Roll No. ..... Total Pages : 03

July-22-00321

B. Tech. EXAMINATION, 2022

Semester V (CBCS)

ELECTROMAGNETIC FIELD THEORY

EC-502

Time : 3 Hours *Maximum Marks : 60*

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt *Five* questions in all, selecting *one* question from each Sections A, B, C and D. Q. No. **9** is compulsory.

Section A

1. Discuss how rectangular, cylindrical and spherical coordinate systems can be correlated with one another. **10**

2. What is Stokes Theorem ? What are its Advantages and Limitations ? Can Stoke's Theorem be applied to closed surfaces ? **10**

Section B

3. State and prove Uniqueness Theorem. **10**

4. Calculate the value off capacitance of a spherical consisting of two concentric spheres of radii 60 mm and 80 mm with air as dielectric medium between two. Derive the formula used. **10**

Section C

5. State and explain Ampere's Circuital Law in point form. **10**

6. If there is a magnetic field representated by : **10**

$\mathbf{B} = 2\sin(\omega_t - \beta\chi)\, \boldsymbol{a}_x = 2y\cos(\omega_t - \beta\chi)\, \boldsymbol{a}_y$

In a medium where $\rho_v = 0$, $\sigma = 0$ and $J = 0$. Find the electric field assume $\varepsilon_r = 1$, $\mu_r = 1$.

Section D

7. Design a stub to match a transmission line which is connected to a load impedance of $Z_L = (450 - j600)\Omega$. The characteristic impedance of the line is 300 Ω. The operating frequency is 20 MHz. **10**

8. What are Transmission Lines ? Explain types of Transmission Lines along with its applications. Explain Primary constants and Secondary constants. **10**

(Compulsory Question)

9. Answer the following : **10×2=20**

(a) Write a short note on physical interpretation of Curl.

(b) State the divergence Theorem.

(c) Write the expression for magnetic flux density due to a current distribution.

(d) What is the instrinsic impedance of a medium ?

(e) Explain Brewster angle.

(f) What are the polarization of EM wave ?

(g) Write Helmholtz equation.

(h) What are the losses in Transmission Lines ?

(i) Explain SWR.

(j) What is Quarter wave transformer ?