[5560]-543

T.E. (Electronics Engineering)
ELECTROMAGNETICS & WAVE PROPAGATION
(2015 Pattern) (End - Semester - I) (304203)

Time : 2½ Hours]   *[Max. Marks : 70*

Instructions to the candidates:

1) *Answer the Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
2) *Neat diagram must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Use of logarithmic tables slide rule, Electronic pocket calculator is allowed.*
5) *Assume suitable data if necessary.*

Q1) a)   State and prove the divergence theorem.   **[6]**

b)   Obtain $\bar{H}$ due to a co-axial cable within conductor, using ampere's circuital law.   **[4]**

OR

Q2) a)   Derive the boundary condition between conductor and free space.   **[4]**

b)   The flux density $\bar{D} = \frac{r}{3}\bar{a}_r$ nC/m² is in free space.   **[6]**

i)   Find $\bar{E}$ at r = 0.2m.

ii)   Find the total electric flux leaving the sphere of r = 0.2m.

iii) Find the total charge within the sphere of r = 0.3m.

Q3) a)   A paper capacitor is made up of aluminum foil of 100 cm² placed on both sides of paper of thickness 0.03mm. If the dielectric constant of paper is 3 and its dielectric breakdown strength is 200 kV/cm, what is the value of capacitor and rating of capacitor?   **[6]**

b)   State properties of dielectric materials.   **[4]**

OR

Q4) a)   Derive the expression for electric field due to infinite sheet of charge.**[5]**

b)   State and explain in brief scalar and vector magnetic potential.   **[5]**

Q5) a) Explain Faradays Law and also explain Transformer e.m.f. and motional e.m.f. in detail. **[10]**

b) Calculate the displacement current through parallel plate air field capacitor having plates of area $10cm^2$ separated by a distance 2 mm connected to $300\sin10^6t$ V, 1MHz source. **[8]**

OR

Q6) a) Derive the boundary conditionfor Time varying Fields. **[10]**

b) State and explain Maxwell's equation in Integral form. **[8]**

Q7) a) Define polarization of a uniform plane waves and Explain its different types. **[8]**

b) State and prove poynting theorem. **[8]**

OR

Q8) a) A 10Ghz plane wave travelling in a free space has an amplitude of $\bar{E}$ as $Ex = 10V/m$. Find β, η, υ, λ. and amplitude. **[8]**

b) For a lossy dielectric material having $\mu_r = 1$, $\varepsilon_r = 48$ $\sigma = 20$ S/m calculate the propagation constant at a frequency of 16 GHz. **[8]**

Q9) a) Write short note on ground wave propagation. **[8]**

b) Explain : **[8]**
    i)   Virtual Height.
    ii)   MUF.
    iii) Multi-Hop Propagation.
    iv) Skip distance.

OR

Q10) a) Derive the expression for Friss Free space Equation. **[8]**

b) Sketch the structure of atmosphere and explain each layer. **[8]**

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