

Course No: EQUIP 3322  
Course Title: Electromagnetic.  
Date: 18 / 04 / 2017  
No. of Questions: \_\_\_\_4\_\_\_\_  
Time: 60 min.  
Using Calculator (Yes)

University of Palestine



2<sup>nd</sup>. Midterm Exam  
2<sup>nd</sup> Term 2016/2017  
Total Grade: 15

Instructor Name: Eng. M. Timraz  
Student No.: \_\_\_\_\_  
Student Name: \_\_\_\_\_  
College Name: Engineering  
Dep. / Specialist: Biomedical Eng.  
Using Dictionary (No)

**Q1):** \_\_\_\_\_ **(05/20)**

A uniform volume charge density of  $0.2 \mu\text{C}/\text{m}^2$  is present throughout the spherical shell extending from  $r = 3 \text{ cm}$  to  $r = 5 \text{ cm}$ . If  $\rho_v = 0$  elsewhere, find: (a) the total charge present within the shell, and (b)  $r_1$  if half the total charge is located in the region  $3 \text{ cm} < r < r_1$ .

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**Q2)**

**(05/20)**

A uniform line charge of  $16 \text{ nC/m}$  is located along the line defined by  $y = -2, z = 5$ . If  $\epsilon = \epsilon_0$ : (a) find  $\mathbf{E}$  at  $P(1, 2, 3)$ ; (b) find  $\mathbf{E}$  at that point in the  $z = 0$  plane where the direction of  $\mathbf{E}$  is given by  $\frac{1}{3}\mathbf{a}_y - \frac{2}{3}\mathbf{a}_z$ .

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**Q3)**

**(05/20)**

Surface charge density is positioned in free space as follows:  $20 \text{ nC/m}^2$  at  $x = -3$ ,  $-30 \text{ nC/m}^2$  at  $y = 4$ , and  $40 \text{ nC/m}^2$  at  $z = 2$ . Find the magnitude of  $\mathbf{E}$  at: (a)  $P_A(4, 3, -2)$ ; (b)  $P_B(-2, 5, -1)$ ; (c)  $P_C(0, 0, 0)$ .

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**Q4)**

**(05/20)**

In cylindrical coordinates, let  $\rho_v = 0$  for  $\rho < 1$  mm,  $\rho_v = 2 \sin 2000$   
 $\pi \rho$  nC/m<sup>3</sup> for  $1 \text{ mm} < \rho < 1.5 \text{ mm}$ , and  $\rho_v = 0$  for  $\rho > 1.5 \text{ mm}$ . Find **D**  
everywhere.

Good Luck.