Hall Ticket Number :										

R-11/R-13

Code : 1G342

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

Electromagnetic Waves and Transmission Lines

(Electronics & Communication Engineering)

Max. Marks: 70 **Time: 03 Hours**

Answer *any* **five** questions

All Questions carry equal marks (14 Marks each)

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1. a) Find the relation between electric field intensity E and potential V. 6M
   b) Given the potential $V = 10/ r^2 \sin\theta \cos\Phi$,
      (i) Find the electric flux density D at $(2, \pi/2, 0)$
      (ii) Calculate the work done in moving a 10 μC charge from point A $(1, 30^o, 120^o)$ to B$(4, 90^o, 60^o)$. 8M

2. a) Derive Poison's and Laplace's equations. 6M
   b) Define capacitance. Derive the expression for capacitance of a spherical type capacitor. 8M

3. a) State and explain Biot-Savart's law. 7M
   b) A surface current density k = 20 ax Amp/mt flows in Y = 1 plane. Find the magnetic field intensity at (-1, 3, 2). 7M

4. Derive and explain transformer and motional emfs. 14M

5. Derive the expression for the phase shift constant and attenuation constant of a plane wave propagation in a lossy dielectric medium. 14M

6. a) Define Poynting vector and power flow. 6M
   b) What is normal incidence and discuss 8M

7. a) What is characteristic impedance? Obtain the relation between characteristic impedance and the propagation constant. 7M
   b) An open wire telephone line has R = 10 ohms per km, L = 0.0037 henrys per km, C = 0.0083×10^{-6}farads per km and G = 0.4×10^{-6} mhos per km. Determine z_0, α and β at 100 Hz. 7M

8. a) Explain the construction of smith chart. 7M
   b) A line 10 km long has the following line constants:
      $z_0 = 600 \angle 0^0 \Omega$
      $\alpha = 0.1$ neper /km
      $\beta = 0.05$ rad/km
      Find the received current and voltage when 20 milli amperes are sent down into one end and the receiving end is shorted. 7M

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Hall Ticket Number :										

R-11/R-13

Code : 1G246

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

Electrical Technology

(Electronics & Communicaiton Engineering)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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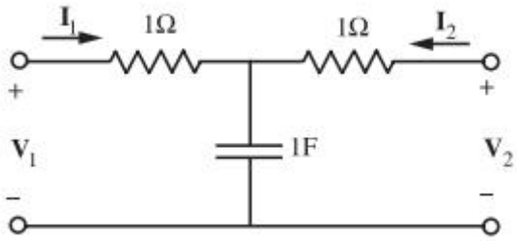
1. A series RLC circuit, with R = 3kΩ, L = 10H and C = 200μF has a constant voltage source applied at t=0. Obtain the transient current if the capacitor has no initial charge. Derive the necessary expressions. 14M

2. a) Express impedance parameters in terms of admittance parameters. 6M

   b) Determine the transmission parameters in the s domain for the following two port network.



8M

3. a) What are the limitations of constant k filters? 4M

   b) Design m derived-low pass filter to meet the following specifications. The filter is to be terminated in 500 Ω resistance and it is to have a cutoff frequency of 1000 Hz with very high attenuation at 1065 Hz. 10M

4. a) What is an attenuator? Classify attenuators. 4M

   b) Design a symmetrical-T and π attenuators to provide an amount of attenuation 40dB and terminated by a nominal impedance of 600Ω. 10M

5. a) Derive the e.m.f. equation of a dc generator when the windings are

      i) lap wounded and ii) wave wounded 6M

   b) A 50KW ,250V dc shunt generator has a field circuit resistance of 60 Ω and an armature resistance of 0.02Ω.Calculate

      i)the load current, field current and armature current

      ii)the generated armature voltage when delivering full load current and half full load current 8M

6. a) Draw and explain very briefly the torque speed characteristics of shunt, series and compound motors 6M

   b) A 500V shunt motor takes 5A on no-load. The resistances of armature and field circuits are 0.5 Ω and 250 Ω respectively. Calculate the efficiency of the machine when running i) as a motor taking 100A from a 500V supply and ii) as a generator delivering100Aat 500V. 8M

7 a) Explain the principle of operation of a single phase transformer and draw the phasor diagram on load. 6M

   b) A 50 kVA single phase transformer draws a primary current of 250A on full load .The total resistance referred to primary side is 0.006Ω.If the iron loss of the transformer is 200W,calculate the efficiency on full load and on half full load at 0.8 p.f.lagging. 8M

