(بسم الله الرحمن الرحيم***لا اله الا الله محمد رسول الله)

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Answer all the following questions

General:-

Q1(10D):a-Write the Maxwell's Equations of electromagnetic fields.
b-Calculate the magnetic field intensity at the center of a square disk coil has 20 turns, 100A caring current, 10x10 &20x20 cm inner and outer dimensions

Q2(10D):a-What is meant by: 1-the self-inductance. 2-the specific stored energy of electro-static and magneto-static fields.
b- Compare between the electric and the magnetic circuits.

2)Electrostatic fields:-

Q3(20D): a) Drive the capacitance equation of spherical capacitor with two conducting spheres'.
b) *If the radii of a 10Km, two cylindrical capacitor are 1000 mm, 995 mm respectively and the insulator material has* ϵ_r =3, calculate:
1-the capacitor capacitance per unit length.
2-the charge of each cylinder if the potential difference between the conducting surfaces is 1000v.
3-the capacitor stored energy.

Q4(20D): Figure1 shows a cross section, el-vision view, of an electrostatic cell. The area of two parallel plates are equal and each has 900 cm^2, a = 50 mm. If V_H=1000Kv, V_L=0.0v and $\epsilon_1 = 2\epsilon_2 = 7$, using 2DFEM as a numerical method, calculate:
1-the electric flux density in each element between the two plats.
2-the electric stored energy in each material.

3) Magnetostatic fields:-

Q5(20D): Figure2 shows a cross section, el-vision view, of two magneto-static cells, a=50mm. Both have the same dimensions, square section of the core and air gaps and used to produce 1.4 T, flux density in the main core. Fig.2-(a) shows a soft iron core with dc exciting coil has 5000 turns, while Fig.2-(b) shows a permanent magnet cell. Calculate: 1-the exciting current for (a). 2-the permanent magnet length and volume for (b).

Q6(20D): If a composite sheet is put into the main air gap of any cell, as shown in Fig.3. Using 2DFEM to calculate:
1-the magnetic flux density in each element. 2-the main gap magnetic energy.

(تم بحمد الله رب العالمين)