Hall Ticket Number :										

R-14

Code: 4G344

II B.Tech. II Semester Supplementary Examinations March 2021

Field Theory and Transmission Lines

(Electronics and Communication 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) Charges of 20nC and -20nC are located at (3,0,0) and (-3,0,0) respectively. Calculate the magnitude of Electric field intensity at origin. 7M

   b) Given the electric flux density, $D=0.3r^2a^r$ nC/m^2 in free space. Find Electric field intensity E at point P($r=2,\theta=25^o,\phi=90^o$) 7M

OR

2. a) i. Apply Gauss law to calculate Electric field due to point charge Q.
   ii. Assume zero potential at infinity, Determine the potential at a distance 'r' from the point charge Q. 8M

   b) Two point charges -4 μC and 5 μC are located at (2,-1, 3) and (0, 4, -2), respectively. Find the potential at (1, 0, 1) assuming zero potential at infinity. 6M

UNIT–II

3. a) Consider a conductor of uniform cross section S and length l connected to a source of electromotive force. Assume electric field E exists inside the conductor to sustain flow of current. Determine the resistance of conductor. 6M

   b) Define boundary conditions? Determine the boundary conditions at dielectric-dielectric interface. 8M

OR

4. a) Define capacitance of a capacitor. Determine the capacitance of parallel plate capacitor. 7M

   b) State Continuity of current equation. Derive Continuity equation. Express the Continuity equation for steady currents and what do you infer from this expression. 7M

UNIT–III

5. a) State Biot-Savarts law. How to determine the direction of magnetic field intensity. 6M

   b) Determine Magnetic field due to straight current carrying filament of finite length. 8M

OR

6. a) State Amperes Law. Apply Amperes circuit law to determine magnetic field for Infinite sheet of current. 8M

   b) Relate Scalar and Vector magnetic potentials to Magnetic field Intensity. 6M

UNIT–IV

7. Compute the following parameters for moist soil $\epsilon_r = 16$, and $\sigma = 5mS/m$ at frequency of 100MHz.
   i. Propagation constant $\hat{\gamma}$
   ii. Attenuation constant α
   iii. Phase constant β
   iv. Intrinsic impedance $\hat{\eta}$
   v. Skin depth δ_c
   vi. Tangent loss tanδ 14M

OR

8. a) Explain skin depth and derive expression for depth of penetration for good conductor. 7M
   b) Find skin depth for a copper conductor at frequency 1MHz. The conductivity of copper is $5.8*10^7$S/m and μ_r=1. 7M

UNIT–V

9. a) Explain the meaning of the terms characteristic impedance and propagation constant of a uniform transmission line and obtain the expressions for them in terms of parameters of line. 7M
   b) Calculate the reflection coefficient and VSWR for a 50Ω lines, terminated with
   i) matched load. ii) short circuit. 7M

OR

10. a) Derive the expression for the input impedance of a transmission line of length L 7M
    b) Explain the applications of smith chart. 7M

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Hall Ticket Number :										

R-14

Code: 4GC41

II B.Tech. II Semester Supplementary Examinations March 2021

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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			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 $f(z) = x^3 + 3kxy^2$ 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)	Using 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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