Faculty of Computers & Artificial Intelligence | **Benha University**

1st Term (January 2020) Final Exam | **Date: 14/ 3 /2021**
Level: 1st level **Major: General** | **Time: 2 Hours**
Course Code: BS121 | **Total Marks: 50 Marks**
Subject: Physics | **Examiner(s): Prof. Dr. Salah Hamza**

Choose the correct answer and shaded its circle (like this ●) in the answer table.

1. 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) $0\,Nm^2C^{-1}$

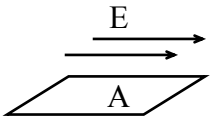

Fig. 1

2. From Fig. 1 the flux of E through A is (a) $0\,Nm^2C^{-1}$ (b) $A/E\,Nm^2C^{-1}$ (c) $E/A\,Nm^2C^{-1}$
3. Coulomb constant k_e is measured in (a) Nm^2C^{-2} (b) $Nm^{-2}C^2$ (c) $Nm^{-2}C^{-2}$
4. Charges on conducting sphere are distributed at (a) center (b) outer surface (c) randomly
5. Object A has a charge of $2\,\mu C$, and object B has a charge of $6\,\mu C$. Which statement is true? (a) $\vec{F}_{AB} = -3\vec{F}_{BA}$ (b) $\vec{F}_{AB} = -\vec{F}_{BA}$ (c) $3\vec{F}_{AB} = -\vec{F}_{BA}$

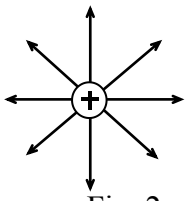
Fig. 2

6. The electric field lines in Fig. 2 are (a) diverge (b) unsymmetrical distributed (c) a and b
7. The units of the electric field E is (a) NC^{-2} (b) NC^2 (c) NC^{-1}
8. The units of the electric flux Φ_E are (a) $Nm\,C^{-1}$ (b) Nm^2C^{-1} (c) NC^{-1}
9. The electric force is given by: (a) $Fr^2 = k_e q_1 q_2$; (b) $F = k_e q r^{-1}$; (c) $F = k_e q r^2$
10. The units of F/k_e is given by (a) C^2m^{-2} (b) m^2C^{-2} (c) $Nm^{-2}C^{-2}$

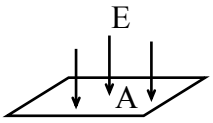

Fig. 3

11. In Fig.3 the flux of E through A is (a) $0\,Nm^2C^{-1}$ (b) $EA\,Nm^2C^{-1}$ (c) $E/A\,Nm^2C^{-1}$
12. Fig. 4 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) $4\pi k_e q$

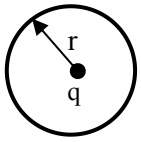

Fig. 4

13. The flux of a constant electric field of $3\,NC^{-1}$ in the z-direction through a rectangle with area $6\,m^2$ in the xz-plane. (a) $0\,Nm^2C^{-1}$ (b) $2\,Nm^2C^{-1}$ (c) $18\,Nm^2C^{-1}$
14. For A and B in Fig. 5 which statement is true? (a) $\vec{F}_{AB} = -\vec{F}_{BA}$ (b) $\vec{F}_{BA} = \vec{F}_{AB}$ (c) a and b
15. The electrical work done on moving charge q distance Δx is (a) $qE\Delta x$ (b) $E\Delta x$ (c) $q\Delta x$
16. For parallel-plate capacitor filled with dielectric, C, is (a) $\varepsilon_o A/d$ (b) $k\varepsilon_o A/d$ (c) kA/d

