



GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

(An Autonomous Institute of Government of Maharashtra)

National Highway No.6, JALGAON - 425 002

Phone No.: 0257-2281522

Website : www.gcoe.ac.in

Fax No.: 0257-2281319

E-mail : princoe@rediffmail.com



Name of Examination : **Summer 2021** - (Preview)

Course Code & Course Name : **EE251U - Electromagnetic Fields**

Generated At : **19-04-2022 15:17:53**

Maximum Marks : **60**

Duration : **3 Hrs**

[Edit](#) [Print](#) [View Answer Key](#) [Close](#) **Answer Key Submission Type:** Marking scheme with model answers and solutions of numerical

Instructions:

1. All questions are compulsory.
2. Illustrate your answer with suitable figures/sketches wherever necessary.
3. Assume suitable additional data; if required.
4. Use of logarithmic table, drawing instruments and non programmable calculators is allowed.
5. Figures to the right indicate full marks.

- 1) Attempt any two of the following
 - a. Define current. Write Ohm's law in point form [2]
 - b. Enlist vector calculus techniques. What is vector algebra [2]
 - c. Enlist different charge configuration with suitable example [2]
- 2) Attempt any three of the following.
 - a. Explain spherical coordinate system. Write dot and cross product of its unit vector [4]
 - b. Define electric field intensity and electric field intensity. Write its expression in different charge configuration. [4]
 - c. Derive Poisson's equation. [4]
 - d. A parallel plate capacitor with surface area 5 square centimeter and separation 3mm has a voltage $50 \sin 10^3 t$ V. Calculate displacement current density assuming that $\epsilon = 2\epsilon_0$ [4]
- 3) Attempt any three of the following.
 - a. State Biot Savart law. Write units of magnetic flux density and magnetic field intensity. [4]
 - b. State Coulomb's law. Write its equation vector form. Illustrate each term of the equation. [4]
 - c. State Poynting theorem. What is skin effect? [4]
 - d. The infinite sheet $0 \leq x \leq 1, 0 \leq y \leq 1$ on $z=0$ plane has the charge density of $\rho_s = (x^2 + y^2 + 25)^{3/2}$, find total charge on the sheet, the electric field at (0,0,5) [4]
- 4) Attempt any four of the following
 - a. Derive wave equation. [8]
 - b. Write Maxwell's equation in point form and integral form. [8]
 - c. Derive the expression for Vector magnetic potential. [8]
 - d. Given that $A = 10 \cos(10^8 t - 10x + 60^\circ)$ and $B_s = (20/j) a_x$, express A in phasor form and B_s in instantaneous form [8]
 - e. Derive the expression for magnetic field intensity due to infinite long conductor [8]

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