Hall Ticket Number :										

R-14

Code: 4G242

II B.Tech. II Semester Supplementary Examinations May 2019

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) An unbalanced 4 wire star connected load has balanced voltage of 400V, the loads are $Z_1=(4+j8)\Omega$; $Z_2=(3+j4)\Omega$; $Z_3=(15+j20)\Omega$. Calculate the i) line current ii) current with neutral wire iii) total power. 7M

   b) A three phase, balanced delta connected load of (4+j8) Ω is connected across a 400V, 3 – Ø balanced supply. Determine the phase currents. Assume the phase sequence to be RYB. 7M

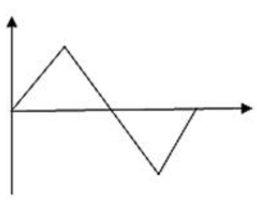
OR

2. a) A three phase balanced delta connected load of $(4+j8)\Omega$ is connected across a 400V, 3 ϕ balanced supply. Determine the phase currents and line currents. Assume the phase sequence to be RYB. Also calculate the power drawn by the load. 7M

   b) The readings of the two watt meters used to measure power in a capacitive load are -3000W and 8000W respectively. Calculate the input power. Assume RYB sequence. 7M

UNIT–II

3. a) Find the expression of f (t) in the graph shown below.



7M

   b) Find the Laplace transform of the function $f(t) = 3t^4 - 2t^3 + 4e^{-3t} - 2\sin 5t + 3\cos 2t$. 7M

OR

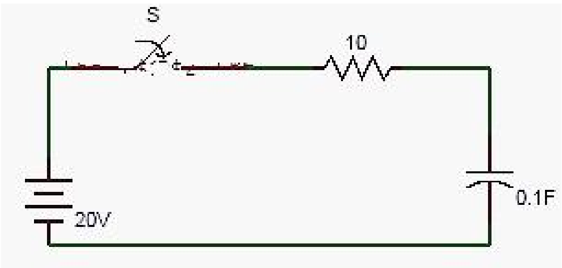
4. a) Determine the inverse transform of $F(s) = (s^2+s+1)/s(s+5)(s+3)$. 7M

   b) From the circuit shown below, find the value of current in the loop.

7M

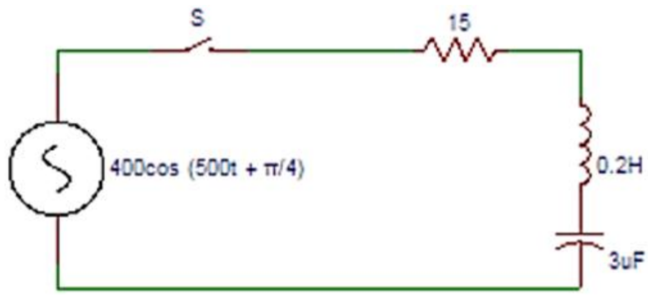
UNIT–III

5. a) A series R-C circuit consists of resistor of 10 and capacitor of 0.1F as shown in the figure. A constant voltage of 20V is applied to the circuit at t = 0. What is the current in the circuit at t = 0?



7M

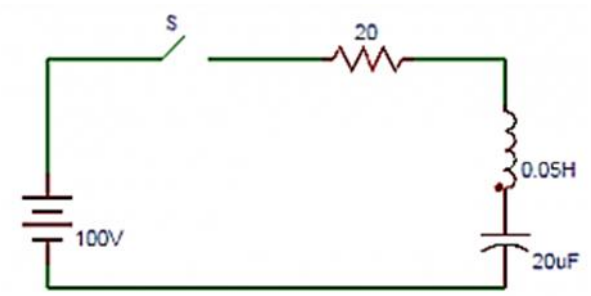
b) In the circuit shown below, the switch is closed at t = 0. Applied voltage is v(t)=400cos (500t+π/4). Resistance R=15Ω, inductance L=0.2H and capacitance=3 μF. Find the roots of the characteristic equation.



7M

OR

6. a) The circuit shown in the figure consists of resistance, capacitance and inductance in series with a 100V source when the switch is closed at t = 0. Find the equation obtained from the circuit in terms of current.