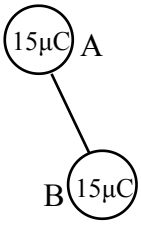

Fig.5

- Figure 7 shows a charged particle "q" moving in a magnetic field "B".Then,

17. The angular velocity "ω" is (a) r/υ (b) υ/r (c) υr
18. The magnetic force F_B is (a) $q\upsilon B$ (b) $m\upsilon^2/r$ (c) qBr
19. The centripetal force F_c is (a) $q\upsilon B$ (b) $m\upsilon^2/r$ (c) qBr
20. The radius of the path "r" is (a) $m\upsilon/qB$ (b) qB/m (c) qBr/m
21. The velocity of the particle "υ" is (a) $m\upsilon/qB$ (b) qB/m (c) qBr/m
22. Chose the correct equation (a) $mr = q\upsilon B$ (b) $mB = qBr$ (c) $m\upsilon = qBr$
23. The angular velocity of the particle "ω" is (a) $m\upsilon/qB$ (b) qB/m (c) qBr/m
24. The periodic time "T" can be calculated from (a) qBr/υ (b) $qB\upsilon/2\pi r$ (c) $2\pi m/qB$
25. The mass of the particle "m" can be calculated from (a) qBr/υ (b) $qB\upsilon/2\pi r$ (c) $B\upsilon r/q$

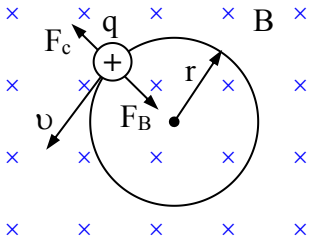

Fig. 6

26. Object A has a charge of $2\,\mu C$, and object B has a charge of $-6\,\mu C$. Which statement is true? (a) $\vec{F}_{AB} = \vec{F}_{BA}$ (b) $\vec{F}_{AB} = -\vec{F}_{BA}$ (c) $3\vec{F}_{AB} = -\vec{F}_{BA}$
27. The unit "Farad" is equivalent to: (a) VC (b) V/C (c) C/V
28. The unit "Volt" is equivalent to: (a) J/C (b) C/J (c) JC

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

29. q_1 at P is (a) $-0.36\times10^4\,V$ (b) $0.76\times10^4\,V$ (c) $1.12\times10^4\,V$
30. q_2 at P is (a) $-0.36\times10^4\,V$ (b) $0.76\times10^4\,V$ (c) $1.12\times10^4\,V$
31. q_1 and q_2 (total) at P is (a) $-0.36\times10^4\,V$ (b) $0.76\times10^4\,V$ (c) $1.12\times10^4\,V$

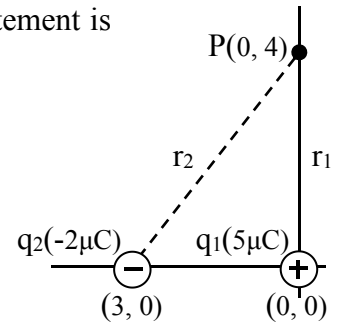

Fig.7

32. The capacitance of parallel-plate capacitor is (a) Ad/ε_o, (b) $\varepsilon_o d/A$ (c) $\varepsilon_o A/d$
33. Figure 8 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
34. In ……., electric charges move freely (a) conductors (b) insulator (c) rubber
35. Charging by ….. requires no contact with objects (a)conduction (b)induction (c)reduction
36. 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) $-q\Delta x$
37. The force F on a particle with charge q is: (a) E/q (b) q/E (c) qE
38. In Fig. 9 the equivalent capacitance is (a) $12.4\,\mu F$ (b) $1.94\,\mu F$ (c) $20\,\mu F$
39. The capacitance C of a capacitor is measured in (a) Farad, (b) V/C (c) a and b
40. 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}
41. The material of the sphere in the Fig. 10 is (a) insulator, (b) conductor (c) semiconductor

