Hall Ticket Number :										

R-14

Code: 4G242

II B.Tech. II Semester Supplementary Examinations Nov/Dec 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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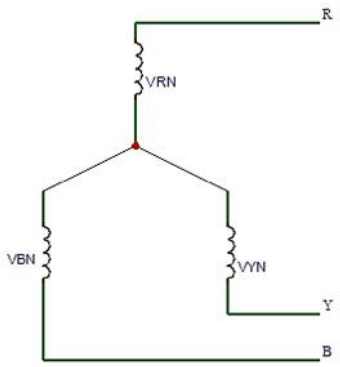
UNIT–I

1. a) A symmetrical star connected system has V_{RN} =230∠0□ The phase sequence is RYB. Find V_{RY}, V_{YB}, V_{BR}.



7M

b) The input power to a three-phase load is 10kW at 0.8 Pf. Two watt meters are connected to measure the power. Find the reading of higher reading wattmeter. 7M

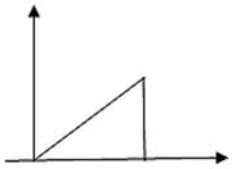
OR

2. a) The three impedances Z_1 = 20∠30□Ω, Z_2 = 40∠60□Ω, Z_3 = 10∠-90□Ω are delta-connected to a 400V, 3 – Ø system. Determine the phase and line currents. 7M

b) A single wattmeter is connected to measure reactive power of a three-phase, three-wire balanced load. The line current is 17A and line voltage is 440V. Calculate the power factor of the load if the reading of the wattmeter is 4488 VAR. 7M

UNIT–II

3. a) Find the function f (t) in terms of unit step function in the graph shown.



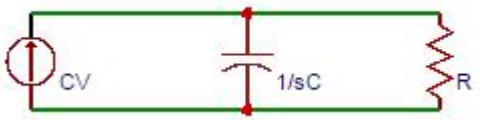
7M

b) If u (t) = 1 for t >= 0 and u (t) = 0 for t < 0, determine the Laplace transform of [u (t) – u (t – a)]. 7M

OR

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

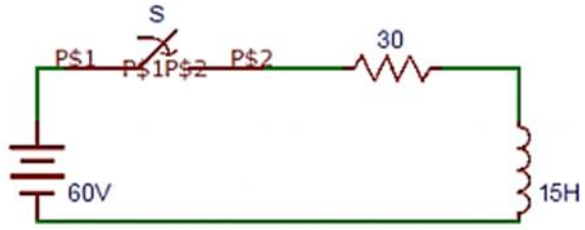
b) The voltage across the resistor in the parallel circuit shown is?



7M

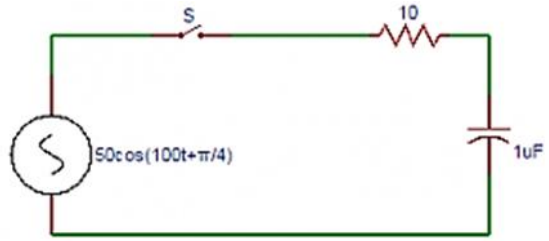
UNIT–III

5. a) A series R-L circuit with R=30Ω and L=15H has a constant voltage V = 60V applied at t = 0 as shown in the figure. Determine the current (A) in the circuit at t = 0+.



7M

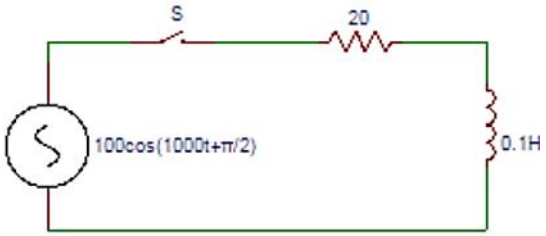
b) In the circuit shown below, the switch is closed at t = 0, applied voltage is v(t)=50cos (102t+π/4), resistance R = 10Ω and capacitance C = 1μF. The complementary function of the solution of 'i' is?



