R11

Code : 1G341

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET**

**(AUTONOMOUS)**

***II B.Tech. II Semester Regular Examinations, June 2014***

***Signals and Systems***

*( ECE )*

**Time: 3 hours** **Max Marks: 70**

*Answer any FIVE of the following*
*All questions carry equal marks (14 Marks each)*

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1. Represent the function $e^t$ over the interval ( -1 < t < 1 ) by the trigonometric Fourier series and the exponential Fourier series. 14M

2. Consider a periodic pulse train $g_p(t)$ of duration $T$ and period $T_0$.

$$g_p(t) = \begin{cases} A, & -\frac{T}{2} < t < \frac{T}{2} \\ 0, & \textit{for the remainder of the period} \end{cases}$$

Plot $g_p(t)$, determine the exponential Fourier series coefficients $c_n$, and plot the amplitude and phase spectra as functions of $n/T_0$. 14M

3. Evaluate and plot the even and odd parts of the rectangular pulse

$$g_p(t) = A\,rect\left(\frac{t}{T} - \frac{1}{2}\right).$$

Also determine their Fourier transforms. 14M

4. a) Define Dirac delta function $\delta(t)$. Explain sifting and replication properties of $\delta(t)$. 7M

   b) Define linearity, duality and frequency shifting properties of Fourier transforms. Using these properties derive the Fourier transform $G(f)$ of $g(t) = cos(2\pi f_c t)$ from the Fourier transform of the Dirac delta function $\delta(t)$. 7M

5. The rectangular RF pulse

$$x(t) = \begin{cases} A\cos(2\pi f_c t), & 0 \le t \le T \\ 0, & elsewhere \end{cases}$$

is applied to a linear filter with impulse response $h(t) = x(T-t)$

Assume that the frequency $f_c$ equals a large integer multiple of $1/T$. Determine the response of the filter, and sketch it. 14M

6 a) Explain finite duration sampling. 7M

   b) Explain sampling process to obtain flat top samples. 7M

7 a) Determine the Laplace transform and ROC of

$$x(t) = \delta(t) - \frac{5}{6}e^{-4t}u(t) + \frac{2}{3}e^{3t}u(-t)$$ 7M

   b) Find the inverse Laplace Transform of

$$X(s) = \frac{2s^2+5s+5}{(s+1)^2(s-2)}$$ with ROC -2<Re{s}<-1 7M

8. a) Determine the unit sample response of the causal discrete time system described by the difference equation

$$y[n] + \frac{1}{4}y[n-1] - \frac{1}{8}y[n-2] = x[n]$$ 10M

   b) Write about any four properties of ROC of z-transforms. 4M

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)

*II B.Tech. II Semester Regular Examinations, June 2014*

*Switching Theory and Logic Design*

( *ECE* )

**Time: 3 hours** **Max Marks: 70**

*Answer any FIVE of the following*
*All questions carry equal marks (14 Marks each)*

* * * * *

1. a) The hamming code 101101101 is received; correct it if any errors are there. There are four parity bits and odd parity is used. 5M

   b) Why are complements used in binary arithmetic? 3M

   c) Perform N1+N2, N1+ (-N2) for the following 8 bit numbers expressed in a 2's complement representation. Verify your answers by using decimal addition and subtraction.

      i. N1=00110010, N2=11111101

      ii. N1=10001110, N2=00001101. 6M

2. a) Simplify the following Boolean function to minimum number of literals.

      i. xy+wxyz'+x'y

      ii. xy+y'z'+wxz' 4M

   b) Obtain the Dual of the following Boolean expressions.

      i. (AB'+AC') (BC+BC') (ABC)

      ii. AB'C+A'BC+ABC 4M

   c) Show that NAND gate and NOR gate are Universal gates? 6M

3. a) Simplify the function using K-map method and implement them in Universal logic.

