Hall Ticket Number :										

R-11 / R-13

Code: 1G342

II B.Tech. II Semester Supplementary Examinations May 2017

Electromagnetic Waves and Transmission Lines

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

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

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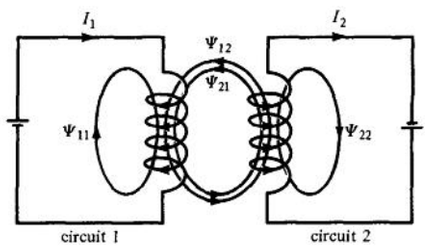
1. a) State Coulomb's law. Develop the vector expression for Force due to N number of Charges. 7M
   b) In a cylindrical conductor of radius 2mm, the current density varies with distance from the axis according to J = 103e−400rA/m2. Find the total current I. 7M
2. a) Establish Poisson's and Laplace's equations from Gauss's law. 7M
   b) A parallel plate capacitance has 500mm side plates of square shape separated by 10mm distance. A sulphur slab of 6mm thickness with εr=4 is kept on the lower plate. Find the capacitance of the setup, if a voltage of 100 volts is applied across the capacitor. Calculate the voltage at both the regions of the capacitor between the plates. 7M
3. a) Formulate expressions for force (i) due to a moving charged particle in a B field (ii) on a current element in an external B field and (iii) between two current elements. 7M
   b) Estimate the magnetic interaction between two given circuits



   Also suggest a procedure to find the self-inductance of a given inductor. 7M
4. a) Outline the Final statements of Maxwell's Equations for Time Varying Fields. Represent the Final forms of Maxwell's Equations in Point and Integral forms. 7M
   b) Find the total current in a circular conductor of radius 4mm, if the current density varies according to J=104/r A/m2. 7M
5. a) Suggest a method to categorize good conductors and good dielectrics. 7M
   b) A uniform plane wave propagating in a medium has E = 2e-αz sin (108t - βz) ay V/m. If the medium is characterized by εr=1, μr=20, and σ=3mhos/m, find α, β, and H. 7M
6. a) State and Prove Poynting Theorem. Justify the Poynting theorem and differentiate time average and instantaneous poynting vectors. 7M
   b) Define and formulate the expressions for the following
      (i) Total Internal Reflection
      (ii) Surface Impedance 7M
7. a) A lossless transmission line of length 100m has an inductance of 28 μ H and capacitance of 20 nF. Find out
      i. Propagation velocity
      ii. Phase constant at an operating frequency of 100 KHz
      iii. Characteristic impedance of the line. 6M
   b) List and explain the various types of distortions that occur in a transmission line. 8M
8. a) Explain the principle of stub matching. List the types of stub matching used in practice. 7M
   b) A 75Ω is terminated by a load of 120+80Ω. Find the maximum and minimum impedances on the line. 7M

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Hall Ticket Number :										

R-11 / R-13

Code: 1G246

II B.Tech. II Semester Supplementary Examinations May 2017

Electrical Technology

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

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

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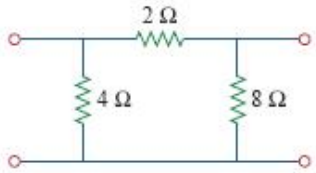
1. a) Derive an expression for transient current response in RLC series circuit. 7M
   b) A series RL circuit with R=30Ω and L=15H has a constant voltage V=60V applied at t=0. Determine the current I, the voltage across resistor and the voltage across the inductor. 7M

2. a) Explain briefly about Lattice Attenuator for symmetrical resistance. 7M
   b) Design a symmetrical lattice attenuator to have characteristic impedance of 800Ω and attenuation of 20dB. 7M

3. a) To find Short circuit Admittance parameters for the circuit shown below.



   10M
   b) Write symmetry and reciprocity condition for open circuit, short circuit, hybrid and ABCD parameters. 4M

4. a) Design a constant K-high pass filter 10M
   b) Design a high pass filter having cut-off frequency of 1KHz with a load resistance of 600Ω. 4M

5. a) Explain about the voltage build up for self-excited generators. 7M
   b) Explain in briefly about the load characteristics of compound generator. 7M

6. a) Explain in briefly about the speed control methods for dc shunt motor. 10M
   b) A 4-pole d.c motor takes a 50A armature current, the armature has lap connected 480 conductors. The flux per pole is 20mwb.Calculate the gross torque developed by the armature of motor. 4M