8. a) Explain the principle of operation and draw the characteristics shaded pole induction motor 7M

   b) Explain briefly about Synchros 7M

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Hall Ticket Number :										

R-11/R-13

Code : 1G244

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

Linear Control Systems

(Common to EEE & ECE)

Max. Marks: 70 **Time: 03 Hours**

Answer *any* **five** questions

All Questions carry equal marks (14 Marks each)

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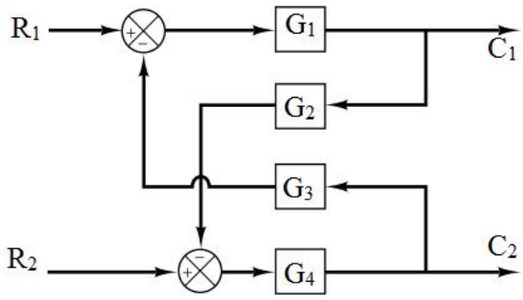
1. a) What are the various types of control systems? Give an example of each control system. 8M

   b) Define transfer function and list its properties. 6M

2. Figure below shows a system with two inputs and two outputs. Derive $C_1(s)/R_1(s)$, $C_1(s)/R_2(s)$, $C_2(s)/R_1(s)$, and $C_2(s)/R_2(s)$. In deriving outputs for $R_1(s)$, assume that $R_2(s)$ is zero and vice versa.



14M

3. a) Obtain the response of a first order system $\frac{C(s)}{R(s)} = \frac{1}{(1+Ts)}$ for unit step input. 7M

   b) Find the steady state error for unit step, unit ramp and unit acceleration inputs for the following system.

$$G(s) = \frac{10}{s(0.1s+1)(0.5s+1)}$$

7M

4. Sketch the root locus of a unity feedback system with $G(s) = \frac{k(s+2)}{s(s+1)(s+4)}$.

14M

5. The open loop transfer function of a unity feedback system is $G(s) = \frac{k}{s(s+1)(s+10)}$.

   Draw the Bode plot and determine the value of K for 40^o phase margin. 14M

6. Consider a unity-feedback system whose open-loop transfer function is $G(s) = \frac{Ke^{-0.8s}}{(s+1)}$. Using the Nyquist plot, determine the critical value of K for stability. 14M

7. The open loop transfer function of a unity feedback system is given by, $G(s) = \frac{5}{s(s+1)(0.5s+1)}$.What is the phase margin of this system. If a lag compensator given by, $G_c(s) = \frac{(10s+1)}{(100s+1)}$ is added in cascade with the forward path transfer function, determine, (**i**) Phase margin (**ii**) Gain cross over frequency (**iii**) Steady state error to a unity velocity input (iv) Gain margin 14M

8. a) Find the homogenous solution of the system, $\dot{X} = \begin{pmatrix} 0 & 1 \\ -2 & -3 \end{pmatrix} X; X_o = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$. 7M

   b) Diagonalize the system matrix, $A = \begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{pmatrix}$ 7M

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Hall Ticket Number :										

R-11/R-13

Code: 1GC41

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

Mathematics – III

(Common to EEE & ECE)

Max. Marks: 70 Time: 3 Hours

Answer *any* **five** questions

All Questions carry equal Marks (**14 Marks** each)

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1. a) Evaluate $\int_0^{\pi/2} \sqrt{\tan\theta}\, d\theta$. 7M

   b) Prove that $\Gamma(m,1/2) = 2^{2m-1}\ \Gamma(m,m)$. 7M

2. a) Prove that the function f(z) defined by

   $$f(z) = \frac{x^3(1+i) - y^3(1-i)}{x^2+y^2}\ (z \neq 0),\ f(0) = 0$$

   is continous and the Cauchy's Riemann equations are satisfied at the origin, yet $f'(0)$ does not exist 7M

   b) Find the analytic function, whose real part is $\sin 2x / (\cosh 2y - \cos 2x)$ 7M

3. a) If cosh(u+iv)=x+iy then prove that

   $$\frac{x^2}{\cosh^2 u} + \frac{y^2}{\sinh^2 u} = 1 \ \text{and}\ \frac{x^2}{\cos^2 v} - \frac{y^2}{\sin^2 v} = 1.$$ 7M

   b) Find all the roots of the equation tanhz+2=0. 7M

4. a) State and prove Cauchy's integral formula. 7M

   b) Evaluate $\int_c \frac{\sin^2 z}{(z-\pi/6)^3} dz$ where c is the circle |z|=1. 7M

