Hall Ticket Number :										

R-15

Code: 5G242

II B.Tech. II Semester Supplementary Examinations December 2017

Electrical Circuits-II

(Electrical & Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) A balanced delta connected load of $(3 + j4)\Omega$ per phase is connected to 400V supply. Find line currents and phase currents using RYB sequence. 10M

   b) Prove that $V_L = \sqrt{3}\,V_{ph}$ for star connected system. 4M

OR

2. a) Prove that $\tan\Theta = \frac{\sqrt{3}\,(w_2 - w_1)}{-w_2 + w_1}$ 10M

   b) Convert into Y connection

4M

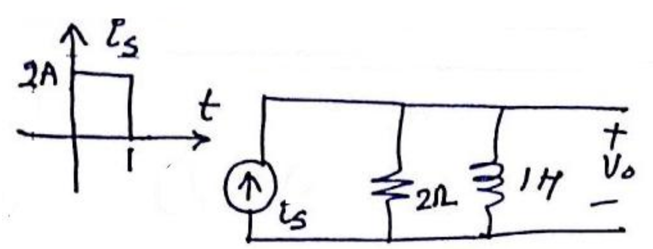
UNIT–II

3. a) $H(S) = \frac{10S}{S^2+2S+9}$ find h(t) 7M

   b) State and prove initial and final value theorems. 7M

OR

4. a)

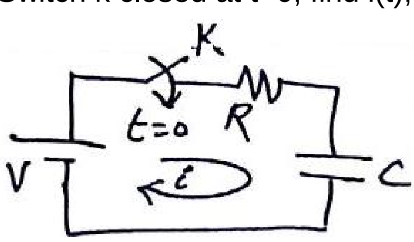


Find $V_0(t)$ for t > 0. 7M

   b) $10\frac{d^2y}{dt^2} - 4\frac{dy}{dt} + 2y(t) = 1u(t)$ Find y(t) using Laplace transform.

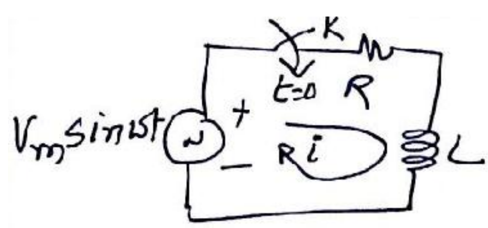
UNIT–III

5. a) Switch k closed at t=0; find i(t), $V_k(t)$, $V_c(t)$ for t > 0 and draw the wave forms.



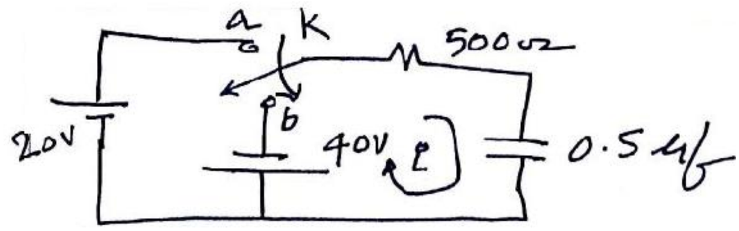
7M

   b) Find i(t) for t > 0.



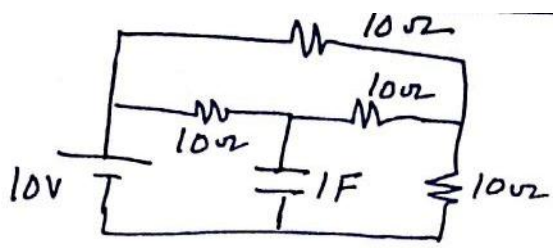
OR

6. a)



Switch ‘k’ is connected to a, at t=0 and moved to b after 1 time constant. The expression for i(t) for t > T — 10M

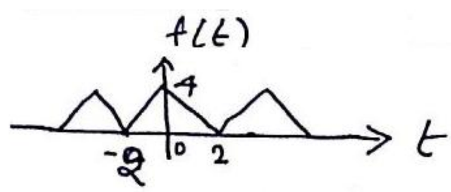
b)



