Hall Ticket Number :										

R-15

Code: 5G244

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

****

UNIT–I

1. a) What are the important rules of the block diagram reduction techniques? 7M
   b) Explain the necessity and effect of feedback in control system? 7M

OR

2. a) What do you mean by the sensitivity of the control system and discuss the effect of feedback on sensitivity. 7M
   b) Derive the transfer function of an armature controlled DC servo motor. 7M

UNIT–II

3. a) Define steady state error and error constants of different types of inputs. 7M
   b) Damping factor and natural frequency of the system are .12 and 84.2 rad/sec respectively. Determine the rise time (t_r), peak time (t_p) ,Maximum peak overshoot (mp) and setting time (t_s) 7M

OR

4. a) What is meant by transient response and steady state response? Explain in detail about various time domain specifications. 7M
   b) Find the various static error constants for a unity feedback control system whose open loop transfer function is $G(s) = \frac{10(s+2)}{S^2(s+1)}$ 7M

UNIT–III

5. a) Explain the effect of adding poles and zeroes to characteristic equation on stability of the root loci. 4M
   b) Sketch the root locus plot of a unity feedback system with open loop T.F is

$$G(s) = \frac{k(s^2 - 2s + 2)}{(s + 21)(s + 3)(s + 4)}$$ 10M

OR

6. a) How RH criteria can be used to study the relative stability? 7M
   b) Using Routh –Hurwitz criterion, check whether systems represented by the following characteristic equation are stable or not. Comment on the location of the roots. Determine the frequency of the sustained oscillations if any $S^3+20S^2+9S+100=0$ 7M

UNIT–IV

7. a) Derive the correlation between time domain and frequency domain specifications. 4M
   b) Sketch the Bode plot Margin for the given system whose H(s)=1

$$G(s) = \frac{1}{s(s + 4)(s + 2)}$$

   i. Determine the gain margin
   ii. Find the phase margin for damping ratio of 0.5 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) Explain the procedure for the design of Lag-Lead compensator. 7M
   b) List the effects and limitations of Phase –Lag control. 7M

OR

10. a) Explain the concept of state, state model, state space. 7M
    b) Write short notes on the following :
       i) Controllability and Observability
       ii) State Transition Matrix
       iii) Diagonalization 7M

****

Hall Ticket Number :										

Code: 5GC41

R-15

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2018

Complex Variables & Special Functions

(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)

****

UNIT–I

1. a) Evaluate $\int_0^1 x^5 \left(log\frac{1}{x}\right)^3 dx$ 7M

   b) Separate $log\ sin(x+iy)$ into real and imaginary parts. 7M

OR

2. a) Prove that $\beta\left(m,\frac{1}{2}\right) = 2^{2m-1}\beta(m,m)$ 7M

   b) If $cosh(u+iv) = x+iy$ prove that$(i)\ \frac{x^2}{cosh^2u} + \frac{y^2}{sinh^2v} = 1$ (ii) $\frac{x^2}{cos^2u} - \frac{y^2}{sin^2v} = 1$ 7M

UNIT–II

3. a) If $f(z)$ is a regular function of z, prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4|f'(z)|^2$ 7M

   b) Find the analytic function whose real part is $e^x\{(x^2-y^2)cosy - 2xy\ siny\}$ 7M

OR

4. Find the analytic fuction $f(z) = u+iv$, if $u+v = \frac{2sin2x}{e^{2y}-e^{-2y}-2cos2x}$ 14M

UNIT–III

5. a) Evaluate, using Cauchy's integral formula $\oint_C \frac{sin^2z}{\left(z-\frac{\pi}{6}\right)^3} dz$, where C is the circle $|z| = 1$ 7M

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

OR

6. a) Evaluate $\int_{1-i}^{2+3i}(z^2+z)\,dz$, along the line joining the points $(1,-1)$ and $(2,3)$ 7M

   b) Find the Laurents series expansion of $f(z) = \frac{1}{(z-1)(z-2)}$ in the region $1 < |z| < 2$ 7M

UNIT–IV

7. a) Evaluate $\oint_C \frac{sin\pi z^2 + cos\pi z^2}{(z-1)^2(z-2)} dz$, where C is the circle$|z| = 3$ 7M

   b) Evaluate $\int_{-\infty}^{\infty} \frac{x^2}{(x^2+1)(x^2+4)} dx$ 7M

OR

8. a) Find the sum of the residues of $f(z) = \frac{sinz}{z\ cosz}$ at its poles inside the circle $|z| = 2$ 7M

   b) Use Rouche's theorem to show that the equation $z^5 + 15z + 1 = 0$ has one root in the disc $|z| < \frac{3}{2}$ and four roots in the annulus $\frac{3}{2} < |z| < 2$ 7M