7. a) Explain briefly about the OC and SC test on single phase transformer. 10M
   b) A 100 KVA transformer has iron losses of 1.2kW and full load copper losses of 1.5kW. Find i) KVA for maximum efficiency ii) Maximum efficiency at unity p.f 4M

8. a) Explain briefly about the shaded pole induction motor with neat sketch. 10M
   b) Explain about the AC Tachometer. 4M

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Hall Ticket Number :										

Code : 1G244

R-11/R-13

II B.Tech. II Semester Supplementary Examinations May 2017

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) Explain about classification of open loop and closed loop control systems with different types of examples. 8M

   b) Write the characteristics of feed-back. 6M

2. a) Derive the transfer function of armature control DC motor. 8M

   b) Write the properties of signal flow graph. 6M

3. a) Sketch the step response of a second order system and indicate the time-domain specifications 8M

   b) Describe the three types of error constants. 6M

4. a) A characteristics equation of a feed back control system is

   $$S^5+S^4+4S^3+4S^2+2S+1$$

   check the stability of the system by using R-H Criterion 6M

   b) Sketch the root locus for the open loop transfer function of unity feed back control system is given by G(S)H(S)=K/S(S+2)(S+4) 8M

5. Sketch the Bode plot for the open loop transfer function

   G(S)=5/S(S+0.2S)(S+0.02S).

   Determine gain cross over frequency and phase cross over frequency assume H(S)=1 14M

6. Sketch the polar plot of an open loop transfer function of unity feed back control system is given by G(S)H(S)=1/S(1+S)(1+4S) and sketch the stability of the system 14M

7. Briefly explain about different types of compensation networks 14M

8. a) Write state transition matrix and its properties. 6M

   b) State and explain controllability and observability with necessary examples. 8M

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Hall Ticket Number :										

R-11 / R-13

Code: 1GC41

II B.Tech. II Semester Supplementary Examinations May 2017

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 $\int_0^\infty \frac{x^c}{c^x}\,dx$. 7M

   b) Show that $\Gamma\left(\frac{1}{2}\right)=\sqrt{®}$. 7M

2. a) Show that the polar form of Cauchy's Riemann equations are $\frac{\partial u}{\partial r}=\frac{1}{r}\frac{\partial v}{\partial ¯}$, $\frac{\partial v}{\partial r}=-\frac{1}{r}\frac{\partial u}{\partial ¯}$.

   Deduce that $\frac{\partial^2 u}{\partial r^2}+\frac{1}{r}\frac{\partial u}{\partial r}+\frac{1}{r^2}\frac{\partial^2 u}{\partial ¯^2}=0$. 7M

   b) Determine the analytic function, whose real part is $x^3-3xy^2+3x^2-3y^2+1$. 7M

3. a) Separate the real and imaginary parts of $i)\sec z \quad ii)\tanh z$. 7M

   b) Find the all roots of the equation sinhz=i. 7M

4. a) Evaluate $\int_c \frac{z^2-z+1}{z-1}\,dz$, where c is the circle (i) |z|=2 (ii)|z|=1/2. 7M

   b) State and prove Cauchy's theorem. 7M

5. a) Find Taylor's expansion of $f(z)=\frac{2z^3+1}{z^2+z}$ about the point z=i. 7M

   b) Expand $\frac{7z-2}{(z+1)z(z-2)}$ about the point z=-1 in the region $1<|z+1|<3$. 7M

6. a) Using Residue theorem, evaluate $\int_c \frac{\sin®\,z^2+\cos®\,z^2}{(z-1)^2(z-2)}\,dz$ where c is the circle $|z|=3$. 7M

   b) Using Residue theorem, evaluate $\int_{-\infty}^{\infty} \frac{x^2dx}{(x^2+1)(x^2+4)}$. 7M

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

   b) Prove that all the roots of $z^7-5z^3+12=0$ lie between the circles $|z|=1$ and $|z|=2$. 7M

8. a) Find the image of the circle |z-2i|=2 under the transformation w=1/z . 7M

   b) Find the Bilinear transformation that maps the points (1,i,-1) into the points (2,i,-2). 7M

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Hall Ticket Number :										

Code : 1G341

R-11/R-13

II B.Tech. II Semester Supplementary Examinations May 2017

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. If x(t) and y(t) are orthogonal, then show that the energy of the signal x(t) + y(t) is identical to the energy of the signal x(t) - y(t) and is given by $E_x + E_y$. Explain this result using vector concepts. In general, show that for the orthogonal signals x(t) and y(t) and for any pair of arbitrary constants C_1 and C_2, the energies of $C_1x(t) + C_2y(t)$ and $C_1x(t) - C_2y(t)$ are identical, given by $C_1^2Ex + C_2^2Ey$.