Find time constant — 4M

UNIT–IV

7. a)



Find exponential Fourier series and draw the spectrum. — 10M

b) State and prove time convolution property using Fourier transformations — 4M

OR

8. a) What is the relationship between Trigonometric and Exponential series? — 4M

b) F.T. [sin w_ot u(t)] — 10M

UNIT–V

9. a) $Z(S) = \frac{S(S^2+2)}{(S^2+1)(S^2+3)}$ Synthesis using foster form I & II. — 10M

b) What are the properties of $Z_{RL}(S)$

OR

10. a) What are the properties of transfer function? — 4M

b) $Z(S) = \frac{S^3+2S}{S^2+1}$. Implement using cauer form–II.

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Hall Ticket Number :										

R-15

Code: 5G345

II B.Tech. II Semester Supplementary Examinations December 2017

Electronic Circuit Theory

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Draw the small-signal model of an Emitter-Follower ,determine R_i,R_o and show that the voltage gain is close to unity 8M

   b) For a CE Amplifier, the biasing resistors R_1=47KΩ, R_2=10KΩ, R_E=470Ω, R_C=2.2KΩ and V_{CC}=12V. The small-signal parameters are h_{ie}=1.17KΩ, h_{oe}=2μA/V, h_{fe}=120. Determine the input and output impedance, Voltage gain and current gain. 6M

OR

2. a) Sketch the circuit of a CD Amplifier. Derive Z_i, Z_o and A_v. 6M

   b) Illustrate with neat circuit the low-frequency response of an RC coupled Amplifier. 8M

UNIT–II

3 Examine the High-Frequency response of a Emitter-Follower circuit applying the Miller's theorem. 14M

OR

4. a) Prove that in a pnp transistor operating in the active region, the diffusion capacitance C_{De} at the emitter junction equals to g_m* W2/2D_B 8M

   b) Obtain the expression for the short-circuit current gain of CE amplifier. 6M

UNIT–III

5. a) Describe the four types of feedback topologies. 8M

   b) What is the relationship between the transfer gain with feedback A_f and without feedback A? 6M

OR

6. a) Draw the circuit of a voltage-Shunt Amplifier and derive the expressions for input and output resistance. 8M

   b) Define the term feedback factor β and amount of feedback. 6M

UNIT–IV

7. a) Explain the Barkhausen criterion for sinusoidal oscillations to be sustained. 6M

   b) Explain the operation of RC phase shift oscillator using BJT and derive the expression for frequency of oscillations. 8M

OR

8. a) Draw the electrical equivalent of a piezoelectric crystal and plot its reactance v/s frequency function. Over what portion of the reactance curve do the oscillations take place when the crystal is used as a part of the sinusoidal oscillator? 6M

   b) Explain the operation of Wein Bridge oscillator. Mentioning its frequency of oscillations and the condition for sustained oscillations. 8M

UNIT–V

9. a) Determine the input dc power, output ac power and efficiency for a class B amplifier. 8M

   b) Calculate the efficiency of a class B amplifier for a supply voltage of V_{CC}= 24V with peak input voltages of (a) $V_{L(P)}$=22V ,(b) $V_{L(P)}$=6V. 6M

OR

10. a) Differentiate between push-pull and complementary symmetry configuration of a class B amplifier. 6M

    b) Calculate the harmonic distortion components for an output signal having fundamental amplitude of 2.5V,second harmonic amplitude of 0.25V, third harmonic amplitude of 0.1V and fourth of 0.005V. Also find THD. 8M

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Hall Ticket Number :										

R-15

Code: 5G241

II B.Tech. II Semester Supplementary Examinations December 2017

Electrical Machines-II

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Explain the construction, principle of operation of an transformer and show that $V_1/ V_2=N_1/ N_2=I_2/ I_1$ 14M

OR

2. a) Arrive at the phasor diagram of transformer when it is operating under load and explain. 7M

b) A100KVA, 3300V/240V, 50HZ single-phase transformer has 990 turns on the primary. Identify the number of turns on secondary and the approximate value of primary and secondary full load currents. 7M