UNIT–V

9. a) Find the bilinear transformation which maps the points $z = 1, i, -1$ onto $w = 2, i, -2$ 7M

   b) Prove that the tranformation $w = e^z$ 7M

OR

10. a) Prove that the tranformation $w = sinz$ 7M

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

****

Hall Ticket Number :										

R-15

Code: 5G242

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

****

UNIT–I

1. a) Explain the application of Millmann's theorem considering a 3-ph star connected Circuit. 7M

   b) A delta connected load has a parallel combination of 5 Ω and -j8 Ω impedance in each phase. If a balanced voltage of 100 V (L-L), 3-ph, 50 Hz supply is applied between the lines, find the phase and line currents. Draw the vector diagram. 7M

OR

2. With a neat circuit diagram explain how the power in a 3-ph circuit is measured experimentally using 2-wattmeter method. Develop the necessary relations for calculation of power and power factor. 14M

UNIT–II

3. a) Discuss in brief application of Laplace transformation technique to electrical circuit Analysis. 7M

   b) Obtain the step response of R-L series circuit using laplace transforms. 7M

OR

4. a) Explain the important functions of Laplace transforms and mention the advantages as applied to electrical circuits. 7M

   b) Find the inverse Laplace transform of $F(s) = \frac{10}{(s+1)(s+2)(s+3)}$ 7M

UNIT–III

5. a) Obtain the D.C. Transient response of R-C series circuit. 7M

   b) Enumerate the differences between the circuit analysis of a given R-L-C series circuit using differential equation approach and Laplace transform approach. 7M

OR

6. A second order differential equation is given by $\frac{d^2f(t)}{dt^2} + 3\frac{df(t)}{dt} + 2f(t) = 2e^{-t}$ Solve the equation using Laplace transform subject to the initial conditions of $f(o^+) = 2$ and $\frac{df(o+)}{dt} = 0$ 14M

UNIT–IV

7. a) Discuss the analysis of Trigonometric form of Fourier series 7M

   b) Obtain the Fourier coefficients for the function given by f(t) = (t+π), when -π<t< π and f(x+2T) = f(x). 7M

OR

8. a) A series R-L circuit with R = 10 Ω and L = 40mH is subjected to a voltage of v (t) = (75+ 25 sinwt+5sin3wt) volts with w=314 rad/sec. Find the current and average power. 7M

   b) Discuss the comparison between Fourier series and Laplace Transforms. 7M

UNIT–V

9. An admittance function is given by Y(s) = $\frac{4s^2+6s}{s+1}$ Realise the network. 14M

OR

10. Find the first and second foster form of the driving point impedance function

$$Z(s) = \frac{2(s^2+1)(s^2+9)}{s(s^2+4)}$$ 14M

***

Hall Ticket Number :										

R-15

Code: 5G345

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2018

Electronic Circuit Theory

(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)

******

UNIT–I

1. a) Explain the different coupling schemes in Multistage amplifier. 8M

   b) In Multistage RC Coupled amplifier the circuit parameters are R_s=1KΩ, R_{C1}=15KΩ, R_{e2}=100Ω, R_{c2}=4KΩ, R_{e2}=330Ω with biasing resistances of 1st stage R_1=200KΩ, R_2=20KΩ and biasing resistances of 2nd stage are R3=47KΩ, R4=4.7KΩ. Find A_I, A_V, R_i and A_{vs} with h-parameters of h_{ie}=1.1KΩ, h_{fe}=50, h_{re}=2.5X10-14 and h_{oe}=25μA/V. 6M

OR

2. a) Explain Cascode amplifier and derive voltage gain. 7M

   b) Define Millers theorem and its dual. 7M

UNIT–II

3. a) Draw the Hybrid π-model for a transistor in the CE Configuration and the significance of every component in this model? 7M

   b) Explain the frequency response of amplifier at Low and Mid frequencies. 7M

OR

4. a) Explain Emitter follower at high frequency in detail. 10M

   b) What is the significance of 3dB bandwidth? 4M

UNIT–III

5. a) Explain the concept of feedback with block diagram. 7M

   b) Briefly discuss about the effect of feedback on amplifier bandwidth. 7M

OR

6. a) Explain voltage shunt feedback. 8M

   b) List the differences between different types of negative feedbacks. 6M

UNIT–IV

7. a) What is the condition for oscillations? 4M

   b) For the Colpitts oscillator using BJT in self-bias having R=1500Ω and the feedback elements C1=0.018μF, C2=0.16μF. Find the values of feedback fraction, minimum gain to sustain oscillations and emitter resistor R_E. 10M

OR

8. a) Explain the Working of transistorized Wein-bridge oscillator with neat diagram. 10M

   b) A Wein bridge oscillator has a frequency of 400Hz, if the value of C is 100Pf, then determine the value of R. 4M

