Hall Ticket Number :										

R-14

Code: 4G244

II B.Tech. II Semester Supplementary Examinations May 2018

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) What is the classification of control systems and discuss the importance of mathematical modeling of a control system 7M

   b) Explain the necessity and effect of feedback in control system? 7M

OR

2 a) Write the block diagram reduction rules with suitable examples. 7M

   b) Derive an expression for the transfer function of an AC servo motor. 7M

UNIT–II

3. a) A unity feedback system has $G(s) = \frac{40(s+2)}{s(s+1)(s+4)}$ Determine i) type of the System (ii) All error coefficients.(iii) Error for ramp input with magnitude 4 10M

   b) How damping ratio affects the time response of second order system? 4M

OR

4. a) The open loop transfer function of unity feedback system is $G(s) = \frac{4}{s(s+1)}$ Determine the nature of the closed loop system. Also determine the rise time, peak time and peak overshoot. 7M

   b) Derive the expression for settling time? 7M

UNIT–III

5. a) What are the limitations of Routh's criteria. Illustrate with an example. 4M

   b) For the system whose characteristic equation is given by $F(s) = s(s+5)(s+6)(s^2+4s+25) + K(s+3) = 0$ Determine the values of K which will cause sustained oscillations in the closed loop using Routh Criteria. 10M

OR

6. a) Explain the construction rules for root locus technique. 7M

   b) Test the stability of the system with the following characteristic equation by Routh's test $s^6+2s^5+8s^4+20s^2+16s+16=0$ 7M

UNIT–IV

7. a) Derive the correlation between time domain and frequency domain specifications. 4M

   b) Sketch the Bode plot and determine the Gain Margin and Phase Margin for the transfer function given by $G(s) = \frac{10}{s(1+0.4s)(1+0.1s)}$ 10M

OR

8. a) List the advantages and disadvantages of Frequency response methods. 4M

   b) Sketch the polar plot and discuss the stability of the system represented by $G(s)H(s) = \frac{K}{s(s+1)(s+5)}$ 10M

UNIT–V

9. a) Derive the expression for the transfer function of a lag-lead compensator. 7M

   b) Explain the design procedure of lag compensator. 7M

OR

10. a) List the properties of State Transition Matrix. 7M

    b) Explain the controllability and observability with an example 7M

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Hall Ticket Number :										

R-14

Code: 4G242

II B.Tech. II Semester Supplementary Examinations May 2018

Electrical Circuits-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) Distinguish the differences between Star and Delta connected 3-ph systems with current and voltage relations 7M

   b) A balanced Star connected load has an impedance of (3+J4) Ω/ph and supply voltage is 230 V; 3 ph supply. Find active and reactive powers. 7M

OR

2. a) Explain the importance of Star-Delta Transformation technique and deduce relevant conversion procedure from Star to Delta of 3-ph circuit. 7M

   b) A Three Phase 4 wire, 100 V (L-L) system is supplied to a balanced Y-connected load having impedances of (8.66+j5) Ω in each phase. Find the currents and draw the vector diagram. 7M

UNIT–II

3. a) State and Prove Initial and Final Value Theorems. 7M

   b) A half cycle sine wave form is given by V (t) = sin wt. Determine its Laplace transform. 7M

OR

4. A time dependent voltage V (t) is applied to a series R-L-C network. Find S-domain impedance and current. Assume initial condition of the voltage in inductor to be assisting the input current, draw the t-domain and s-domain circuits. 14M

UNIT–III

5. a) State the initial conditions and their significance as applied for the transient analysis of an electrical circuit. 7M

   b) A series R-L circuit is energized by a d.c.voltage of 1.0 V by switching it at t = 0. If R = 1 Ω and L = 1 H, find the expression for current using differential equation approach. 7M

OR

6. To a series L-C circuit, a 50 V d.c. is applied at t = 0. Find the voltage across the capacitor at t = ∞ α. Assume zero initial condition in the circuit elements. 14M

UNIT–IV

7. Explain Even, Odd and Half wave symmetry by using relevant examples. 14M

OR

8. Find the Fourier series of saw tooth wave form. 14M

UNIT–V

9. Realise the network whose impedance is given by $Z_1(s) = \frac{s^4+10s^2+7}{s^2+2s}$ 14M

OR

10. What are positive real functions? Discuss the properties of these functions. 14M

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Hall Ticket Number :										

Code: 4G241

R-14

II B.Tech. II Semester Supplementary Examinations May 2018

Electrical Machines-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) Discuss the constructional features of transformers. Draw neat diagrams 10M
   b) The number of turns on the primary and secondary windings of a single phase transformer are 350 and 35 respectively. If the primary is connected to a 2.2 kV 50 HZ supply. Determine the secondary voltage 4M

OR

2. a) Explain the principle of operation of a single-phase transformer when it supplies lagging power factor load. Draw the phasor diagram under this condition 8M
   b) The maximum flux density in the core of 250/3000 Volts 50 HZ single phase transformer is 1.2 webers per square meter. If the emf per turn is 8 volts, determine primary and secondary turns and area of the core 6M