7M

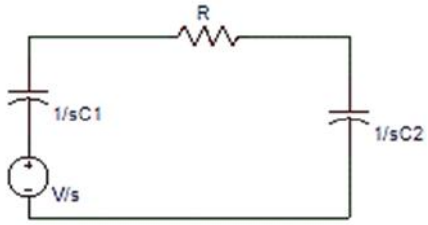
OR

6. a) In the circuit shown below, the switch is closed at t = 0, applied voltage is v(t)=100cos (103t+π/2), resistance R = 20Ω and inductance L = 0.1H. The complementary function of the solution of 'i' is?



7M

b) For the circuit shown below, find the voltage across the capacitor C_1 at the time the switch is closed.



7M

UNIT–IV

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

b) The function f is defined by f(x) = e^x for −L<x <L. Find its Fourier series. 7M

OR

8. a) Compute the Fourier transform of the signal

$$x(t)=\sum_{k=-\infty}^{\infty} f(t+2k), where$$

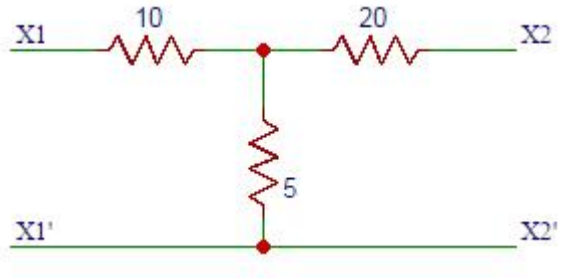
$$f(t)=\begin{cases} t+1, & for \quad -1\le t<0 \\ 1-t, & for \quad 0\le t<1 \\ 0, & else \end{cases}$$

7M

b) Compute the Fourier transform of the signal $x(t)=e^{-t}u(t)$. 7M

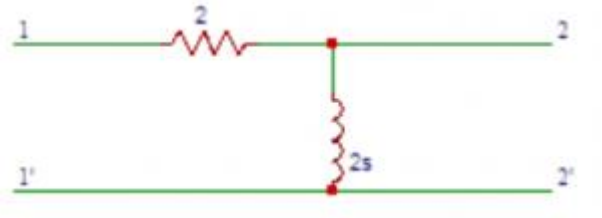
UNIT–V

9. a) In the circuit shown below, find the Z-parameter $Z_{11}, Z_{12}, Z_{21}, Z_{22}$.



7M

b) Obtain the transfer function G_{21} (S) in the circuit shown below.



7M

OR

10. a) Consider the impedance function Z(s)=3(s+2)(s+4)/(s+1)(s+3) . Find the value of R_1, R_2, C_1, C_2 and R_∞ after realizing by first Foster method. 7M

b) Consider the polynomial $P(s)=s^4+3s^2+2$. Check whether the given polynomial P (s) is Hurwitz or not. 7M

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II B.Tech. II Semester Supplementary Examinations Nov/Dec 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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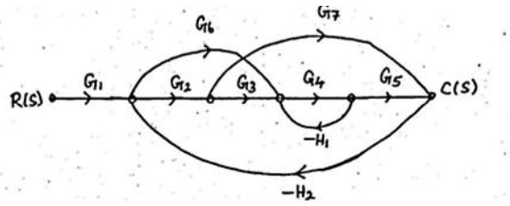
UNIT–I

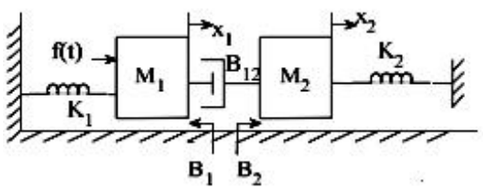
1. Deduce the block diagram of the given signal flow graph. Also find the transfer function using Mason's gain formula



14M

OR

2. For the mechanical system shown below, derive the transfer function. Also draw the force-voltage and force-current analogous circuits.



