كلية الحاسبات والذكاء الإصطناعي
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الإجابة باللون الأحمر

Faculty of Computers & Artificial Intelligence

Benha University

1st Term (January 2022) Final Exam
Level: 1st level **Major: General**
Course Code: BS121
Subject: Physics

Date: 26/1/2022
Time: 2 Hours
Total Marks: 50 Marks
Examiner(s): Prof. Dr. Mostafa Y. Elbakry
Prof. Dr. Salah Hamza

Choose the correct answer and shaded its circle in the answer table.

1. In …….. electric charges can not move freely in response to an electric force. (a)conductors (b) insulators (c)semiconductors.
2. Charging an object by …… requires no contact with the object inducing the charge. (a)induction (b) conduction (c) no answer
3. An electric force is directed …….. a line joining the two charges. (a) perpendicular (b) parallel (c) along
4. An electric force is …….. to the square of the separation distance between the two charges (a) proportional (b) inversely proportional (c) no answer
5. Coulomb's law is given by: (a) $Fr^2 = k_e q_1 q_2$; (b) $F = k_e q r^{-1}$; (c) $F = k_e q r^2$
6. The magnitude of the electric force between two protons separated by one femtometer (10^{-15} m) is (a) 3.2×10^{-2} N (b) 2.3×10^{2} N (c) 2.3×10^{-2} N

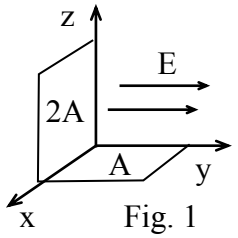

Fig. 1

7. In Fig. 1, $E = 5\,NC^{-1}$ and $A = 4\,m^2$ then the electric flux Φ through xy plane is (a) $\frac{5}{8}\,Nm^2C^{-1}$ (b) $\Phi = 40\,Nm^2C^{-1}$ (c) $\Phi = 0\,Nm^2C^{-1}$
8. The units of the electric field E is (a) NC^{-2} (b) NC^{2} (c) NC^{-1}

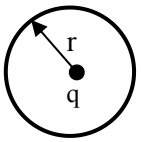

Fig. 2

9. The electric flux Φ_E through any closed surface is equal to …… inside the surface divided by ……. (a) q_i, ε_o (b) ε_o, q_i (c) F, q_i
10. Fig. 2 shows a point charge q surrounded by a spherical surface of radius r, the electric flux Φ_E is given by: (a) E/ε_o (b) $4\pi q/r^2$ (c) $4\pi k_e q$
11. From Gauss law, the electric flux Φ_E is given by (a) $q_{in}\varepsilon_o$ (b) q_{in}/ε_o (c) ε_o/q_{in}

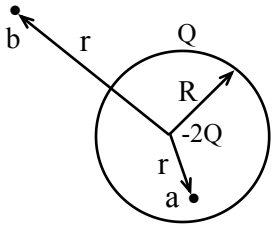

Fig. 3

12. For a closed surface through which the net flux is zero, which of the following statements must be true? (a) There are little charges inside the surface. (b) The net charge inside the surface is zero. (c) The electric field is not equal zero everywhere on the surface.

13. Figure 3 shows a conducting sphere of radius R with charge Q on its surface and charge $-2Q$ at its center. The electric field at point a and b are: (a) $-Q/4\pi\varepsilon_o r^2$, $Q/4\pi\varepsilon_o r^2$ (b) $-2Q/4\pi\varepsilon_o r^2$, $-Q/4\pi\varepsilon_o r^2$ (c) zero, $-2Q/4\pi\varepsilon_o r^2$

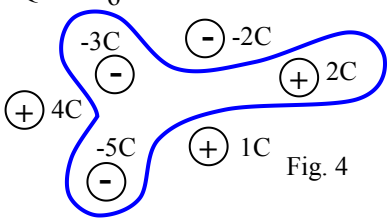

Fig. 4

14. The electric flux through the surface in Fig. 4 is: (a) $-3/\varepsilon_o$ (b) $3/\varepsilon_o$ (c) $-6/\varepsilon_o$

15. A spherical balloon contains a charge + q uniformly distributed over its surface. When it has a diameter d, the electric field at its surface has magnitude E. If the balloon is now blown up to twice this diameter without changing the charge, the electric field at its surface is (a) 4E (b) 2E (c) E/4

16. From Fig. 5, the electric field at "a" is (a) 0 (b) $\sigma/2\varepsilon_o$ (c) σ/ε_o

17. From Fig. 5, the electric field at "b" is (a) 0 (b) $\sigma/2\varepsilon_o$ (c) σ/ε_o

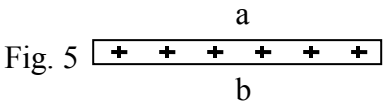

Fig. 5

18. Three equal point charges are held in place as shown in Fig 6. If F_1 is the force on q due to q_1 and F_2 is the force on q due to q_2, how do F_1 and F_2 compare? (a) $F_1 = 3F_2$ (b) $F_1 = 4F_2$ (c) $F_1 = 9F_2$