UNIT–V

9. a) Explain transformer coupled class A power amplifier with neat sketch. 7M

   b) A class B push pull amplifier drives a load of 16Ω, connected to the secondary of the ideal transformer. The supply voltage is 25v, if the number of turns on the primary is 200 and the number of turns on the secondary is 50. Calculate maximum power output, d.c power input, efficiency and maximum dissipation per transistor. 7M

OR

10. a) Classify tuned amplifier depending on coupling used. 4M

    b) Explain how the stability is obtained in tuned amplifiers. 10M

***

Hall Ticket Number :										

R-15

Code: 5G241

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

****

UNIT–I

1. a) Derive an emf equation of a single phase transformer and define turns ratio 8M

   b) Calculate the flux in the core of a single-phase transformer having a primary voltage of 230 V, at 50 Hz and 50 turns. If the flux density in the core is 1 Tesla, calculate the net cross-sectional area of the core 6M

OR

2. a) Give the constructional features of “CORE” and “Shell” types of transformers, and give the advantages and disadvantages of each type 7M

   b) List out various types of losses. Also explain the effect of frequency & supply voltage on core losses. 7M

UNIT–II

3. a) Define voltage regulation of a transformer. Deduce the expression for the voltage regulation 7M

   b) A single phase transformer working at unity power factor has an efficiency of 90% at half load and full load of 500 W. Determine the efficiency at 75% of full load 7M

OR

4. a) Draw the equivalent circuit of a transformer and show how the constants of primary and secondary windings may be combined to give a simplified equivalent circuit with the values of constants given in terms of secondary winding 7M

   b) Explain about the parallel operation of transformer 7M

UNIT–III

5. 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

OR

6. 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 8M

   With neat phasor diagram, explain the voltage regulation of 3-phase transformer 6M

UNIT–IV

7. a) What are the merits and demerits of the two types (cage and wound, or slip-ring) of rotors in induction motor? 7M

   b) A 4-pole, 3-phase, 50 Hz, IM supplies a useful torque of 160 Nm at 5 % slip. Calculate: rotor input, motor input, efficiency if friction & windage losses are 500 W and stator losses are 1000 W. 7M

OR

8. a) Discuss about the effects of crawling and cogging on operation of an induction motor 6M

   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. 8M

UNIT–V

9. a) Explain the tests to be carried out to draw circle diagram of an induction motor 8M

   b) Explain the need of starters for starting of a 3 – phase induction motor 6M

OR

10. a) Explain all the modes of operation of induction machine. Plot the neat characteristics. 7M

    b) A 3-phase squirrel cage induction motor has maximum torque equal to thrice the full load torque. Determine the ratio of starting torque to full load torque if started by:

       i. DOL starter.
       ii. Star delta starter.

    The maximum torque occurs at 0.1 slip 7M

***

Hall Ticket Number :										

R-15

Code: 5G243

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2018

Generation of Electric Power

(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)

****

UNIT–I

1. a) Explain the generation of electrical energy. 6M
   b) Briefly explain about Turbines, Condensers, Chimney and Cooling Towers. 8M

OR

2. a) Draw the complete schematic diagram of a coal fired thermal power plant. Discuss briefly the function of each component. 7M
   b) What is mean by calorific value and write the calorific value for different fuels. 7M

UNIT–II

3. a) Write the advantages and disadvantages of Hydro power plant. 7M
   b) Draw the layout of hydro power station and discuss it's generation 7M

OR

4. a) Explain the functions of the following (i) Reservoir (ii) Dam (iii) Spill ways (iv) Penstock (v) Surge tank. 10M
   b) Explain the principle of operation of a gas power plant. 4M

UNIT–III

5. a) What is a nuclear reactor? Describe briefly various components of a Nuclear reactor. 7M
   b) Compare the performance of various materials used as moderator in a nuclear reactor. 7M

OR

6. a) Write the advantages and disadvantages of Nuclear Power plant. 5M
   b) Write short notes on the following (i) Moderator (ii) Control Rods (iii) Reflectors and coolants. 9M

UNIT–IV

7. a) Explain about load curve and load duration curve with one example. 7M
   b) The maximum demand of a generating station is 200MW. The annual load factor being 60%. Calculate the total electrical energy generated per year. 7M

OR

8. a) Briefly explain how "Two part tariff" is most justified. 7M
   b) A consumer has a maximum demand of 200 KW at 40% load factor. If the tariff is Rs100/- per KW of maximum demand plus 10paise per KWh. Find the overall cost per KWh. 7M

UNIT–V

9. a) Explain the role of solar energy in the present scenario. 7M
   b) Explain the working of horizontal axis wind mill with neat diagram. 7M

OR

10. Briefly explain about (a) Ocean energy (b) Tidal energy (c) Wave energy. 14M

***