



قائمة الاسئلة

نظرية مجالات- كلية الهندسة - قسم الكهرباء- المستوى ..الثاني... -...التخصص:قوى واليات- ..الزمن:ثلاث ساعات- . درجة هذا الاختبار (60)

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- 1) Which of the following is the equation of a straight line passing through the points (0, 0) and (3, 4)?
a) $y = 3x + 4$
b) $y = (4/3)x$
c) $y = 4x$
d) $x = 3y$

- 1) - a
2) + b
3) - c
4) - d

- 2) If a point is on the y-axis, its x-coordinate is:

- a) 0
b) 1
c) -1
d) 2

- 1) + a
2) - b
3) - c
4) - d

- 3) Which of the following equations represents a vertical line in the Cartesian plane?
a) $y = 2x + 1$
b) $x = 4$
c) $x + y = 5$
d) $y = -3$

- 1) - a
2) + b
3) - c
4) - d

- 4) When two vectors are perpendicular, their

- a) Dot product is zero
b) Cross product is zero
c) Both are zero
d) Both are not necessarily zero

- 1) + a
2) - b
3) - c



4) - d

5) Which of the following are not vector functions in Electromagnetics?

- a) Gradient
- b) Divergence
- c) Curl
- d) None of the above

1) - a

2) - b

3) - c

4) + d

6) The work done of vectors force F and distance d , separated by angle θ can be calculated using,

- a) Cross product
- b) Dot product
- c) Addition of two vectors
- d) Cannot be calculated

1) - a

2) + b

3) - c

4) - d

7) Which of the following is not true?

- a) $A \cdot (B \cdot C) = \text{scalar value}$
- b) $A \cdot (B \times C) = \text{scalar value}$
- c) $A \times (B \cdot C) = \text{scalar value}$
- d) $A \times (B \times C) = \text{vector value}$

1) - a

2) - b

3) + c

4) - d

8) The work-electric field relation is given by

- a) Volume integral
- b) Surface integral
- c) Line integral
- d) Relation impossible



- 1) - a
- 2) - b
- 3) c
- 4) - d

9) Find the projection of A on B. Given $A = 10j + 3k$ and $B = 4j + 5k$.

- a) 6
- b) 6.25
- c) 6.5
- d) 6.75

- 1) - a
- 2) b
- 3) - c
- 4) - d

10) Which of the following criteria is used to choose a coordinate system?

- a) Distance
- b) Intensity
- c) Magnitude
- d) Geometry

- 1) - a
- 2) - b
- 3) - c
- 4) d

11) Coulomb law is employed in

- a) Electrostatics
- b) Magnetostatics
- c) Electromagnetics
- d) Maxwell theory

- 1) a
- 2) - b
- 3) - c
- 4) - d

12) For Making A Capacitor, It Is Better To Select A Dielectric Having

- a) Low Permittivity
- b) High Permittivity
- c) Permittivity Slightly More Than That Of Air
- d) Permittivity Same As That Of Air



- 1) - a
2) b
3) - c
4) - d
- 13) The electric field at a point situated at a distance d from straight charged conductor is
- a) Inversely proportional to d
 - b) Inversely proportional to squared d
 - c) Proportional to d
 - d) None of the above

- 1) a
2) - b
3) - c
4) - d
- 14) In a capacitor the electric charge is stored in
- a) Metal plates
 - b) Dielectric
 - c) Both (a) and (b)
 - d) None of the above

- 1) - a
2) b
3) - c
4) - d
- 15) When a dielectric slab is introduced in a parallel plate capacitor, the potential difference between plates will
- a) remain uncharged
 - b) become zero
 - c) decrease
 - d) increase

- 1) - a
2) - b
3) c
4) - d
- 16) Dielectric strength of a material depends on
- a) thickness
 - b) moisture Content
 - c) temperature
 - d) all of the above

- 1) - a



- 2) - b
3) - c
4) + d
- 17) **Biot Savart law in magnetic field is analogous to which law in electric field?**
a) Gauss law
b) Faraday law
c) Coulomb's law
d) Ampere law
- 1) - a
2) - b
3) + c
4) - d
- 18) **Find the magnetic field of a finite current element with 2A current and height $1/2\pi$ is**
a) 1
b) 2
c) $1/2$
d) $1/4$
- 1) + a
2) - b
3) - c
4) - d
- 19) **In a static magnetic field only magnetic dipoles exist. State True/False.**
a) True
b) False
- 1) + a
2) - b
- 20) **The magnetic field intensity will be zero inside a conductor. State true/false.**
a) True
b) False
- 1) - a
2) + b
- 21) **Find the conduction current density when conductivity of a material is 500 units and corresponding electric field is 2 units.**
a) 500
b) 250
c) 1000
d) 2000
- 1) - a
2) - b
3) + c
4) - d
- 22)





Find the electric field of a potential function given by $20 \log x + y$ at the point (1,1,0).