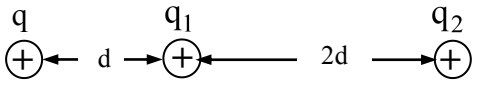

Fig. 6

19. The capacitance C of a capacitor is measured in (a) Farad, (b) V/C (c) a and b

20. The change in electric potential energy of charge q moving a distance Δx in an electric field is given by: (a) $-qE\Delta x$ (b) $E\Delta x$ (c) $-q\Delta x$

21. The electrical work done on moving charge q distance Δx is (a) $qE\Delta x$ (b) $E\Delta x$ (c) $q\Delta x$

22. The electric potential created by a point charge is measured in …….. and given by …….. (a)Volt, $k_e q^2/r^2$ (b) Volt, $k_e q/r^2$ (c) J/C, $k_e q/r$

23. The Electric field E is proportional to …… while the electric potential V is proportional to ……. (a) r^2, r (b) r^{-2}, r^{-1} (c) r^2, r^{-1}

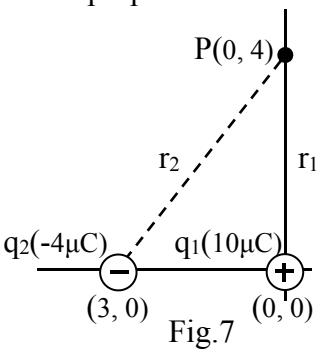

Fig.7

- **For the two charges in Fig. 7 the electric field due to:**

24. q_1 at P is (a) -0.36×10^4 V (b) 0.76×10^4 V (c) 2.24×10^4 V

25. q_2 at P is (a) -0.72×10^4 V (b) 0.76×10^4 V (c) 1.12×10^4 V

26. q_1 and q_2 (total) at P is (a) -0.36×10^4 V (b) 1.52×10^4 V (c) 1.12×10^4 V

27. If a $3\,\mu F$ capacitor is connected to a 12-V battery, the magnitude of the charge on each plate of the capacitor is (a) $36\,\mu C$ (b) $4\,\mu C$ (c) $0.25\,\mu C$

- **A parallel-plate capacitor has an area $A = 2\times10^{-4}\,m^2$ and a plate separation $d = 1\times10^{-3}\,m$.**

28. Its capacitance C is (a) $7.11\,pF$ (b) $1.77\,pF$ (c) $1.17\,pF$
29. If the capacitor is connected to 3V battery, the charge Q on the positive plate is (a) $5.31\,pC$ (b) $3.51\,pC$ (c) $1.35\,pC$
30. The charge density σ on the positive plate is (a) $6.22\times10^{-8}\,C/m^2$ (b) $2.2\times10^{-8}\,C/m^2$ (c) $2.66\times10^{-8}\,C/m^2$
31. The electric field between the plates is (a) $1.03\times10^{3}\,N/C$ (b) $3.01\times10^{3}\,N/C$ (c) $1.13\times10^{3}\,N/C$

- **Figure 8 shows a charged particle "q" moving in a magnetic field "B". The magnetic force F_B is always directed toward the center of the circle and a centripetal force F_c is upward the center. Then,**

32. The angular velocity "ω" is (a) r/υ (b) υ/r (c) υr
33. The magnetic force F_B is (a) $q\upsilon B$ (b) $m\upsilon^2/r$ (c) qBr
34. The centripetal force F_c is (a) $q\upsilon B$ (b) $m\upsilon^2/r$ (c) qBr
35. The radius of the path "r" is (a) $m\upsilon/qB$ (b) qB/m (c) qBr/m
36. The velocity of the particle "υ" is (a) $m\upsilon/qB$ (b) qB/m (c) qBr/m
37. Chose the correct equation (a) $mr = q\upsilon B$ (b) $mB = qBr$ (c) $m\upsilon = qBr$

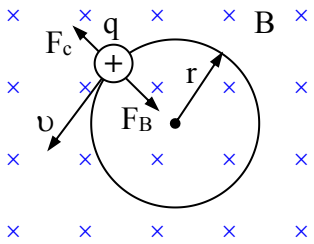

Fig. 8

38. The angular velocity of the particle "ω" is (a) $m\upsilon/qB$ (b) qB/m (c) qBr/m
39. The periodic time "T" can be calculated from (a) qBr/υ (b) $qB\upsilon/2\pi r$ (c) $2\pi m/qB$
40. The mass of the particle "m" can be calculated from (a) qBr/υ (b) $qB\upsilon/2\pi r$ (c) $B\upsilon r/q$

GOOD LUCK,

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