نموذج إجابة مادة/ الفيزياء
كلية الحاسبات والزكاء الإصطناعي
الفرقة الأولي خاص شعبة شبكات
تاريخ الامتحان 2022/1/24

أ.د. مصطفي يسن البكري
أ.د. صلاح عيد إبراهيم حمزة
كلية العلوم
قسم الفيزياء

الإجابة باللون الأحمر

Faculty of Computers & Artificial Intelligence

1st Term (January 2022) Final Exam
Information Security and Digital Forensics Program
Networking and Mobile Technologies Program
Course Code: FBS121, NBS121 **Level:** 1st level
Subject: Physics

Benha University

Date: 24/1/2022
Time: 3 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 move freely in response to an electric force. (a) conductors (b) insulators (c)semiconductors.
2. Charging an object by ……… requires contact with the object inducing the charge. (a) induction (b)conduction (c) no answer
3. An electric force is ……… to the product of the magnitudes of the charges, q_1 and q_2, of the two particles. (a) proportional (b) inversely proportional (c) no answer
4. An electric force is ……… if the charges are of opposite sign and …….. if the charges have the same sign. (a) repulsive, attractive (b) attractive, attractive (c) attractive, repulsive
5. Coulomb constant k_e is measured in (a) Nm^2C^{-2} (b) $Nm^{-2}C^2$ (c) $Nm^{-2}C^{-2}$
6. The electron and proton of a hydrogen atom are separated by a distance of about $5.3\times10^{-11}\,m$. The magnitudes of the electric force on the other is: (a) $8.2\times10^{8}\,N$ (b) $8.2\times10^{-8}\,N$ (c) $2.8\times10^{8}\,N$
7. ……….. is said to exist in the region of space around a charged object (a) an electric field (b) an electric force (c) an electric potential

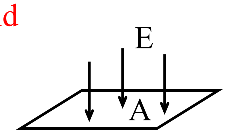


Fig. 1

8. In Fig.1 the flux of E through A is (a) $0\,Nm^2C^{-1}$ (b) $EA\,Nm^2C^{-1}$ (c) $E/A\,Nm^2C^{-1}$
9. The flux of electric field of $5\,NC^{-1}$ in the z-direction through a rectangle with area $4\,m^2$ in the xy-plane is (a) $20\,Nm^2C^{-1}$ (b) $10\,Nm^2C^{-1}$ (c) $0\,Nm^2C^{-1}$

10. Figure 2 shows a point charge q surrounded by a spherical surface of radius r, the electric flux Φ is given by: (a) q/ε_o (b) $4\pi q/r^2$ (c) $4\pi q$

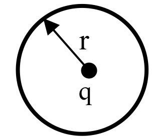


Fig. 2

11. Figure 3 shows a conducting sphere of radius R with charge Q. Then, the electric field at point a and b are: (a) zero, k_eQ/r^2 (b) k_eQ/r^2, zero (c) zero, zero

12. According to Coulomb's law, what happens to the attraction of two oppositely charged objects as their distance of separation increases? (a) increases (b) decreases (c) remains unchanged.

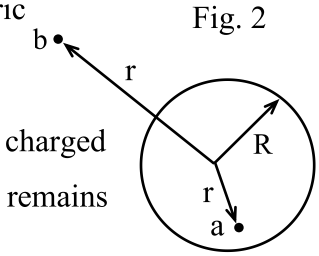


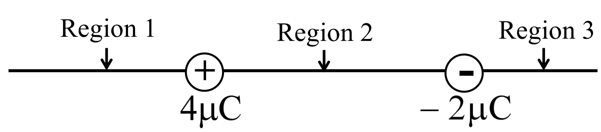
Fig. 3

13. A positive and a negative charge are initially 4 cm apart. When they are moved closer together so that they are now only 1cm apart, the force between them is (a) 4 times larger than before (b) 8 times larger than before (c) 16 times larger than before.

14. Two small charged spheres are separated by 2 mm. Which of the following would produce the greatest attractive force? (a) –1q and –4q (b) +2q and +2q (c) +2q and –2q

15. If the electric field is E at a distance d from a point charge, its magnitude will be 2E at a distance (a) $d/2$ (b) $d/\sqrt{2}$ (c) 2d

16. Two unequal point charges are separated as shown in Fig 4. The electric field due to this combination of charges can be zero (a) only in region 1 (b) only in region 2 (c) only in region 3 (d) in both regions 1 and 3.

