Hall Ticket Number :										

R-15

Code: 5GC41

II B.Tech. II Semester Supplementary Examinations March 2021

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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			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	Show that $\int_0^1 \frac{x^{m-1}(1-x)^{n-1}}{(x+a)^{m+n}} = \frac{\beta(m,n)}{a^n(1+a)^m}$	7M	2	II
	b)	Find all the roots of $\sin z = 2$	7M	2	I
		OR			
2.	a)	Show that $\int_0^\infty x^n e^{-a^2x^2} = \frac{1}{2a^{n+1}}\Gamma\left(\frac{n+1}{2}\right), n > -1$	7M	2	II
	b)	Find all values of z which satisfy $e^z = -2$.	7M	2	I
		UNIT–II			
3.	a)	Show that $f(z) = xy + iy$ is everywhere continuous but is not analytic.	7M	1	I
	b)	Find all the values of k such that $f(z) = e^x(\cos ky + i \sin ky)$ is analytic.	7M	1	I
		OR			
4.	a)	Show that the function $f(z) = \sqrt{\lvert xy \rvert}$ is not analytic at the origin, although Cauchy- Riemann equations are satisfied at the point.	7M	1	I
	b)	Find k such that $f(z) = x^3 + kxy^2$ may be harmonic and find its conjugate.	7M	1	I
		UNIT–III			
5.	a)	Evaluate $\int_C z^2 dz$ where C is the straight line segment from $O(z=0)$ to $A(z=2+i)$.	7M	2	V
	b)	Express $f(z) = \frac{1}{z}$ as the Taylor series at the point $z = 1$.	7M	2	II
		OR			
6.	a)	Verify Cauchy's theorem for the function $f(z) = z^2 + iz - 4$ if C is the square with the vertices at $1 \pm i$ and $-1 \pm i$.	7M	2	III
	b)	Express $f(z) = \left(\frac{1}{1-z}\right)\left(\frac{1}{(z-2)}\right)$ as the Laurent's series expansion in an annulus region $1 < \lvert z \rvert < 2$.	7M	2	II
		UNIT–IV			
7.	a)	Show that $\int_{-\infty}^{\infty} \frac{\cos ax}{x^2+1} dx = \pi e^{-a}, a \geq 0$.	7M	3	II
	b)	Show that $\int_0^{2\pi} \frac{d\theta}{2+\cos\theta} = \frac{2\pi}{\sqrt{3}}$. Use Rouche's theorem to identify the number of zeros of the polynomial $f(z) = 2z^4 - 2z^3 + 2z^2 + 2z + 11$, that lie inside the circle $\lvert z \rvert = 1$.	7M	3	III
		OR			
8.		Solve $\int_{-\infty}^{\infty} \frac{dx}{(x^2+a^2)(x^2+b^2)}$, $a > 0, b > 0, a \neq b$.	14M	3	III
		UNIT–V			
9.	a)	Illustrate the image of the infinite strip $0 < y < \frac{1}{2}$ under the transformation $w = \frac{1}{z}$.	7M	2	II
	b)	Find the bilinear transformation that maps the point $(0,1,\infty)$ in the z-plane onto the point $(-1,-2,-i)$ in the w-plane.	7M	2	I
		OR			
10.	a)	Illustrate the image of the rectangle $R: -\pi < x < \pi, \frac{1}{2} < y < 1$ under the transformation $w = \sin z$.	7M	2	II
	b)	Find the linear transformation that maps $z_1 = 0, z_2 = 1, z_3 = \infty$ onto $w_1 = -1, w_2 = -i, w_3 = 1$ respectively.	7M	2	I

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Hall Ticket Number :										

R-15

Code: 5G345

II B.Tech. II Semester Supplementary Examinations March 2021

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. With a neat diagram explain the small signal analysis of common emitter amplifier and derive the necessary equations to calculate the voltage gain, input and output impedance.

OR

2. a) How two amplifiers are cascaded using coupling?
   b) Give the complete analysis of RC coupled CE amplifier.

UNIT–II

3. a) Derive the expression for Common Emitter short circuit gain AI as a function of frequency
   b) A transistor has h_{ie}=6 KΩ h_{fe}=224 at IC=1mA with f_T=80MHz and Cb'c=12pF. Determine $g_{m,}$ $r_{b'e}$ and Cb'e at room temperature.

OR

4. What are the various capacitances that affect the performance of amplifier circuits and explain one example in detail

UNIT–III

5. Explain Current shunt feedback amplifier in detail and derive the R_{if}, R_{of} parameters.

OR

6. Classify the feedback amplifiers based on the type of mixing and type of Sampling

UNIT–IV

7. a) State Barkhausen Criterion for oscillations.
   b) Find the frequency of oscillations of Hartley oscillator circuit and obtain the condition for oscillations.

OR

8. Derive the general form for frequency of oscillations for LC oscillator with suitable diagram.

UNIT–V

9. a) Differentiate between push-pull and complementary symmetry configuration of a class B power amplifier
   b) Derive the expression for efficiency of a transformer coupled Class A power amplifier

OR

10. a) Discuss the classification of tuned amplifiers
    b) Draw the circuit diagram of Single tuned inductive coupled amplifier and explain its operation.