2. a) Sketch the signal $f(t) = t^2$ for all t and find the trigonometric Fourier series φ (t) to represent f(t) over the interval (-1, 1). Sketch φ(t) for all values of t.

   b) Show that, in general, time inversion of a periodic signal does not affect the amplitude spectrum and the phase spectrum is also unchanged except for the change of sign.

3. Prove the frequency differentiation property

   $-jtf(t) \iff \frac{d}{dw}F(w)$

   Using the time shifting property, show that if $f(t) \iff F(w)$

   $f(t+T) + f(t-T) \iff 2F(w)\cos Tw$

4. Show that a filter with transfer function

$$H(w) = \frac{(10)^5}{w^2 + 10^{10}}$$

   show that this filter is physically un realizable by using the time domain criterion and the frequency domain criterion.

5. a) What is Impulse Response? Show that the Response of an LTI system is convolution Integral of its impulse Response with input signal?

   b) Find the convolution of two signals x(n) = { 1, 1,0, 1, 1} and h(n) = { 1, -2, -3, 4} and represent them graphically.

6. State and prove sampling theorem for low pass band limited signal and explain the process of reconstruction of the signal from its samples.

7. a) Discuss any four properties of Laplace Transform.

   b) Determine the impulse response h(t) of the system given by the differential equation $\frac{d^2y(t)}{dt^2} + 3\frac{dy(t)}{dt} + 2y(t) = x(t)$ with all initial conditions to be zero.

8. a) Find the inverse z-transform of $x(z) = \frac{z^2+z}{(z-1)(z-3)}$, ROC: z > 3 using Partial fraction method.

   Compute the response of the system.

   y(n) = 0.7y[n - 1] - 0.12y[n - 2] + x[n - 1] + x[n - 2] to input x(n) = nu[n]. Is the system is stable?

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Hall Ticket Number :										

R-11/R-13

Code : 1G245

II B.Tech. II Semester Supplementary Examinations May 2017

Switching Theory and Logic Design

(Electronics and 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. Convert $(8A9.B4)_{16}$ to binary. 2M
   ii. Perform the following subtraction
   10011.11 – 101.11 using 2's complement. 3M
   iii. Given that $(292)_{10} = (1204)_b$. Determine the value of b. 2M

   b) i. With an example explain even and odd parity. 3M
   ii. The Hamming code 101101101 is received. Correct it if any error. Here four parity bits and odd parity is used. 4M

2. a) Simplify the following functions using Boolean algebra
   (i) $X = \Pi M (3,5,7)$
   (ii) $(x + y) (x+\overline{y})$ 7M

   b) Implement the following function using NAND gates.
   $F = wx +\overline{x} y (z +\overline{w})$ 7M

3. Determine the prime implicants of the following function and verify using k-map.
   $Y = (P,Q,R,S) + \Sigma (3,4,5,7,9, 13, 14, 15)$ 14M

4. a) Realize full subtractor using Karnaugh map. 6M

   b) Implement the following Boolean function using 8 : 1 multiplexer
   $F (A, B, C, D) = \overline{A} B \overline{D} + A C D + \overline{B} C D + \overline{A} \overline{C} D$ 8M

5. a) Implement the following Boolean functions using PAL
   $w(A,B,C,D) = \Sigma m (0,2,6,7,8,9,12,13)$
   $x (A,B,C,D) = \Sigma m (0,2,6,7,8,9,12,13,14)$
   $y (A,B,C,D) = \Sigma m (2,3,8,9,10,12,13)$
   $z (A,B,C,D) = \Sigma m (1,3,4,6,9,12,14)$ 10M

   b) Explain the construction of threshold gate. 4M

6. a) What is race around problem? With neat diagrams explain how it will be overcome in JK master slave flip flop. 7M

   b) What is excitation table? Write the excitation tables for the following flip-flops.
   (i) S R flip-flop (ii) JK flip-flop 7M

7. a) What is Mealy machine? Give an example. 7M

   b) Explain the concept of minimal cover table. 7M

8. a) Explain data path sub system and ASM chart for binary multiplier. 7M

   b) Design the ASM chart for weighing machine 7M

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