Course No: EQUP 3322 **Course Title: Electromagnetic.** **Date: 27 / 05 / 2018** **No. of Questions: ____5/6___** **Time: 2 hours.** **Using Calculator (Yes)**	**University of Palestine** **Final Exam** **2nd Term 2017/2018** **Total Grade: 50**	**Instructor Name: Eng. M. Timraz** **Student No.: _____** **Student Name: _____** **College Name: Engineering** **Dep. / Specialist: Biomedical Eng.** **Using Dictionary (No)**

Q_1: (10/50)

1.1. Express in cartesian components: *(3Pt).*

a) The vector at $A(\rho = 6, \varphi = 30^\circ, z = -2)$

b) The vector at $B(\rho = 5, \varphi = -110^\circ, z = 2)$

1.2. Express in cylindrical components: *(3Pt).*

The vector from *point* $C(3, 2, -7)$ to *point* $D(-1, -4, 2)$:

1.3. Determine the cartesian components of the vector from $A(r = 5, \theta = 110^\circ, \varphi = 200^\circ)$ to $B(r = 7, \theta = 30^\circ, \varphi = 70^\circ)$: *(4Pt).*

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Q_2: (10/50)

2.1. A uniform line charge of $2\ \mu$C/m, is located on the z axis. *(5Pt).*

Find $\boldsymbol{E}$ in cartesian coordinates at $P(1, 2, 3)$, if the charge extends from $-\infty < z < \infty$.

2.2. Surface charge density is positioned in free space as follows: *(5Pt).*

$\rho_{s1} = 20$ nC/m^2 at $x = -3$,

$\rho_{s2} = -30$ nC/m^2 at $y = 4$, and

$\rho_{s3} = 40$ nC/m^2 at $z = 2$.

Find the magnitude of $\boldsymbol{E}$ at the three points, $(4, 3, -2)$, $(-2, 5, -1)$, and $(0, 0, 0)$.

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Q_3**:** (10/50)

The cylindrical surfaces ρ = 1, 2, and 3 cm carry uniform surface charge densities of 20, −8, and 5 nC/m^2, respectively

a) How much electric flux "φ" passes through the closed surface ρ = 5 cm, 0 < z < 1 m? Since the densities are uniform.

b) Find **D** at *P(*1 cm, 2 cm, 3 cm*)*.

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Q_4: (10/50)

A uniform volume charge density of $80\ \mu C/m^3$ is present throughout the region $8mm < r < 10mm$.

Let $\rho_v = 0$ for $0 < r < 8mm$.

a) Find the total charge inside the spherical surface $r = 10$ mm.

b) Find D at $r = 10$ mm.

c) If there is no charge for $r > 10$ mm, find D at $r = 20$ mm.

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Answer only one question:

Q_5: (10/50)

5.1. *A 50-cm* length of *coaxial cable* has an *inner* radius of *1 mm* and an *outer* radius of *4 mm*. The space between conductors is assumed to be filled with *air*. The total charge on the inner conductor is *30 nC*. *(5Pt).*

Find the charge density on each conductor and the expressions for E and D fields.

5.2. A current filament carrying 15A in the az direction lies along the entire z axis, Find H in Cartesian coordinates at the following points: *(5Pt).*

a) $(\sqrt{20}, 0, 4)$ b) (2, -4, 4)

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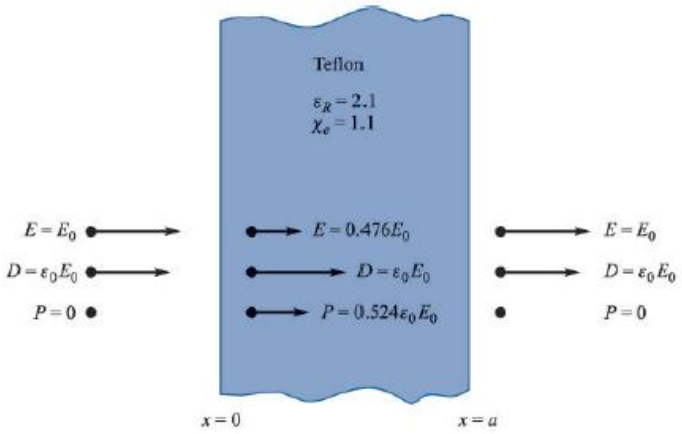
Q_6: (10/50)

6.1. We locate a slab of Teflon in the region $0 \leq x \leq$ a, and assume free space where $x < 0$ and $x >$ a. *(5Pt).*

Outside the Teflon there is a uniform field $E_{out} = E_o a_x$ V/m.

Find D, E, and P everywhere.

Find the fields within the Teflon, given the uniform external field $E_{out} = E_o a_x$ V/m in free space.



6.2. A slab of dielectric material has a relative constant of 3.8 and contains a uniform electric flux density of 8 nC/m^2. If the material is lossless;

Find: *(5Pt).*

a) E; b) P;

c) the average number of dipoles per cubic meter if thr average dipoles moment is 10^{-29} V.m. (Bounce 2 Pt.)

مع تمنياتي لكم بالتوفيق والنجاح

رمضان كريم