7M

b) A series RL circuit with R=50Ω and L=0.2H has a Sinusoidal Voltage source v=150 Sin500t.Find the expression for i(t). 7M

UNIT–IV

7. a) What is the Fourier sine series of f(x) = π /4 – x/ 2 , where 0 <x<π. 7M

b) Compute the Fourier transform of the signal

$$x(t) = \begin{cases} 1, & for -5 \le t \le 5 \\ 0, & for\, 5 < |t| \le 10 \end{cases}$$

x(t) periodic with period 20. 7M

OR

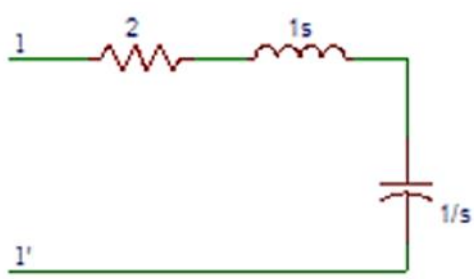
8. a) Calculate the Fourier series of f(x) = x^2 where 0 <x< 2π and f has period 2π. 7M

b) Compute the Fourier transform of the signal $x(t)=\cos(2\pi t)$. 7M

UNIT–V

9. a) Write the necessary conditions for transfer function. 7M

b) For the network shown in the figure, find the driving point impedance.



7M

OR

10. a) Explain the procedure of testing passive real functions. 7M

b) Consider the impedance function $Y(s)=(s^2+4s+3)/(3s^2+18s+24)$. Find the value of R_0, R_1, C_1, R_2 and C_2 after realizing by second Foster method. 7M

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Hall Ticket Number :										

R-14

Code: 4G241

II B.Tech. II Semester Supplementary Examinations May 2019

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. Explain the principal of operation of transformer. Derive its e. m. f. equation.

OR

2. a) With relevant phasor diagrams, explain the operation of a practical single phase transformer operating on unity and lagging power factor loads.

   b) A 2.4kV/115V transformer has sinusoidal flux expressed by 0.113sin188.5t. Determine the primary & secondary turns.

UNIT–II

3. a) Draw the Exact and approximate equivalent circuits of 1-Φ transformer and explain.

   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 (ii) the total resistance of the transformer in terms of the primary and secondary.

OR

4. a) In a transformer, derive the condition for maximum efficiency and thus find the load current at which the efficiency is maximum.

   b) A200kVA 1-phasetransformer is in operation continuously. For 8 hours in a day, the load is 160kW at 0.8 pf. For 6 hours, the load is 80kW at unity pf and for the remaining period of 24 hours it runs on no-load. Full-load copper losses are 3.02 kW and the iron losses are 1.6 kW. Find all-day efficiency.

UNIT–III

5. Draw the Connection diagram of Y- Y and Δ - Δ connected three-phase transformer.

OR

6. Explain the open delta connected three-phase transformer with neat diagram.

UNIT–IV

7. a) Explain why an induction motor will never run at its synchronous speed?

   b) A3-phase, 50Hz squirrel cage induction motor runs at 4% slip. What will be frequency of rotor currents? And speed of the machine?

OR

8. a) Explain how rotating magnetic field of constant amplitude is produced in 3-phase induction motor.

   b) A 3-phase, 400 V, 50 Hz, 6-pole induction motor drawing a line current of 78 A at 0.8 p.f. Calculate synchronous speed, slip, rotor frequency and rotor speed.

UNIT–V

9. Explain the principle of operation of Induction generator with the help of torque - speed characteristics.

OR

10. a) Describe how the speed control of induction motor is achieved from stator side?

    b) A 4 pole, 50 Hz, wound rotor IM has a rotor resistance of 1.1 ph and runs at 1460 rpm at full load. Calculate the additional resistance per phase to be inserted in the rotor circuit to lower the speed to 1200 rpm, if the torque remains constant.

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Hall Ticket Number :										

R-14

Code: **4G244**

II B.Tech. II Semester Supplementary Examinations May 2019

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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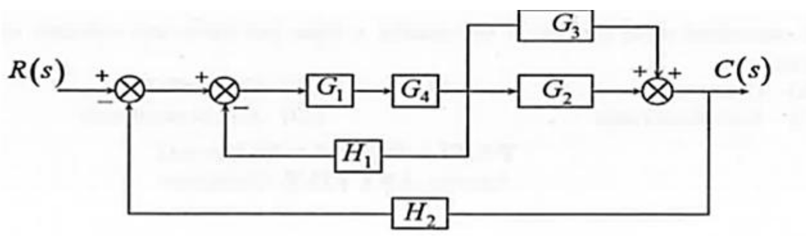
UNIT–I