UNIT–II

3. a) With all necessary instruments draw a neat experimental set up to conduct OC and SC tests on a single phase transformer 7M
   b) A three phase transformer is used to step down the supply voltage from 10000 V to 440 V. If the output capacity of the transformer is 132 kVA, find the secondary and primary currents of the transformer 7M

OR

4. a) Define all day efficiency? Also derive the condition for maximum efficiency of a transformer 6M
   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? 8M

UNIT–III

5. Compare the different connections of 3-phase transformers 14M

OR

6. a) Why should the tap changer be connected near the neutral? What about delta connected transformer? 7M
   b) With neat phasor diagram, explain the voltage regulation of 3-phase transformer 7M

UNIT–IV

7. a) Explain the following terms:
(i) Maximum torque. (ii) Full load torque and (iii) Starting torque. 6M

b) A 12-pole, 3-phase, 50 HZ, IM draws 280 Amp and 110 KW under the blocked rotor test. Find the starting torque when switched on direct rated voltage and frequency supply. Assume the stator and rotor copper losses to be equal under the blocked rotor test 8M

OR

8. a) What are the various losses in an induction motor and on what factors they depend? 7M

b) A 3-phase induction motor runs at 1440 rpm at full load when supplied power from 50 Hz, 3-phase line. Calculate:
(i) The number of poles. (ii) Slip of full load.
(iii) Speed of the rotor field w.r.t rotor. (iv) Speed of the rotor field w.r.t stator. 7M

UNIT–V

9. a) With neat diagram explain the operation of 3-phase IM as induction generator 7M

b) Two 50 Hz, 3-Φ induction motor having 6 and 4-poles respectively are cumulatively cascaded. The 6-pole motor being connected to the main supply. Determine frequencies of rotor currents and the slips referred to each stator field. If the set has slip of 2%. 7M

OR

10. a) Explain in detail about the working of rotor rheostat starter with a suitable diagram. 7M

b) The rotor of 3-phase slip ring induction motor has an induced voltage of 120 V and impedance of 0.23 + j14 ohm at stand still. The induction motor has full load slip of 0.04 driving constant torque load and running at 1340 rpm. Calculate the voltage to be injected if the motor is to be driven at 1000 rpm. 7M

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Hall Ticket Number :										

Code: 4GC41

R-14

II B.Tech. II Semester Supplementary Examinations May 2018

Mathematics-III

(Common to EEE and 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) Evaluate $\int_0^1 \left(\log\frac{1}{y}\right)^{n-1} dy,\ (n>0)$. 6M

   b) Separate $\tan^{-1}(x+iy)$ into real and imaginary parts. 8M

OR

2. a) Prove that $\int_0^1 \frac{x^2}{\sqrt{1-x^4}}dx \times \int_0^1 \frac{1}{\sqrt{1+x^4}}dx = \frac{\pi}{4\sqrt{2}}$ 7M

   b) If $\tan(\theta+i\varphi) = e^{i\alpha}$, show that $\theta = (n+\frac{1}{2})\frac{\pi}{2}$ and $\varphi = \frac{1}{2}\{\log\tan(\frac{\pi}{4}+\frac{\alpha}{2})\}$ 7M

UNIT–II

3. a) Show that the function $f(z) = \sqrt{|xy|}$ is not analytic at the origin even though CR equations are satisfied there. 7M

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

OR

4. a) Find the analytic function whose real part is $\frac{\sin x}{\cosh y - \cos x}$ 7M

   b) Show that the function $f(z)$ is harmonic. 7M

UNIT–III

5. a) Evaluate $\int_{-2+i}^{2+i} (z^2)\,dz$, along the line $y = 2$ 7M

   b) Using Cauchy's integral formula, evaluate $\oint_C \frac{\sin\pi z^2 + \cos\pi z^2}{(z-1)(z-2)}dz$, where C is the circle $|z| = 3$ 7M

OR

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

   b) Find the Laurents series expansion of $\frac{z^2-6z-1}{(z-1)(z-3)(z+2)}$ in the region $3 < |z+2| < 5$ 7M

UNIT–IV

7. a) Find the residues of $f(z) = \frac{z^3}{(z-1)^4(z-1)(z-3)}$ at its poles. 7M

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

OR

8. a) State and prove Argument principle. 7M

   b) Determine the poles of the function $f(z) = \frac{z^2}{(z-1)^2(z+2)}$ and the residue at each pole. 7M

UNIT–V

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

   b) Discuss the transformation $f(z) = z^2$ maps the families of lines $x = \text{constant}$ and $y = \text{constant}$ into two families of confocal central conics. 7M

OR

10. a) Discuss the transformation $w = \cosh z$ 7M

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

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Hall Ticket Number :										

