TEE-501   1042

Odd Semester Examination, 2017-18

B.TECH. (SEMESTER-V)

ELECTROMAGNETIC FIELD THEORY

Time: 03:00 Hours   Max Marks : 100

Note:- Attempt **all** questions.

1.   Attempt **any four** questions: (5x4=20)

   (a)   Find the vector component of $F=10a_x - 6a_y + 5a_z$ that is parallel to $G=0.1a_x + 0.2a_y + 0.3a_z$.

   (b)   Points P and Q are located at (0,2,4) and (-3,1,5) calculate:

      (i)   The position vector P

      (ii)   The distance vector from P to Q

   (c)   State and explain

      (i)   Divergence theorem

      (ii)   Stokes theorem

   (d)   State and explain Gauss's law in different form and explain what you mean by ΔD.

   (e)   Define the curl, prove the curl grad φ =0

2.   Attempt **any four** questions: (5x4=20)

   (a)   Explain convection current and conduction current. Derive ohms law in point form.

   (b)   Derive boundary condition for static electric fields in the general form across a common boundary separated by two different perfect dielectric media.

   (c)   What is the Laplace's equation in two dimensions?

   (d)   What do you mean by duality? Are J and D fields are dual?

   (e)   Derive Poisson's equation in two dimensions

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3. Attempt **any two** questions (10x2=20)

   (a) State and explain poynting theorem.

   (b) Explain boundary conditions in magnetostatic field.

   (c) Derive transmission line differential equation. Derive the condition for lossless transmission.

4. Attempt **any two** questions (10x2=20)

   (a) Write the differential form of Maxwell's equations. Are all four Maxwell's equations independent? Explain.

   (b) Explain the following :

      (i) Scalar magnetic potential

      (ii) Magnetic vector potential

   (c) Define **any four** from the following

      (i) Propagation constant

      (ii) Matched transmission line

      (iii) Voltage reflection coefficient

      (iv) Standing wave ratio

      (v) Single stub matching.

5. Attempt **any two** questions (10x2=20)

   (a) (i) Transform the vector field $G = (XY/Y)a_x$ into spherical components and variables.

      (ii) Find the vector components of F that is perpendicular to G.

   (b) (i) Explain convection current and conduction current, also derive the Ohm's law in point form.

      (ii) What is the Laplace equation in 2 dimension?

   (c) Define the Biot Savort law and Amperes law. A long straight conductor cross section with radius has a magnetic fields strength $H = (I_0/2\pi a^2)a_\phi$ with the conductor (r<a) and $H = (1/2\pi r)a_\phi$ for r>a find J in both the regions.

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