Hall Ticket Number :										

Code : 1G242

R-11/R-13

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

Electrical Circuits-II

(Electrical & Electronics 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) Show that when two two port networks N_1 and N_2 are connected in parallel, the equivalent Y-parameter of the combined network is $Y_{eq}=Y_{N1}+Y_{N2}$ 7M

   b) Find the transmission parameters for the network shown in figure1.

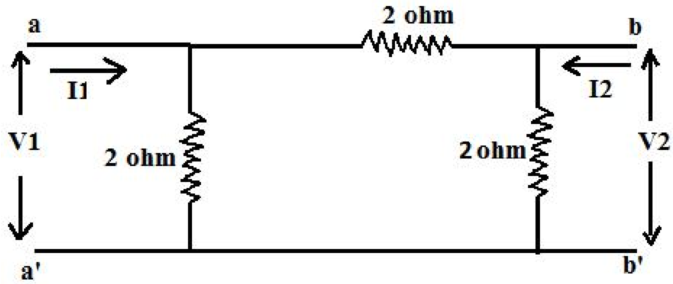

Figure1 7M

2. a) Define the terms:

   (i) Graph (ii) Oriented graph (iii) Incidence Matrix (iv) Twig (v) Link 5M

   b) Draw the directed graph for the given matrix?

$$\begin{bmatrix} I1 \\ i2 \\ i3 \\ i4 \\ I5 \\ i6 \\ i7 \\ i8 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & -1 \\ 0 & 1 & 0 & -1 \\ 0 & 1 & 1 & 0 \\ 0 & 1 & 1 & 0 \\ 1 & -1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} I1 \\ I2 \\ I3 \\ I4 \end{bmatrix}$$

9M

3. a) Calculate the impedance,resistance,power and power factor whose expression for voltage and current are given as:

   $v(t)=100\sin(\omega t+60°) - 50\sin(3\omega t-30°)$ volt.

   $i(t)=10\sin(\omega t+60°) + 50\cos(3\omega t+60°)$ volt 7M

   b) A series RLC circuit with R=5Ω,L=3mH,C=50µF has an applied voltage $v(t)=150\sin 1000t + 100\sin 2000t + 75\sin 3000t$ .Determine the effective current and RMS voltage. 7M

4. a) State and explain initial and final value theorems. 7M

   b) The impulse response of a network is $(e^{-t}-e^{-2t})$.Find the transfer function. Determine the input excitation required to produce an output response as te^{-2t}. 7M

5. a) A series RL circuit consists of resistor of 30Ω and inductor of 15H as shown in figure2.A constant voltage of 60V is applied to the circuit at t=0.Obtain the current equation. Determine the voltages across the resistor and inductor.

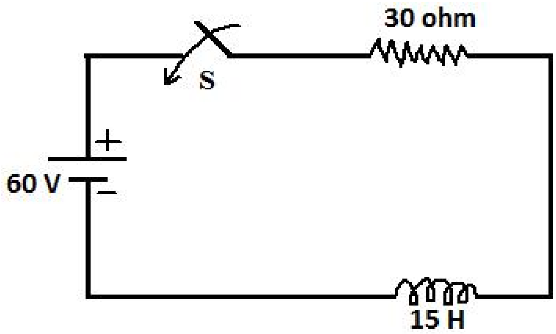

Figure 2 7M

b) Explain the DC transient analysis of series RLC circuit fed with DC source. 7M

6. a) In the circuit shown in figure 3, determine the complex solution for the current when the switch is closed at t=0.Applied voltage is v(t)=100 cos(10^2t+90°).Resistance R=10Ω and inductance,L=0.1H.