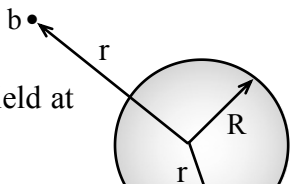

Fig. 8

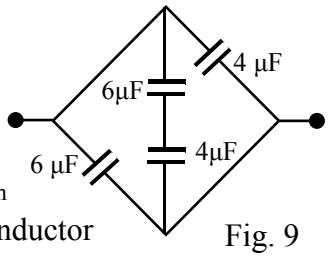

Fig. 9

- 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

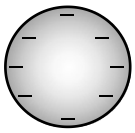
Fig. 10

42. The proton angular frequency is (a) $2.92\times10^3\,s^{-1}$ (b) $9.2\times10^5\,s^{-1}$ (c) $1.92\times10^7\,s^{-1}$
43. The proton velocity in its orbit is (a) $8.83\times10^6\,m/s$ (b) $3.83\times10^5\,m/s$ (c) $33.8\times10^4\,m/s$
44. Time required for one evolution is (a) $0.237\times10^{-6}\,s$ (b) $0.237\times10^{-5}\,s$ (c) $0.27\times10^{-8}\,s$
45. In Fig.11 the flux of E through A is (a) $0\,Nm^2C^{-1}$ (b) $EA\,Nm^2C^{-1}$ (c) $E/A\,Nm^2C^{-1}$
46. The units of Fr^2/k_e is given by (a) C^2m^{-2} (b) m^2C^{-2} (c) C^2

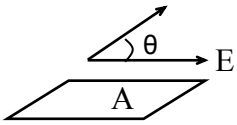

Fig.11

47. The flux of a constant electric field of $20\,NC^{-1}$ in the z-direction through a rectangle with area $10\,m^2$ in the yz-plane. (a) $0\,Nm^2C^{-1}$ (b) $200\,Nm^2C^{-1}$ (c) $2\,Nm^2C^{-1}$
48. The electric potential created by a point charge is measured in …….. and given by ……. (a) Volt, k_eq^2/r^2 (b) Volt, k_eq/r^2 (c) J/C, k_eq/r
49. The capacitance for parallel-plate capacitor is given by (a) $\varepsilon_o A/d$ (b) $k\varepsilon_o A/d$ (c) kA/d
50. Figure 12 shows spherical conducting shell of inner radius "a" and outer radius "b" carries a total charge "$+Q$" distributed on its surface and an additional charge of $-2Q$ is placed at the center then the electric flux at $r = a$ and b are: (a) 0, $-Q/\varepsilon_o$ (b) $-Q/\varepsilon_o$, 0 (c) $-2Q/\varepsilon_o$, $-Q/\varepsilon_o$

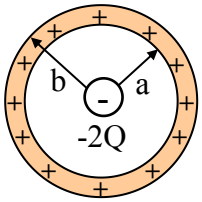

Fig. 12

Practical Exam (in the same answer sheet)

51. What is the aim of meter bridge experiment? (a) to determine the resistivity of the material of a wire (b) to verify the laws of resistances (c) a and b

52. What is the law of meter bridge experiment? (a) $\left(\frac{L_1}{L_2}\right)\times Z$ (b) $\left(\frac{L_1}{Z}\right)\times L_2$ (c) $\left(\frac{L_2}{Z}\right)\times L_1$

53. Can you find high resistances accurately with the help of a meter bridge? (a) yes (b) no (c) may be

54. What is the tools used in meter bridge experiment? (a) meter bridge, resistance box resistance wire (b) wooden board, galvanometer, power supply (c) a and b

55. The length of resistance wire of meter bridge experiment is? (a) 1m (b) 1.5m (c) 2m

56. What is the aim of magnetic moment experiment? (a) verification of the square law of magnetic forces (b) comparing between two magnets on the effect of magnetic needle (c) a and b

57. What is the law of magnetometer experiment? (a) $\frac{H}{d^2}=M\tan\theta$ (b) $H\tan\theta=\frac{M}{d^2}$ (c) $Md^2=H\tan\theta$

58. What is the slope of the relation between $\frac{1}{d^2}$ and $\tan\theta$? (a) HM (b) $\frac{H}{M}$ (c) $\frac{M}{H}$

59. What is the tools used in magnetometer experiment? (a) two magnets magnetic needle (b) wooden board, galvanometer (c) a and b

60. What do you do after you get the θ_1 and θ_2? (a) Get the largest from θ_1 and θ_2 (b) Get the average value of θ_1 and θ_2 (c) Get the smallest of θ_1 and θ_2

GOOD LUCK,

Prof. Dr. Salah Hamza