Hall Ticket Number :										

R-14

Code: 4G344

II B.Tech. II Semester Supplementary Examinations October 2020

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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UNIT–I

1. a) Compute the expression for electricfield due to line charge distributions? 7M

b) Point charges 5nC and -2nC are located at (2, 0, 4) and (-3, 0, 5) ,respectively .

i) Determine the force on a 1nC point charge located at (1, -3, 7).

ii) Find the electric field E at (1, -3, 7) 7M

OR

2. a) State and prove Gauss's law .Express Gauss's law in both integral and differential forms. and also discuss the salient features and limitations of Gauss's law 7M

b) Obtain the expression for the field and the potential due to a small electric dipole oriented along 7M

UNIT–II

3. a) Derive the equation for Continuity equation and relaxation time 7M

b) A parallel plate capacitor with free space between the plates is connected to a constant source an voltage .Determine how electro static energy wE, capacitance C, total charge Q and surface charge density $\rho_{s\ change}$ as dielectric of $\epsilon_r=2$ is inserted between the plates. 7M

OR

4. a) Derive an equation of polarization 'p' in dielectric materials 7M

b) Derive Poisson's and Laplace's equations starting from Gauss's law 7M

UNIT–III

5. a) State and derive Biot-Savart's law? Is Magnetostatic field conservative discuss, hence obtain M.E for divergence of magnetic field? 10M

b) A current element of length 2 cm is located at the origin in free space and carries current 12mA along a_z, a filamentary current of 15 a_z, is located along x=3, y=4. Find the force on a current filament? 4M

OR

6. a) What is magnetic energy? Derive energy stored in Magnetostatic field? 8M

b) Given the magnetic vect? Deri ntial V_{vm}= $(-\rho^2/4)a_z$ wb/m^2 ? Calculate the total magnetic flux crossing the surface $\Phi=\varpi/2$, 1<ρ<2m, 0<z<5m? 6M

UNIT–IV

7. a) For conducting medium derive expressions for α and β? 7M

b) State and prove pointing theorem. 7M

OR

8. a) Derive expression for reflection and transmission coefficients of an EM wave when it is incident normally on a dielectric. 7M

b) Distinguish between good conductors and good dielectrics. explain the wave propagation in good dielectrics 7M

UNIT–V

9. a) Explain how quarter wave transformer is used for load matching and impedance measurement of a transmission line? 8M

b) An open wire transmission line having characteristic impedance 600Ω is terminated by a resistive load of 900Ω. Design single stub matched transmission line. 6M

OR

10. a) Why stub matching is used? Explain the double stub matching for transmission lines 7M

b) Explain Smith chart and its applications? 7M

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Hall Ticket Number :										

R-14

Code: 4GC41

II B.Tech. II Semester Supplementary Examinations October 2020

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 $\int_0^1 x^2\left(\log\frac{1}{x}\right)^3 dx$

b) If sin(A + iB)=x+iy, prove that (i) $\frac{x^2}{\cosh^2 B}+\frac{y^2}{\sinh^2 B}=1, (ii)\frac{x^2}{\sin^2 A}-\frac{y^2}{\cos^2 A}=1$

OR

2. a) Show that $\int_0^{\frac{\pi}{2}} \sin^2\theta\ \cos^4\theta\, d\theta = \frac{\pi}{32}$

b) Separate into real and imaginary parts for f(z) = tanz

UNIT–II

3. Prove that the function f(z) defined by $f(z)=\begin{cases}\frac{x^3(1+i)-y^3(1-i)}{x^2+y^2}, & z\neq 0\\ 0, & z=0\end{cases}$ is continuous and the C – R equations are satisfied at the origin. Yet $f^1(0)$ does not exist.

OR

4. Find the analytic f(z) = u + iv, if u – v = $\frac{\cos x+\sin x-e^{-y}}{2\cos x-e^{y}-e^{-y}}$ and f(π/2) = 0

UNIT–III

5. a) State and prove Cauchy's theorem.

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

OR

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

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

b) Derive Cauchy's integral formula.

UNIT–IV

7. a) Determine the poles of the function $\frac{z^2+1}{z^2-2z}$ and the residue at each pole

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 $\frac{3}{2}<|z|<2$.

OR

8. a) Evaluate $\int_c \frac{z-3}{z^2+2z+5}dz$, where c is the circle $(i)|z|=1,\ (ii)|z+1-i|=2$

b) state and prove Argument Principle

UNIT–V

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

OR

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

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