CLASS:     BTECH
BRANCH:   EEE

SEMESTER: IV
SESSION: SP/2020

**SUBJECT: EE253 ENGINEERING ELECTROMAGNETICS**

TIME:     2 HOURS

FULL MARKS: 25

**INSTRUCTIONS:**
1. The total marks of the questions are 25.
2. Candidates may attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

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|  |  |  | | CO | BL |
|---|---|---|---|---|---|
| Q1 | (a) | Calculate $\nabla \cdot D$ at the point specified if **D** = $2r \sin\theta\sin\varphi$ **a**r + $r \cos\theta\sin\varphi$ **a**$\theta$ + $r \cos\varphi$ **a**$\varphi$ at $P(3, 45^0, -45^0)$ | [2] | C02 | BL3 |
| Q1 | (b) | For a continuous charge distribution ρ derive the equation of electrostatic energy density $w_e = \frac{1}{2} D.E$ ? | [3] | C01 | BL2 |
| Q2 | (a) | Write the boundary conditions for the tangential and normal components of D at an interface between two perfect dielectric media with dielectric constants $\varepsilon_{r1}$ and $\varepsilon_{r2}$? | [2] | C01 | BL2 |
| Q2 | (b) | Assume that z = 0 plane separates two lossless dielectric regions with $\varepsilon_{r1}$ = 2 and $\varepsilon_{r2}$ = 3 If we know that $E_1$ in the region 1 is $a_x 2y – a_y 3x + a_z(5+z)$ what do we also know about E and D in region *2?* Can we determine E and D at any point in region 2? Explain. | [3] | C04 | BL4 |
| Q3 | (a) | Obtain the relation between vector magnetic potential A and magnetic flux ø through given area? | [2] | C01 | BL2 |
| Q3 | (b) | Determine the Magnetic field intensity at a point P(3,6,8) in a medium having relative permeability of 5 for a given magnetic potential vector $(3x+2z^2)a_x + x^3y^2/z\ a_y + (z-7x)\ a_z$ ? | [3] | C02 | BL3 |
| Q4 | (a) | Show that E field caused by spherical cloud of electrons outside its radius decreases with distance? | [2] | C01 | BL2 |
| Q4 | (b) | Obtain the solution of Laplace equation by method of separation of variables in Cartesian coordinate system? | [3] | C02 | BL3 |
| Q5 | (a) | Write the Maxwell's equations in differential and integral form for time varying fields with their significance? | [2] | C01 | BL1 |
| Q5 | (b) | Express the poissons equation in all types of three dimensional coordinate systems? | [3] | C01 | BL1 |

**:::: 02/03/2020E ::::::**