UNIT–II

3. a) What is meant by Inrush current in Transformer? Describe the nature of inrush currents and its problem during transformer charging. 7M

b) A 500KVA Transformer has a core loss of 2200 watts and a full load copper loss of 7500 watts. If the power factor of the load is 0.90 lagging, Evaluate the full load efficiency and the KVA load at which maximum efficiency occurs. 7M

OR

4. Describe the method of calculating the regulation and efficiency of a single-phase transformer by OC and SC tests? 14M

UNIT–III

5. a) Explain the constructional details of a 3-Φ transformer and discuss its merits and demerits over three 1-Φ transformers. 7M

b) Explain three phase transformer connections in methods. 7M

OR

6. a) Write short notes on three winding transformer. 7M

b) With the help of connection and vector diagrams how a 2-Φ supply can be obtained from 3-Φ supply. 7M

UNIT–IV

7. a) Explain the principle of operation of three-phase induction motor. 7M

b) Explain briefly the production of rotating magnetic field. What are the speed and direction of rotation of the field? Is the speed uniform? 7M

OR

8. Define torque. How it is developed in wound rotor machines? Derive an expression for the same. State the assumptions made. 14M

UNIT–V

9. a) Explain why induction motors are often described as ‘constant speed’ machines 7M

b) What determines the direction of rotation of an induction motor? How is the direction reversed? 7M

OR

10. a) Discuss different stator side speed control methods of Induction motor in detail with suitable diagrams. 7M

b) A 3-Φ squirrel cage induction motor has maximum torque equal to twice the full load torque. Determine the ratio of motor starting torque to its full-load torque, if it is started by (i) direct-on-line starter, (ii) star-delta starter, (iii) auto-transformer starter with 70 % tapping. The per phase rotor resistance and per phase standstill reactance referred to stator are 0.2Ω and 2Ω respectively. Neglect stator impedance. 7M

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Hall Ticket Number :										

R-15

Code: 5G244

II B.Tech. II Semester Supplementary Examinations December 2017

Linear Control Systems

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Derive the transfer function of field controlled d.c servomotor. Explain the advantages of armature controlled d.c servomotor over field controlled d.c servomotor. 14M

OR

2. a) What is SFG? Write the application of SFG. State Mason's gain formula. 7M

b) Draw the SFG for the following equations

$x_1 - x_2 - 2x_3 - 5x_4 = 0$

$2x_2 - 3x_3 - 5x_4 = 0$

$7x_1 - 3x_3 - 2x_4 = 0$ 7M

UNIT–II

3. a) The open-loop transfer function of a unity feedback control system is given by $G(s) = \dfrac{K}{s(s+2)}$. The system is to have 25% maximum overshoot and peak time 1.0 second. Determine the value of K ? 7M

b) Determine the error constants for standard test signals. 7M

OR

4. The overall transfer function of a control system is given by $\dfrac{C(s)}{R(s)} = \dfrac{16}{s^2 + 1.6s + 16}$. It is desired that the damping ratio to be 0.8. Determine the derivative rate feedback constant K_t and compare rise time, peak time, maximum overshoot and steady state error for unit ramp input without and with derivative feedback control. 14M

UNIT–III

5. a) Explain the absolute, relative and marginal stability. State the limitations of R-H criterion. 7M

b) The characteristic equation of feedback control system is $s^4 + 20s^3 + 15s^2 + 2s + k = 0$. Determine the range of K for the system to be stable. Can the system be marginally stable? If so, find the required value of K and the frequency of sustained oscillation. 7M

OR

6. a) Sketch the root locus plot for the system when open loop transfer function is given by $G(s)H(s) = \dfrac{K}{s(s+4)(s^2+4s+13)}$. 7M

b) Lists out the construction rules of root locus. 7M

UNIT–IV

7. Define minimum and non-minimum phase transfer function. Sketch the bode diagram for the transfer function $G(s) = \dfrac{1000}{(1+0.1s)(1+0.001s)}$. Determine the a) PM b) Gain margin c) Stability of the system. 14M

OR

8. a) State the definition of Type and order of the system. Sketch the polar plot for $G(s) = \dfrac{20}{s(s+1)(s+3)}$. 7M

   b) Define PCF and GCF. Sketch the inverse polar plot of $G(s) = \dfrac{1+ST}{ST}$. 7M

UNIT–V

9. A unity feedback system has an open loop transfer function

   $G(s) = \dfrac{K}{s(s+1)(0.2s+1)}$.