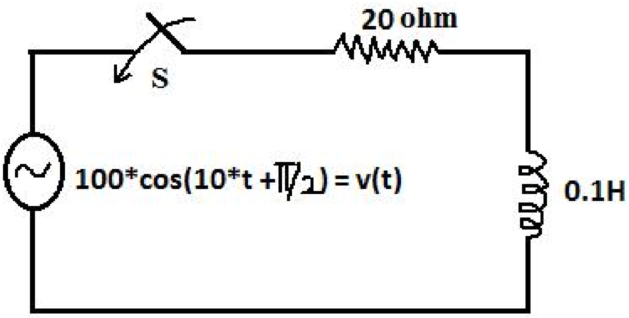

Figure 3 7M

b) Explain the AC transient analysis of series RLC circuit fed with AC source. 7M

7. a) Explain the necessary conditions to be satisfied by driving point function? 7M

b) The impedance of a parallel RC circuit is 100 Ω at 60Hz and 62.5 Ω at 120Hz. Determine the values of R and C. 7M

8. a) Explain the properties of RL driving point admittance function? 7M

b) The driving point impedance of a one port network is given by

$Z(s) = 4 (s^2+9) (s^2+25) / s (s^2+36)$.

Obtain the second Foster form of equivalent networks. 7M

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Hall Ticket Number :										

R-11/R-13

Code : 1G241

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

Electrical Machines – II

(Electrical & Electronics 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) Draw and explain the phasor diagram on no-load of a transformer. 7M

   b) A 1-phase transformer has 180 turns respectively in its secondary and primary windings. The respective resistances are 0.233 Ω and 0.067 Ω. Calculate the equivalent resistance of (**i**) the primary in terms of the secondary winding, (**ii**) the secondary in terms of the primary winding, and (**iii**) the total resistance of the transformer in terms of the primary. 7M

2. a) Explain the effect of variations of frequency and supply voltage on iron losses. 7M

   b) A single phase 150 KVA transformer has efficiency of 96 % at full load, 0.8 pf and at half load, 0.8 pf lagging. Find maximum efficiency of transformer and corresponding load. 7M

3. a) Derive the equations for the currents supplied by each transformer when two transformers are operating in parallel with equal voltage ratios 7M

   b) In Sumpner's test on two identical transformer rated 500 KVA, 11/0.4 KV, 50 Hz, the wattmeter reading on HV side is 6 KW on rated voltage and on LV side is 15 KW when circulated full load current. Find the efficiency of each transformer on 3/4th load and 0.8 pf lagging. What will be the maximum efficiency of each transformer? 7M

4. a) Explain the Scott connection in the transformer. 7M

   b) An ideal 3-phase step down transformer connected in delta/star delivers power to a balanced 3-phase load of 120 KVA at 0.8 pf. The input line voltage is 11 KV and the turn's ratio of transformer (phase to phase) is 10. Determine the line voltage line currents, phase voltages, phase currents on both primary and secondary sides. 7M

5. a) Explain neatly with diagrams how three phase rotating magnetic field is produced in an induction motor 8M

   b) A 3-phase induction motor is wound for 4-poles and is supplied from 50 Hz system. Calculate:
      (i) Synchronous speed.
      (ii) Rotor speed when slip is 4% and
      (iii) Rotor frequency when rotor runs at 600 rpm. 6M

6. a) Discuss the phenomenon of crawling and cogging in an induction motor 7M

   b) A 4 pole, 50Hz, 3 phase induction motor develops a maximum torque of 162.8N-m at 1365 rpm. The resistance of the star connected rotor is 0.2 ohms/ph. Calculate the value of the resistance that must be inserted in series with each rotor phase to produce a starting torque equal to half the maximum torque. 7M

7. a) Explain the no load and blocked rotor tests on 3-phase induction motor. 7M

   b) A 10 KW, 400 V, 3-phase induction motor has full load efficiency of 0.87 and power factor 0.85. At stand still at rated voltage the motor draws 5 times full load current and develops a starting torque of 1.5 times full load torque. An autotransformer is installed to reduce the starting current to give full load torque at the time of starting. Calculate the voltage applied line current. 7M

8. a) Explain the principle of operation of induction generator. 8M

   b) A certain 3 Φ 6-pole, 50 Hz induction motor when fully-loaded, runs with a slip of 3%, find the value of resistance necessary in series per phase of the rotor to reduce the speed by 10%, assume that the resistance per phase is 0.2 Ω 6M