5. a) Find the Taylor's expansion of $f(z) = \frac{1}{(z+1)^2}$ about the point z=-i. 7M

   b) Expand $f(z) = \frac{1}{(z-1)(z-2)}$ in the regions (i)$|z|<1$,(ii) $1<|z|<2$. 7M

6. a) Using Residue theorem, evaluate $\int_c \tan z\, dz$ where c is the circle $|z| = 2$. 7M

   b) By Integrating around a unit circle, evaluate $\int_0^{2\pi} \frac{\cos 3\theta}{5-4\cos\theta} d\theta$. 7M

7. a) State and prove Rouche's theorem. 7M

   b) Prove that the polynomial $z^5 + z^3 + 2z + 3$ has just one zero in the first quadrant of the complex plane. 7M

8. a) Find the image of the infinite strip $0 < y < 1/2$ under the transformation $w = \frac{1}{z}$. 7M

   b) Find the Bilinear transformation which maps the points (∞,i,0) in the z-plane into (-1,-i,1) in the w-plane. 7M

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Hall Ticket Number :										

R-11/R-13

Code : 1G341

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

Signals and Systems

(Electronics & Communication Engineering)

Max. Marks: 70 **Time: 03 Hours**

Answer *any* **five** questions

All Questions carry equal marks (14 Marks each)

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1. a) Discuss the concept of signal space and hence approximation of a function using complete set of orthogonal functions. 8M

   b) Describe Impulse function and Signum function 6M

2. a) Write down the trigonometric form of the Fourier series representation of a periodic signal. 7M

   b) Explain the concept of generalized fourier series representation of signal f(t) 7M

3. a) Describe **i**) Signum function **ii**) Hilbert transform 8M

   b) Explain the properties of Fourier transforms. 6M

4. a) Differentiate between LTI and LTV systems with examples 5M

   b) Find whether the following systems are causal or non-causal

   i) y(t)=x(-t) **ii**) y(t) = x(t+10)+x(t) **iii**) y(t)=x(t)sin(t+1) 9M

5. a) Explain the Graphical representation of Convolution with an example. 8M

   b) Determine the following for a given signal x(t) = Asin (ωt+Φ)

   i. Auto Correlation **ii.** Power Spectral Density 6M

6. a) Explain Natural and Flat top sampling and effects of under sampling 7M

   b) Describe 1) what is aliasing effect 2) What is impulse sampling 7M

7. a) Find the Laplace transforms of the following functions

   i) Exponential Function **ii)** Unit step Function **iii)** Damped sign function 6M

   b) Find the Inverse Laplace transform of the functions

   1)$Y(s) = 10s/(s+2)^3(s+8)$ 2) $Y(s) = 2s^2+6s+6/(s+2)(s^2+2s+2)$ 8M

8. a) Find the Z-transform of the following

   i) x[n]=cosnw.u[n] **ii)** $x[n]=a^n u[n]$ 8M

   b) Find the Inverse Z-transform of $X(z) = (x-1)^2 / z^2-0.1z-0.56$ 6M

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Hall Ticket Number :										

R-11/R-13

Code : 1G245

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

Switching Theory and Logic Design

(Electronics & Communication Engineering)

Max. Marks: 70 **Time: 03 Hours**

Answer *any* **five** questions
All Questions carry equal marks (14 Marks each)

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1. a) i) $2B1C_{16} = (?)_8$ ii) $1010111011_2 = (?)_{16}$
   iii) $9834_{10} = (?)_{16}$ iv) $10AF_{16} = (?)_2$ 8M
   b) Describe error detection codes with examples 6M

2. a) Realize XOR and XNOR functionalities using Universal NOR gates. 8M
   b) Describe switching functions-Canonical and Standard forms each with an example. 6M

3. a) Generate the prime implicants and essential prime implicants for
   $F(A,B,C,D) = \sum m\{0,2,5,6,7,8,10,12,13,14,15\}$ 10M
   b) Represent 5-variable k-map with max-terms. 4M

4. a) Realize the functionality of 2-input NAND-Gate using MUX. 6M
   b) Draw the conversion tables for binary to Gray and BCD to Ex-3. 8M

5. a) Distinguish PLA and PAL. 6M
   b) Describe the Implementation of Boolean function using Threshold gate with an example. 8M

6. a) Distinguish synchronous and asynchronous sequential circuit. 4M
   b) Design mod-5 asynchronous counter. 10M

7. a) Distinguish Mealy and Moore type FSMs 4M
   b) Design Mealy type sequence detector for 1110 sequence. 10M

8. a) Describe the components of ASM chart. What are the features of ASM over normal flow chart? 8M
   b) Construct an ASM chart for binary multiplier. 6M

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