   Design a phase–lag compensation for the system to achieve the following specifications: Velocity error constant K_v= 8, phase margin =40 degrees. Also compare the cross over frequency of the uncompensated and compensated system. 14M

OR

10. a) Define Observability. Check the Observability and find its rank.

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & -2 & -3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} = Ax + Bu$$

7M

   b) State Cayley-Hamilton. Find the f(A)= e^{At} for $A = \begin{bmatrix} 0 & 1 \\ -1 & -2 \end{bmatrix}$. 7M

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Hall Ticket Number :										

R-15

Code: 5GC41

II B.Tech. II Semester Supplementary Examinations December 2017

Complex Variables and Special Functions

(Common to EEE & ECE)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Express the integrals $\int_0^{\infty} x e^{-x^8} dx \,.\int_0^{\infty} x^2 e^{-x^4} dx$ in terms of Gamma functions. 8M

b) Find the principal value of $\sqrt{2i}$. 6M

OR

2. a) Show that $\int_0^{\frac{\text{®}}{2}} \frac{d\bar{}}{\sqrt{\sin\bar{}}}.\int_0^{\frac{\text{®}}{2}} \sqrt{\sin\bar{}}\, d\bar{} = \text{®}$ 7M

b) Find the real and imaginary parts of $\cot z$ 7M

UNIT–II

3. a) State and prove Cauchy-Riemann equations in polar form and hence deduce that $\frac{\partial^2 u}{\partial r^2} + \frac{1}{r}\frac{\partial u}{\partial r} + \frac{1}{r^2}\frac{\partial^2 u}{\partial \bar{}^2} = 0$ 7M

b) Find an analytic function, whose real part is $\frac{\sin 2x}{(\cosh 2y - \cos 2x)}$ 7M

OR

4. Show that for $f(z) = \frac{2xy(x+iy)}{x^2+y^2} \quad if \;\; z \neq 0$
$\quad = 0 \quad if \;\; z = 0$ the C-R equations are satisfied at origin but derivatives of $f(z)$ at origin does not exist. 14M

UNIT–III

5. a) Evaluate, using Cauchy's integral formula $\int_c \frac{\sin\text{®} z^2 + \cos\text{®} z^2}{(z-1)(z-2)} dz$ where c is the circle $|z| = 3$ 7M

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

OR

6. a) Evaluate $\int_c z^2\, dz$ along the straight line from $z = 0$ to $z = 2 + i$ 7M

b) Expand $f(z) = \frac{1}{(z+1)(z+3)}$ in Laurent series valid for $0 < |z+1| < 2$. 7M

UNIT–IV

7. a) Find the sum of the residues of $f(z)=\dfrac{\sin z}{z\cos z}$ at its poles inside the circle $|z|=2$ 7M

b) Use Rouche's theorem to solve $p(z)=z^9-2z^6+z^2-8z-2,\ C:|z|=1$ 7M

OR

8. a) Using Residue theorem, evaluate $\int_c \dfrac{3z^2+2}{(z-1)(z^2+9)}dz$, where C is the circle $|z-2|=2$. 7M

b) State and prove Argument principle. 7M

UNIT–V

9. a) Discuss the transformation $w=\sin z$. 7M

b) Find the bilinear transformation which maps the points $z=0,1,\infty$ onto $w=-1,-i,1$. 7M

OR

10. a) Show that $w=\dfrac{i-z}{i+z}$ maps the real axis of z-plane into the circle $|w|=1$ and the half plane $y>0$ into the interior of the unit circle $|w|=1$ in the w-plane. 7M

b) Find the bilinear transformation which maps the points $z=1,i,-1$ onto $w=2,\ i,-2$ respectively. Find the fixed points of the transformation. 7M

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