1. a) Derive an expression for the transfer function of an armature controlled DC servo motor. 10M

   b) Distinguish open loop and closed loop control system. 4M

OR

2. Find the closed loop transfer function of the given system using block reduction technique.



14M

UNIT–II

3. Derive the time domain specifications of a second order system 14M

OR

4. For the given system, $G(s) = \frac{1}{(s^2+s+2)}$ and $H(s) = \frac{1}{(s+1)}$, find the steady state error constants for unit step, unit ramp and unit parabolic input $\left(\frac{t^2}{2}\right)u(t)$ 14M

UNIT–III

5. A unity feedback control system has an open loop transfer function of $G(s) = \frac{K}{s(s^2+4s+3)}$. Sketch the root locus 14M

OR

6. a) A system has $G(s)H(s) = \frac{K}{s(s+2)(s+4)(s+8)}$. Where K is positive. Determine the range of K for stability. 10M

   b) Discuss the effect of adding a pole/zero to the open loop transfer function and its effect on the root locus of a system 4M

UNIT–IV

7. Plot the bode diagram for the transfer function $G(s) = \frac{K}{s(1+0.4s)(1+0.1s)}$. Also obtain the gain and phase cross over frequencies 14M

OR

8. Sketch the Nyquist plot for a system with open loop transfer function $G(s)H(s) = \frac{K(1+s)^2}{s^3}$. Find the range of value of K for which the system is stable. 14M

UNIT–V

9. Derive the transfer function of Lag, Lead and Lag-Lead compensator using electrical network 14M

OR

10. Design a lead compensator for a system with transfer function $G(s) = \frac{k}{s^2(1+0.1s)}$ for the specifications: acceleration error constant K_a=10 and phase margin $\emptyset_{PM} = 30^o$ 14M

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Hall Ticket Number :										

R-14

Code: 4GC41

II B.Tech. II Semester Supplementary Examinations May 2019

Mathematics-III

(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) Evaluate $\int_0^\infty e^{-ax} x^{m-1} \sin bx\, dx$ in terms of Gamma function 7M

b) If $\tan\left(\text{¯} + i\text{¤}\right) = e^{i\text{~}}$, then show that (i) $\text{¯} = \left(n+\frac{1}{2}\right)\frac{\text{®}}{2}$

(ii) $\text{¤} = \frac{1}{2}\log\tan\left(\frac{\text{®}}{4}+\frac{\text{~}}{2}\right)$ 7M

OR

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

b) Separate the real and imaginary parts of

(i) $\sin(x+iy)$ (ii) $\cos(x+iy)$ (iii) $\tan(x+iy)$ 7M

UNIT–II

3. Derive Cauchy Riemann equations in cartesian coordinates 14M

OR

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

b) If $f(z)$ is a regular function of z, prove that $\nabla^2 \left|f(z)\right|^2 = 4\left|f'(z)\right|^2$. 7M

UNIT–III

5. a) Evaluate $\int_C \frac{e^z}{\left(z^2+\text{®}^2\right)^2} dz$, where C is $|z| = 4$. 7M

b) Find the Laurent's series expansion of $f(z) = \frac{7z-2}{(z+1)z(z-2)}$ in the region

$1 < |z+1| < 3$. 7M

OR

6. a) If $f(z)$ is analytic in the ring-shaped region R bounded by two concentric circles C and C_1 of radii r and r_1 $(r > r_1)$ and with the centre at a, then for all z in R, prove that

$$f(z) = a_0 + a_1(z-a) + a_2(z-a)^2 + ----+a_{-1}(z-a)^{-1} + a_{-2}(z-a)^{-2} + ----$$

where $a_n = \frac{1}{2\text{®}i}\int \frac{f(t)}{(t-a)^{n+1}} dt$ 7M

b) Expand $\sin z$ in a Taylor's series about $z = 0$ and determine the region of convergence. 7M

UNIT–IV

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

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

OR

8. Evaluate $\int_{-\infty}^{\infty} \frac{e^{ax}}{e^x + 1} dx$ 14M

UNIT–V

9. a) Show that $w = \frac{i-z}{i+z}$ 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 1, i, -1 to 2, i, -2 respectively. Find the fixed and critical points of the transformation. 7M

OR

10. a) Discuss the transformation $w = e^z$. 7M

b) Prove that the transformation $w = \sin z$, maps the families of lines x = constant and y = constant into two families of confocal central conics. 7M

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