u_2, u_3 [6]

(b) Solve $u_{n+2}+6u_{n+1}+9u_n=2^n, u_0=u_1=0$ by Z-transforms. [6]

(OR)

8. (a) Using convolution theorem evaluate the inverse Z-transform of the $\frac{z^2}{(z-1)(z-3)}$ [6]

(b) Solve $u_{n+2}+6u_{n+1}+9u_n=2^n, u_0=u_1=0$ by Z-transforms. [6]

UNIT-V

9. (a) Two independent samples of 7 items respectively had the following values

Sample-I	11	11	13	11	15	9	12	4
Sample-II	9	11	10	13	9	8	10	-

Is the difference between the means of samples of significant? [6]

(b)A die was thrown 264 times with the following frequency results [6]

No. of appeared on the die	1	2	3	4	5	6
Frequency	40	32	28	58	54	52

Test whether the die is un-biased?.

(OR)

10. (a) Find the student's –**'t'** for the following variable values in a sample of eight:-4,-2,-2,0,2,2,3,3; taking the mean of the universe to be zero. [6]

(b)A machinist is making engine parts with axle diameter of 0.7inch. A random sample of 10 parts shows mean diameter 0.742 inch with a standard deviation of 0.04inch.On the basis of this sample, would you say that the work is inferior? [6]

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Hall Ticket No: **Question Paper Code :**

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES

(AUTONOMOUS)

II/IV B. Tech II- Semester Regular Examinations April – 2017

Probability Theory & Random Processes

(ECE)

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

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered at one place only

UNIT-I

1 (a) State Bayes' theorem. If A and B are two mutually exclusive events, show that P(A/B') = P (A) / [1- P (B)] 5M

(b) Distinguish between statistically independent and mutually exclusive events. 2M

(c) A shipment consists of three identical boxes. The 1st box contains 2000 components of which 25% are defective, the 2nd has 5000 components of which 20% are defective and the third contains 2000 components of which 600 are defective. A box is selected at random and a component is removed from the box. Find the probability that 5M

i) the component is defective

ii) the defective component came from the second box.

(OR)

2 (a) Define random variable and state the conditions for a function to be a Random Variable. 6M

(b) In a video library there are 500 films among which 250 are action oriented. Among these action films, 100 are Korean. Three films are chosen at random, the chosen film being replaced each time. What is the probability of getting 6M

(i) All three action films

(ii) Three action films among which only one is a Korean film.

(iii) At least one of the three is a Korean film..

UNIT-II

3 (a) . If 'x' is a continuous random variable with PDF, find 'a' and CDF of x.

$$f(x) = \begin{cases} ax & \text{for } 0 \le x \le 1 \\ a & \text{for } 1 \le x \le 2 \\ 3a - ax & \text{for } 2 \le x \le 3 \\ 0 & \text{elsewhere} \end{cases}$$ 6M

(b) A Gaussian random variable X is transformed to a new random variable Y where $y = b + e^x$. Find the density of Y if 'b' is a real constant. Also, for a non-linear transformation, is the new density function Gaussian? 6M

(OR)

(b) State and prove Chebyshev's inequality. Define characteristic function of a random variable and show that it is the fourier transform of its pdf.

6M

UNIT-III

5 (a) The joint pdf of f (x, y) is given to be — 6M

$f(x, y) = A e^{-x-2y}$ for $0 \le x \le y$ and $0 \le y \le \infty$

$= 0$ otherwise

(i) Find A
(ii) Find marginal density of x and y
(iii) Are 'x' and 'y' independent?
(iv) Find the conditional density function of y given x = 2.

(b) Find the moment generating function of two normally distributed random variables X and Y — 6M

(OR)

6 (a) The joint probability distribution of two random variables X and Y is given by — 6M

$f(x, y) = 9(1+x+y) \quad 2(1+x)^4(1+y)^4$ for $0 \le x \le \infty$ and $0 \le y \le \infty$.

Find the marginal distribution of X and Y and conditional distribution of Y for X= x

(b) State Central Limit theorem and explain its significance. Verify Central Limit Theorem for the independent random variable X_k where for each k, $P(X_k \pm 1) = 1/2$ — 6M

UNIT-IV

7 (a) Define auto covariance and cross covariance functions. List their properties. — 6M

(b) Define stationarity and ergodicity of random processes. — 2M

(c) Two random processes X(t) and Y(t) are given by — 4M

$X(t) = A\cos(w_0 t + Ø)$; $Y(t) = A\sin(w_0 t + Ø)$

Here A and w_0 are constants and Ø is a uniform random variable distributed on $(0, 2\pi)$. Find the cross correlation of X(t) and Y(t).

(OR)

8 (a) Define stationary and independence for random processes. Give examples to illustrate. — 5M

(b) If a random process w(t) is a narrow band random process, then show that it can be represented as $w(t) = x(t)\cos\omega_0 t + y(t)\sin\omega_0 t$, Where x(t) and y(t) are uncorrelated random processes with spectral density identical to that of w(t) — 7M

UNIT-V

9 (a) The input to a linear filter with transfer function $H(f) = \frac{1}{1+j\left(\frac{f}{f_c}\right)}$ is a stationary random process X(t) with auto correlation function $R_X(\tau) = e^{-\tau/\tau_0}$. Find (i) output power spectral density (ii) cross correlation between input and output (iii) the mean square value of the output — 6M

(b) Discuss the significance of band pass and band limited processes — 6M

(OR)

10 (a) State and prove Wiener – Khintchine theorem. — 6M

(b) A noise waveform n(t) has the power spectral density given by — 6M

$$S_n(f) = 1 - \frac{|f|}{f_0} \qquad |f| \le f_0$$
$$= 0 \qquad |f| > f_0$$

Find the mean square value of the noise.

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