Code: 4G346

R-14

II B.Tech. II Semester Supplementary Examinations May 2018

Pulse and Digital Circuits

(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) Derive the expression for the output of a high-pass circuit excited by exponential input and ramp for different time constants. 8M

   b) A 20 Hz symmetrical square wave whose peak to peak amplitude is 1V is impressed upon a high –pass RC circuit whose lower 3-dB frequency is 10Hz. Calculate and sketch the output waveform for the first two cycles. What is the peak-to-peak output amplitude under steady-state conditions? 6M

OR

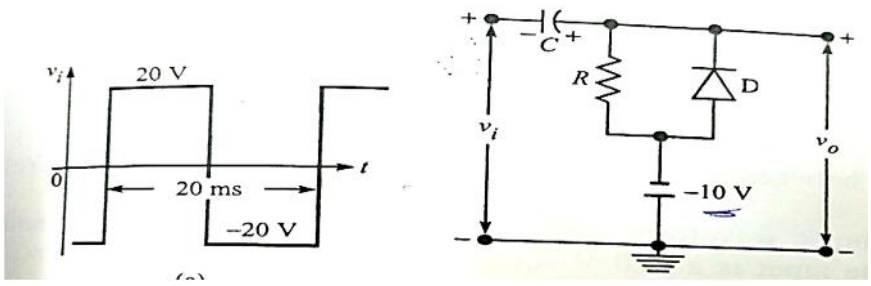
2. a) Define following
   i. Transmission Error
   ii. Percentage tilt
   iii. Attenuator.
   iv. Over compensation
   v. Linear wave shaping
   vi. integrator 6M

   b) A square wave whose peak-to-peak value is 1V extends ± 0.5V with respect to ground. The duration of the positive section is 0.1 sec and of the negative section is 0.2 sec. if this wave form impressed upon an RC differentiating circuit whose time constant is 0.2s, what are the steady-state maximum and minimum values of the output waveform? Prove that the area under the positive section equals that under negative section of the output waveform. What is the physical significance of the result? 8M

UNIT–II

3. a) Give the circuits of different types of shunt clippers and explain their operation with the help of their transfer characteristics. 6M

   b) State and prove clamping circuit theorem. Sketch the output waveform that you would expect from the circuit shown in figure.

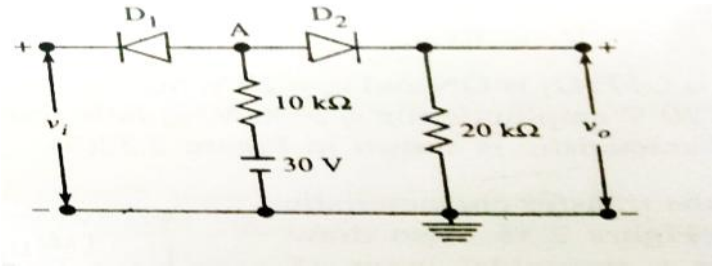


8M

OR

4. a) Explain transfer characteristics of emitter coupled clipper and derive necessary equations. 6M

   b) Draw the transfer characteristics for the clipper circuit shown. Assume ideal Diodes.



8M

UNIT–III

5. a) Explain and Derive the expression for frequency of oscillation of an Astable multi vibrator. 8M

   b) Design a collector coupled Astable multivibrator using NPN silicon transistors with h_{fe}=40, r_{bb}=200 supplied with V_{cc}=10V and circuit component values are R_c=1.2K and C=270 pF. 6M

OR

6. a) Explain the operation of a Monostable multivibrator and derive for the pulse width with necessary waveforms & circuits. 6M

   b) Design a symmetric collector-coupled astable multivibrator to generate a square wave of 10 kHz having peak-to-peak amplitude of 10 V where, h_{FE} min = 30, V_{CE}(sat) = 0.2 V, I_C(sat) = 2 mA 8M

UNIT–IV

7. a) Define and derive the terms slope error, displacement error and transmission error. 8M

   b) In the transistor bootstrap circuit, V_{CC}=25V, V_{BE}=-15V, R= 10kΩ, R_E = 15KΩ, R_B = 150KΩ, C= 0.05 µF, and C_1 =100 µF. the gating waveform has a duration Tg =300µS. The transistor parameters are h_{fe} = 1.1 KΩ, h_{re} =2.5X10^{-4} kΩ h_{fe} = 50, h_{oe} = 1/40 kΩ

      a) Draw the waveforms of I_{C1} and V_O
      b) What is the slope error of the sweep
      c) What is the retrace time for C discharge completely. 6M

OR

8. a) How is deviation of linearity expressed? What do you mean by sweep time and restoration time? 6M

   b) How a compensation circuit improves the linearity of a Bootstrap voltage time base generator? Discuss. 8M

UNIT–V

9. a) Draw and explain with relevant waveforms the process of frequency division by an Astable multivibrator. 8M

   b) Explain about phase delay and phase jitters. 6M

OR

10. a) Explain the synchronization of a sweep circuit with symmetrical signals. 6M

    b) Explain about unidirectional diode sampling gate. Write its advantages and disadvantages. 8M

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