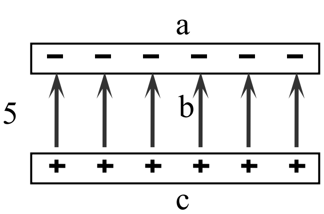
Fig. 4


17. An electric field of magnitude E is measured at a distance r from a point charge q. If the charge is doubled to 2q and the electric field is now measured at a distance of 2r from the charge, the new measured value of the field will be (a) E (b) E/2 (c) E/4

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

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

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

Fig. 5


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

22. The capacitance for parallel-plate capacitor is given by (a) $\varepsilon_o A/d$ (b) $k\varepsilon_o A/d$ (c) kA/d

23. The unit “Volt” is equivalent to: (a) J/C (b) C/J (c) JC

24. The unit “Farad” is equivalent to: (a) VC (b) V/C (c) C/V

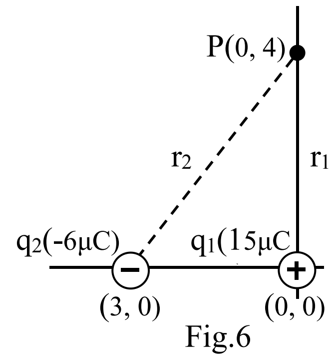
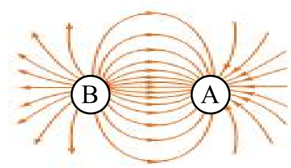


Fig.6

- **For the two charges in Fig. 6 the electric field due to:**

25. q_1 at P is (a) $-0.36\times10^4\,V$ (b) $0.76\times10^4\,V$ (c) $3.36\times10^4\,V$
26. q_2 at P is (a) $-1.08\times10^4\,V$ (b) $0.76\times10^4\,V$ (c) $1.12\times10^4\,V$
27. q_1 and q_2 (total) at P is (a) $-0.36\times10^4\,V$ (b) $2.28\times10^4\,V$ (c) $1.12\times10^4\,V$
28. The capacitance C of a capacitor is the ratio of ……… to the magnitude of the ……… between the plates (a) Q/V (b) E/Q (c) Q/E

Fig. 3 

29. The charge "A" in Fig. 3 is (a) positive (b) negative (c) no answer
30. The charge "B" in Fig. 3 is (a) positive (b) negative (c) no answer

31. If the electric field E = 0 at a point P then , the electric flux must Φ_E be: (a) constant at P (b) zero at P (c) very high at P

- **Proton of charge** $q=1.6\times10^{-19}\,C$ **and mass** $m=1.67\times10^{-27}\,Kg$ **move in a circular orbit with radius** $2\,cm$ **under the effect of a magnetic field intensity** $2\,T$ **. Then**

32. The proton angular frequency is (a) $2.92\times10^3\,s^{-1}$ (b) $9.2\times10^5\,s^{-1}$ (c) $1.92\times10^7\,s^{-1}$
33. The proton velocity in its orbit is (a) $8.83\times10^6\,m/s$ (b) $3.83\times10^5\,m/s$ (c) $33.8\times10^4\,m/s$
34. Time required for one evolution is (a) $0.327\times10^{-6}\,s$ (b) $0.237\times10^{-5}\,s$ (c) $0.27\times10^{-8}\,s$
35. The continuity equation which express the local conservation of charge is (a) $\nabla^2 J=\rho$ (b) $\nabla\cdot J+\frac{\partial\rho}{\partial t}=0$ (c) $\nabla^2\cdot J+\frac{\partial\rho}{\partial t}=0$ (d) $\nabla\cdot J^2+\frac{\partial\rho}{\partial t}=0$
36. Using Boit and savart law the vector magnetic potential A is given by (a) $\frac{\mu_o}{4\pi}\nabla x\int_V\frac{J'(r')}{|r-r'|}d^3r'$ (b) $\frac{\mu_o}{4\pi}\int_V\frac{J'(r')}{|r-r'|}d^3r'$ (c) $\frac{\mu_o}{4\pi}\int_V\frac{\nabla J'(r')}{|r-r'|}d^3r'$ (d) $\frac{\mu_o}{4\pi}\nabla\bullet\int_V\frac{J'(r')}{|r-r'|}d^3r'$
37. The Maxwell equation which express the Faraday law is given by (a) $\nabla\times E+\frac{\partial\rho}{\partial t}=0$ (b) $\nabla\times E+\frac{\partial B}{\partial t}=0$ (c) $\nabla\bullet E+\frac{\partial B}{\partial t}=0$ (d) $\nabla\times B+\frac{\partial E}{\partial t}=0$

38. There are no single pole of magnetic field" this is expressed by The Maxwell equation as

(a) $\nabla \times B = 0$ (b) $\nabla \times E + \frac{\partial B}{\partial t} = 0$ (c) $\nabla \bullet B + \frac{\partial E}{\partial t} = 0$ (d) $\nabla \bullet B = 0$

39. The scalar potential of electric field ϕ is deduced from electric field in the equation (a) $E = -\nabla \times \phi$

(b) $E = -\nabla \bullet \phi$ (c) $E = -\nabla \phi$ (d) $E = \nabla \phi$

40. The vector magnetic potential A is deduced from magnetic field B as (a) $B = -\nabla \bullet A$

(b) $B = \nabla \times A$ (c) $B = \nabla^2 A$ (d) $B = \nabla A$

GOOD LUCK,
Prof. Dr. Mostafa Y. Elbakry
Prof. Dr. Salah Hamza