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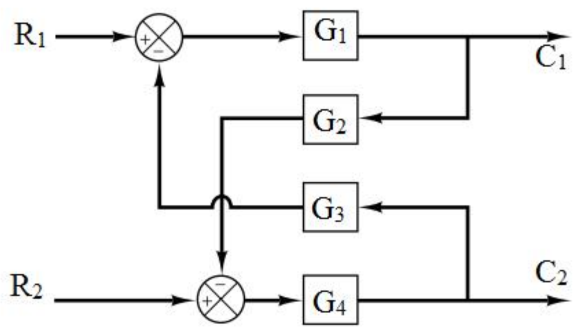
1. a) What are the various types of control systems? Give an example of each control system. 8M

   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 $(m,1/2) = 2^{2m-1}\ (m,m)$. 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 *at the origin, yet $f'(0)$ does not exist* 7M

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

Code : 1G343 **R-11/R-13**

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

Pulse and Digital Circuits

(Electrical & Electronics Engineering)

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

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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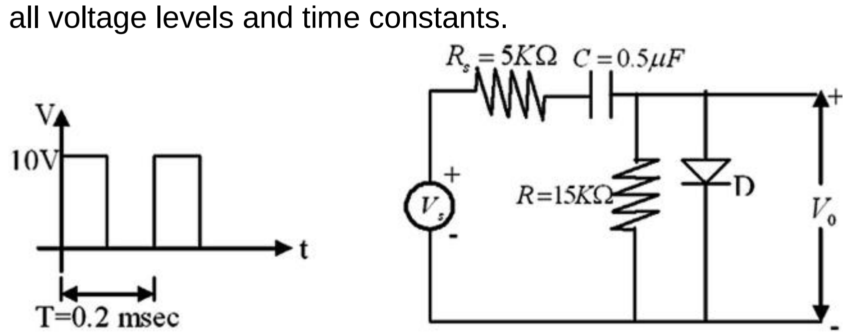
1. a) Discuss the response of R-C High Pass circuit for square wave input, also sketch necessary waveforms. 7M

   b) A 10 HZ symmetrical square wave whose peak -to -peak amplitude is 2V is imprened upon a high pass R-C circuit whose lower 3-dB frequency is 5HZ calculate and sketch the output wave form. In particular, what is peak -to-peak output amplitude? 7M

2. a) What is synchronized clamping? Explain. 7M

   b) For the network shown below. Draw the output wave for the first three cycles, labeling all voltage levels and time constants.



   For `D' $R_f = 100\Omega,\ R_r = \infty,\ V_\gamma = 0V$. 7M

3. a) Explain the terms pertaining to transistor switching characteristics.
   i. Rise time.
   ii. Delay time.
   iii. Turn-on time.
   iv. Storage time.
   v. Fall time.
   vi. vi. Turn-off time. 9M

   b) Give the expression for rise time and fall time in terms of transistor parameters and operating currents. 5M

4. a) Explain the need and usefulness of commutating capacitors in multivibrator circuits. 7M

   b) Silicon transistor with *hfe*(*min*)=20 are available. Design a bistable multivibrator for the following specifications, *VCC* = 15V; *V*0 = 1D *VP-P* ; *IC*(sat) = 10mA; *ICBO* = 0*mA*, *VCE*(sat)=0.3V; *VBE*(off)= -5V. 7M

5 a) With reference to voltage sweeps explain the following terms:
   i. Sweep speed
   ii. Linearity of sweep
   iii. Sweep stability
   iv. Recovery time 8M

   b) Why short recovery time is required? Draw and explain bootstrap sweep circuit with this time. 6M

6. a) With the help of a neat diagram, explain the working of two-diode sampling gate. 7M

   b) Derive expressions for gain and minimum control voltages of a bi-directional two- diode sampling gate. 7M

7. a) What is phase jitter? Explain how to avoid it in frequency divider. 7M

   b) What is relaxation oscillator? Explain how it is used for synchronization? Name some negative resistance devices used as relaxation oscillator. 7M

8. a) Why totem pole is used in DTL? Draw the circuit diagram and explain a DTL gate with this. 7M

   b) Verify the truth table of RTL NOR gate with the circuit diagram of two inputs. 7M

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