14M

UNIT–II

3. Obtain the response of an unity feedback system whose open loop transfer functions is $G(s) = \frac{4}{s(s+5)}$. The system is subjected to unit step input. Find the rise time, peak time, settling time and peak over shoot 14M

OR

4. Derive the response of under damped second order system with unit ramp input 14M

UNIT–III

5. a) By Routh stability criterion determine the stability of the system represented by characteristics equation $9s^5 - 20s^4 + 10s^3 - s^2 - 9s - 10 = 0$. Comment on the location of characteristic equation. 10M

   b) Define : Asymptotic stability; BIBO stability 4M

OR

6. A unity feedback system has an open loop transfer function $G(s) = \frac{K}{s(s^2+s+12)}$. Sketch the root locus and determine the dominant closed loop poles with $\zeta = 0.5$. Determine the value of K at this point. 14M

UNIT–IV

7. The open loop transfer function of a unity feedback system is given by $G(s) = \frac{1}{s(1+s)^2}$. Sketch the polar plot. Determine gain margin and phase margin 14M

OR

8. Derive the frequency domain specifications of a second order system 14M

UNIT–V

9. A unity feedback system has an open loop transfer function of $G(s) = \frac{k}{s(2s+1)}$. Design a suitable lag compensator so that the phase margin is 40^o and steady state error for ramp input is less than or equal to 0.2 14M

OR

10. a) Compute state transition matrix e^{At} where $A = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}$ 7M

    b) Find the eigen values of the matrix given below: $A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix}$ 7M

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Hall Ticket Number :										

R-14

Code: 4GC41

II B.Tech. II Semester Supplementary Examinations Nov/Dec 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) Show that $(m,n)=\dfrac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$ 7M

   b) If cosh(u + iv) = x + iy, prove that

   (i) $\dfrac{x^2}{\cosh^2 u}+\dfrac{y^2}{\sinh^2 u}=1$ (ii) $\dfrac{x^2}{\cos^2 v}-\dfrac{y^2}{\sin^2 v}=1$ 7M

OR

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

   b) Separate the real and imaginary parts of (i) $\sinh(x+iy)$ (ii) $\cosh(x+iy)$ 7M

UNIT–II

3. a) Prove that the function $f(z)$ defined by $f(z)=\dfrac{x^3(1+i)-y^3(1-i)}{x^2+y^2}(z\neq 0),\ f(0)=0$ is continuous and the Cauchy Riemann equations are satisfied at the origin, yet $f'(0)$ does not exist. 7M

   b) Find the conjugate harmonic of $v(r,\theta)=r^2\cos 2\theta-r\cos\theta+2$. Show that v is harmonic. 7M

OR

4. a) Determine the analytic function

   $f(z)=u+iv$ if $u-v=\dfrac{\cos x+\sin x-e^{-y}}{2(\cos x-\cosh y)}$ and $f\left(\dfrac{\pi}{2}\right)=0$. 7M

   b) Derive Cauchy-Riemann equations in polar coordinates. 7M

UNIT–III

5. Find the Taylor's expansion of $f(z)=\dfrac{2z^3+1}{z^2+z}$ about the point $z=i$. 14M

OR

6. If $f(z)$ is analytic inside a circle C with centre at a, then for z inside C prove that

   $$f(z)=f(a)+f'(a)(z-a)+\frac{f''(a)}{2!}(z-a)^2+\text{----}+\frac{f^n(a)}{n!}(z-a)^n+\text{----}$$ 14M

UNIT–IV

7. a) State and prove Residue theorem. 7M

b) Evaluate $\int_0^{\infty} \frac{\cos ax}{x^2+1} dx$. 7M

OR

8. a) Find the residue of $f(z) = \frac{z^2}{(z-1)^4(z-2)(z-3)}$ at its poles and hence evaluate $\int_C f(z)dz$ where C is the circle $|z| = 2.5$. 7M

b) Show that $\int_0^{2®} \frac{\cos 2^{-}}{1-2a\cos^{-}+a^2} d^{-} = \frac{2® a^2}{1-a^2}, (a^2 < 1)$ 7M

UNIT–V

9. Find the bilinear transformation which maps the points z = 1, i, -1 onto the points w = i, 0, -i. Hence find the image of $|z| < 1$, 14M

OR

10. Show that the transformation effected by an analytic function $w = f(z)$ is conformal at every point of the Z-plane where $f'(z) \neq 0$. 14M

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