      $F=\sum m(4,5,7,12,14,15)+\sum d(3,8,10)$ 10M

   b) Differentiate between Prime Implicants and Essential Prime Implicants. 4M

4. A staircase light is controlled by two switches. One is at the top of stairs and other at bottom of stairs.

   (a) Make a truth table for this system. 3M

   (b) Write a logic equation in the SOP form. 3M

   (c) Realize the circuit using AOI logic. 3M

   (d) Realize the circuit using minimum number of (i) NAND gates and (ii) NOR gates 5M

5. a) Explain the capabilities & limitations of Threshold gates. 4M

   b) Given a 32x8 PROM chip with an enable input, show the external connection necessary to construct a 128x8 PROM with four chips & a decoder. 10M

6. a) Write a short note on Master slave flip-flop. 4M

   b) Design a Mod-6 Synchronous Counter using J-K flip-flop. 10M

7. a) Explain the limitations of Finite State Machines. 4M

   b) Find the equivalence partition and the corresponding reduced machine in standard form for the machine given in table below.

| PS | NS, Z | |
|---|---|---|
| | X=0 | X=1 |
| A | E,0 | D,1 |
| B | F,0 | D,0 |
| C | E,0 | B,1 |
| D | F,0 | B,0 |
| E | C,0 | F,1 |
| F | B,0 | C,0 |

10M

8. a) What do you mean by Control Subsystem? 4M

   b) Draw the State diagram and ASM chart for 2 bit up-down counter having mode control input. M=1 up counting and M=0 down counting. The circuit should generate an output 1 whenever count becomes minimum or maximum. 10M

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)

**II B.Tech. II Semester Regular Examinations, June 2014**

***Electrical Technology***

( Electronics & Communication Engineering )

**Time: 3 hours** **Max Marks: 70**

*Answer any FIVE of the following*
*All questions carry equal marks (14 Marks each)*

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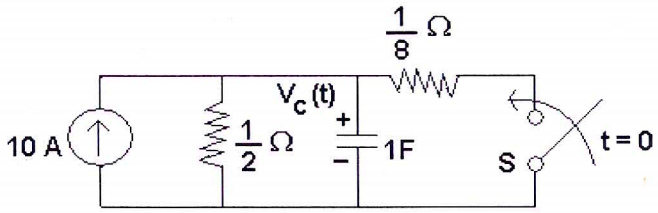
1. a) Find $V_C(t)$.




7M

b) A voltage 25 sint is applied at t = 2 to an RL circuit with R = 5Ω, L = 1 H. Find i(t) by using Laplace Transform method. Assume that the network is at zero state before t = 2. 7M

2. a) The y-parameters of a two port network are $y11$=0.6 mho, $y22$=1.2 mho and $y12$=-0.3 mho. Determine the ABCD Parameters 6M

b) Deduce the relation between Y and Z parameters & Y and h parameters. 8M

3. Design a m- derived high pass filter with a cut-off frequency of 10kHz. Design impedance 500 ohms and m=0.4 14M

4. Derive the expressions for attenuation constant, phase constant, cut-off frequency and characteristic impedance of a symmetrical T – attenuator. 14M

5. a) Explain the principle on which a generator works 6M

b) A 4 ploe lap wound shunt generator supplies to 50 lamps of 100 watts, 200V each. The field and armature resistances are 50 ohm and 0.2 ohms respectively. Allowing a brush drop of 1V each brush, calculate the following: (i) armature current (ii) current per path (iii) generated emf (iv) power output of dc armature. 8M

6. List out different methods of speed control of dc shunt motor. And explain any two of them in detail 14M

7. a) Define regulation and efficiency of a transformer 6M

b) A 250kVA, 11000V/415V, 50Hz single phase transformer has 80 turns on the secondary, calculate (i) the approximate values of the primary and secondary currents. (ii) the approximate number of primary turns. (iii) the maximum value of the flux. 8M

8. a). Explain the operation of capacitor run motor with neat diagram. 7M

b). What is a synchro? Draw a connection diagram of a synchro-transmitter motor system and explain its working? 7M

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**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET**
**(AUTONOMOUS)**
***II B.Tech. II Semester Regular Examinations, June 2014***
***Electromagnetic Waves and Transmission Lines***
*( ECE)*