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Hall Ticket Number :										

R-15

Code: 5G241

II B.Tech. II Semester Supplementary Examinations March 2021

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. Discuss the constructional features of transformers. Draw neat diagrams.

OR

2. What are the various losses taking place in transformer? How these losses can be minimized?

UNIT–II

3. Discuss how you will perform O.C and S.C tests on a single phase transformer in the Laboratory.

OR

4. Explain the procedure for conducting Sumpner's test along with all precautions to be taken while conducting the test with neat diagram.

UNIT–III

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

OR

6. Compare a Three –phase transformer with single phase transformer in detail.

UNIT–IV

7. How does the rotor speed differ from synchronous speed explain in detail with neat diagram? Also what is meant by the term slip and explain its significance.

OR

8. From fundamentals, deduce a relationship between Rotor power input, rotor copper loss and mechanical power developed in case of Induction motor.

UNIT–V

9. Draw the circle diagram of a 20HP, 400V, 50 Hz, 4 pole, 3-phase star connected induction motor from the following test data (line values):

   No-load: 400V; 9A; $\cos\phi_0 = 0.2$ Blocked Rotor: 200V; 50A; $\cos\phi_{sc} = 0.4$

   From the circle diagram Find (a) Line current, P.f and full load slip (b) Starting torque and maximum torque, both in N-m (c) the slip for maximum torque (d) the maximum output and maximum input (e) Efficiency of motor.

OR

10. Explain how the speed of induction motor is controlled by injecting emf into the rotor Circuit.

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Hall Ticket Number :										

R-15

Code: 5G244

II B.Tech. II Semester Supplementary Examinations March 2021

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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Marks

UNIT–I

1. a) Simplify the block diagram shown in figure 1 below and obtain the transfer function C(s)/R(s). Verify the result using signal flow graph

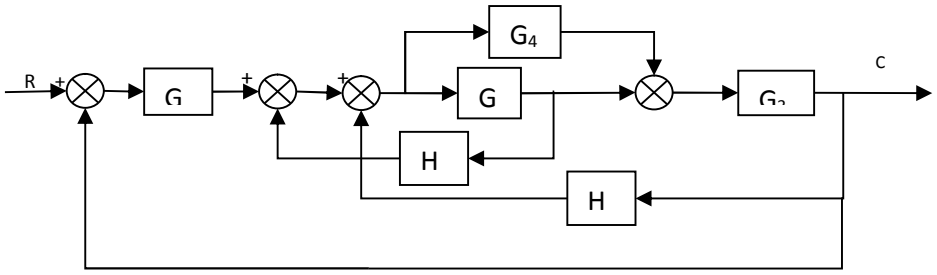

Figure 1 10M

b) Define transfer function and analyze it's limitations? 4M

OR

2. a) Compare Open loop and closed loop control systems 4M

b) Obtain the transfer function of a field control DC Servo motor 10M

UNIT–II

3. a) If x is the input and y is the output of the system described by the differential equation $\frac{d^2y}{dt^2} + 4\frac{dy}{dx} + 8y = 8x$. Determine the un-damped natural frequency, damping ratio, damped natural frequency, peak overshoot and settling time. Hence find the time response for unit step.

7M

b) Analyze the various test signals required in the analysis of steady state error analysis? 7M

OR

4. a) Derive the expressions for Delay time, Settling of a second order system. 6M

b) Valuate the static error constants for a unity feedback system having a forward path transfer function $G(s) = \frac{50}{s(s+10)}$. Estimate the steady state errors of the system for the input $r(t) = 1 + 2t + t^2$. 8M

UNIT–III

5. Find the conditions for stability of the systems whose characteristic equations given below. In each case, determine the value of K which will cause sustained oscillations and the frequency of Oscillations

a. $s^4 + 20s^3 + 224s^2 + 1240s + 2400 + K = 0$

b. $s^3 + (6K + 0.5)s^2 + 4Ks + 50 = 0$ 14M

OR

6. a) Analyze Relative stability of a system with suitable example? 4M

   b) Given $G(s) = \frac{K}{s(s+1)(s+3)}$. Sketch the root locus plot and comment on the stability. Also determine the range of K for which the system is stable and the frequency of sustained oscillations. 10M

UNIT–IV

7. Sketch the bode plot for the transfer function given by $G(s) = \frac{10}{s(1+0.5s)(1+0.1s)}$ and hence determine the gain margin and the phase margin of the system. 14M

OR

8. The open loop transfer function of the unity feedback system is $G(s) = \frac{k}{s(s+2)(s+10)}$.

   By using Nyquist plot

   a. Find the range of k for stability
   b. Find the value of k for gain margin be 10 dB
   c. Find the value of k for phase margin to be 50^o 14M

UNIT–V

9. The open loop transfer function of a unity feedback system is $G(s) = \frac{K_v}{s(s+2)}$. Design a suitable lead compensator to meet the following specification : $K_v=12s^{-1}$, $\varphi_{pm}=45^o$ 14M

OR

10. a) Design state model of a series RLC circuit with output voltage measured across capacitor and current denoted as I_L 7M

    b) Design the basic lag compensator and draw the Bode plot 7M

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