**Time: 3 hours** **Max Marks: 70**

*Answer any FIVE of the following*
*All questions carry equal marks (14 Marks each)*

* * * * *

1. a) State and explain Coulomb's law?

   b) Three equal positive charges of 4 C each located at three corners of square of side 20 cm. Determine the magnitude and direction of the electric field intensity (E) at the vacant corner point of the square

2. a) Define the relaxation time and derive the equation for continuity equation and relaxation time?

   b) Find out the capacitance and energy stored in a parallel plate capacitor with the following specifications

   Plate area = 30 cm X 30 cm
   Plate separation = 5 mm
   Applied potential = 500 V
   Assume air is the medium between the plates.

3. a) State and explain Ampere's Circuital law?

   b) A circular loop located on $x^2 + y^2 = 25$ , z = 0 carries a current of 15 A along $a_\phi$. Determine the value of H at (0, 0, 5) and (0, 0,-5).

4. a) Discuss the electric boundary conditions at dielectric-dielectric boundary interface?

   b) Region1 $(z < 0)$ contains a dielectric for which $\varepsilon_r$ = 2.5, while region2 $(z > 0)$ is characterized by $\varepsilon_r = 4$.

   If $E_1 = -30a_x + 50a_y + 70a_z$ V/m calculate

   (i) $D_2$

   (ii) The angle between $E_1$ and normal to the surface

5. a) Show that

$$\alpha = \omega\sqrt{\frac{\mu\varepsilon}{2}\left(\sqrt{1+\left(\frac{\sigma}{\omega\varepsilon}\right)^2}-1\right)}, \qquad \beta = \omega\sqrt{\frac{\mu\varepsilon}{2}\left(\sqrt{1+\left(\frac{\sigma}{\omega\varepsilon}\right)^2}+1\right)}$$

   When the wave is propagating through the lossy dielectric.

   b) In free space $H = 0.1\cos(2\times10^8 - \beta z)a_y$ A/m calculate

   (i) β, λ and T

   (ii) The time $t_1$ takes by the wave to travel a distance of λ/8

6. a) State and explain the Poynting theorem?

   b) In free space $H = 0.2\cos(\omega t - \beta x)a_z$ A/m find the total power passing through

   (i) A square plate of side 10 cm on plane $x + z = 1$

   (ii) A circular disc of radius 5 cm on plane $x = 1$

7. a) What is loading and explain the types of loading?

   b) A distortion less line has $z_0 = 60\Omega, \alpha = 20mNep/m, v_p = 0.6C$ where C is the speed of light in a vacuum. Find the primary constants and wavelength of transmission line at a frequency 100MHz.

8. a) Define and derive the input impedance of lossy and lossless transmission line?

   b) What is the importance of smith chart and explain its applications?

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)

***II B.Tech. II Semester Regular Examinations, June 2014***

***Linear Control Systems***

*( Common to EEE & ECE )*

**Time: 3 hours** **Max Marks: 70**

*Answer any FIVE of the following*
*All questions carry equal marks (14 Marks each)*

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1. a) By means of relevant diagrams, explain the working principles of a practical closed loop system. 7M

   b) What do you mean by open loop control system? Explain its features. 7M

2. Construct the signal flow graph for the given set of algebraic equations and find the overall Gain using Mason gain formula.

$$x_2 = a_{12}x_1 + a_{22}x_2 + a_{32}x_3 + a_{42}x_4 + a_{52}x_5$$
$$x_3 = a_{23}x_2$$
$$x_4 = a_{34}x_3 + a_{44}x_4$$
$$x_5 = a_{35}x_3 + a_{45}x_4$$

   14M

3. a) Discuss the commonly used test input signals. 6M

   b) A positional servomechanism with H(s)=1 is characterized by $G(s) = \frac{10(s+2)}{s^2(s-1)}$. Find the static error coefficients of the system. Also find the steady state error of the system when subjected to input defined by $r(t) = 3 - 2t + t^2/6$ ; $t>0$. 8M

4. a) Explain the concept of Bounded input and bounded output stability. 7M

   b) Explain the two difficulties of the Routh-Hurwitz criterion. Also explain how to overcome these difficulties. 7M

5 a) Define the following terms:

   (i) Gain cross over frequency (ii) Resonant peak

   (iii) Resonant frequency (iv) Band width 6M

   b) The damping ratio and natural frequency of oscillations of a second order system is 0.5 and 8 rad/sec respectively. Calculate the resonant peak, phase margin and resonant frequency. 8M

6. Sketch the polar plot for the following transfer function and from the plot determine the phase margin and gain margin $G(s) = \frac{200(s+2)}{s(s^2+10s+100)}$ 14M

7. The open loop transfer function of an ufb system is $G(s) = \frac{k}{s(s+1)}$. It is desired to have the velocity error constant $K_v = 12\text{sec}^{-1}$ and phase margin as $40^0$. Design a lead compensator to meet the above specifications. 14M

8. a) Obtain state variable representation of an armature controlled D.C. motor. 7M

   b) Obtain the state model of the system whose transfer function is given by $G(s) = \frac{(s^2+3s+3)}{(s^3+2s^2+3s+1)}$ 7M

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)

II B.Tech. II Semester Regular Examinations June 2014

*Mathematics–III*

*(Common to EEE & ECE)*

**Time: 3 hours** **Max Marks: 70**

*Answer any FIVE of the following*
*All questions carry equal marks (14 Marks each)*

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1. a) Show that $\int_0^1 \frac{x^{m-1}(1-x)^{n-1}}{(x+a)^{m+n}}dx = \frac{\beta(m,n)}{a^n(1+a)^m}$ 7 M

   b) Show that $\int_0^\infty \sqrt{x}e^{-x^2}dx \times \int_0^\infty \frac{e^{-x^2}}{\sqrt{x}}dx = \frac{\pi}{2\sqrt{2}}$ 7 M

2. a) Show that an analytic function of constant absolute value is constant. 7 M

   b) Find the analytic function $f(z) = u(x,y) + iv(x,y)$ if

   $u - v = \frac{\cos x + \sin x - e^{-y}}{2\cos x - e^{y} - e^{-y}}$ and $f(\frac{\pi}{2}) = 0$ . 7 M

3. a) If $\cosh(u+iv) = x+iy$ then show that $\frac{x^2}{\cosh^2 u} + \frac{y^2}{\sinh^2 u} = 1$ 7 M

   b) If $(x+iy)^{1/3} = a+ib$ then prove that $4(a^2-b^2) = \frac{x}{a} + \frac{y}{b}$ 7 M

4. a) Evaluate $\int_0^{2+i} z^2 dz$ along the imaginary axis to i and then horizontally to 2 + i. 7 M

   b) Find the value of $\int_C \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)}dz$ where C is the circle $|z| = 3$ using Cauchy's integral formula. 7 M

5. a) Obtain Taylor series expansion of $f(z) = \frac{e^z}{z(z+1)}$ about z = 2 . 7 M

   b) Expand $\frac{1}{(z^2+1)(z^2+2)}$ in positive and negative powers of z if $1 < |z| < \sqrt{2}$ 7 M

6. a) Evaluate $\int_C \frac{z-3}{z^2+2z+5}dz$ where C is the circle given by $|z+1+i| = 2$ using Residue theorem. 7 M

   b) Show that $\int_{-\infty}^{\infty} \frac{x^2-x+2}{x^4+10x^2+9}dx = \frac{5\pi}{12}$ by the method of contour integration. 7 M

7. a) Show that all zeros of $z^7 - 5z^3 + 12 = 0$ lie between the circles $C_1 : |z| = 1$ and $C_2 : |z| = 2$ 7 M

   b) State and prove Fundamental theorem of Algebra. 7 M

8. a) Show that the function $w = \frac{4}{z}$ transforms the straight line x = c in z – plane into a circle in the w – plane. 7 M

   b) Find a bilinear transformation which maps the points $z_1 = -2, z_2 = 0, z_3 = 2$ onto the points $w_1 = \infty, w_2 = 1/4, w_3 = 3/8$ respectively. 7 M

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