- a) $-20 \mathbf{i} - \mathbf{j}$
- b) $-\mathbf{i} - 20 \mathbf{j}$
- c) $\mathbf{i} + \mathbf{j}$
- d) $(\mathbf{i} + \mathbf{j})/20$

- 1) a
- 2) b
- 3) c
- 4) d

23) Find the resistivity of a material having resistance $20 \text{ k}\Omega$, area 2 units and length of 12m.

- a) 6666.6
- b) 3333.3
- c) 1200
- d) 2000

- 1) a
- 2) b
- 3) c
- 4) d

24) Find the capacitance when charge is 20 C has a voltage of 1.2V.

- a) 32.67
- b) 16.67
- c) 6.67
- d) 12.33

- 1) a
- 2) b
- 3) c
- 4) d

25) Calculate the capacitance of two parallel plates of area 2 units separated by a distance of 0.2m in air (in picofarad)

- a) 8.854
- b) 88.54
- c) 885.4
- d) 0.885

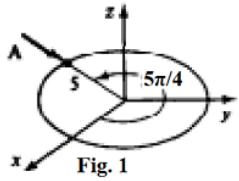
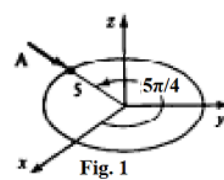
- 1) a
- 2) b
- 3) c
- 4) d

26) A cable of core radius 1.25 cm and impregnated paper insulation of thickness 2.13 cm and relative permittivity 3.5. Compute the capacitance of the cable/km (in nF)

- a) 195.7
- b) 179.5
- c) 157.9
- d) 197.5

- 1) a
- 2) b
- 3) c



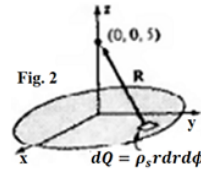
- 4) - d
- 27) Determine the value of E in a material for which the electric susceptibility is 3.5 and the polarization $P = 2.3 \times 10^{-7} \text{ C/m}^2$.
- $E = 3.5 \times 10^4 \text{ V/m}$.
 - $E = 3.5 \times 10^{-4} \text{ V/m}$.
 - $E = 7.42 \times 10^3 \text{ V/m}$.
 - $E = 2.3 \times 10^3 \text{ V/m}$.
- 1) - a
2) - b
3) + c
4) - d
- 28) Two point charges in a dielectric medium where $\epsilon_r = 5.2$ interact with a force of $8.6 \times 10^{-3} \text{ N}$. What force could be expected if the charges were in free space?
- $4.47 \times 10^{-2} \text{ N}$.
 - $8.6 \times 10^{-3} \text{ N}$.
 - $8.6 \times 10^{-2} \text{ N}$.
 - 0.86 N .
- 1) + a
2) - b
3) - c
4) - d
- 29) Given $\vec{A} = 2\vec{a}_x + 4\vec{a}_y$ and $\vec{B} = 6\vec{a}_x - 4\vec{a}_y$, find the smaller angle between them?
- $\theta = 22.5^\circ$.
 - $\theta = 41.9^\circ$.
 - $\theta = 51.7^\circ$.
 - $\theta = 63.2^\circ$.
- 1) - a
2) + b
3) - c
4) - d
- 30) A vector of magnitude 10 points from $(5, 5\pi, 0)$ in cylindrical coordinates toward the origin (Fig. 1). Express the vector in cartesian coordinates.
- $\vec{A} = -5\vec{a}_x - 5\vec{a}_y$
 - $\vec{A} = 5\vec{a}_x + 5\vec{a}_y$
 - $\vec{A} = -\frac{10}{\sqrt{2}}\vec{a}_x - \frac{10}{\sqrt{2}}\vec{a}_y$
 - $\vec{A} = \frac{10}{\sqrt{2}}\vec{a}_x + \frac{10}{\sqrt{2}}\vec{a}_y$
- 
- Fig. 1
- 1) - a
2) - b
3) - c
4) + d
- 31) Two point charges, $Q_1 = 50 \mu\text{C}$ and $Q_2 = 10 \mu\text{C}$, are located at $(-1, 1, -3) \text{ m}$ and $(3, 1, 0) \text{ m}$, respectively. Find the force on Q_1 .
- $\vec{F} = 0.144\vec{a}_x - 0.108\vec{a}_z \text{ N}$
 - $\vec{F} = -0.144\vec{a}_x - 0.108\vec{a}_z \text{ N}$
 - $\vec{F} = 0.144\vec{a}_x + 0.108\vec{a}_z \text{ N}$
 - $\vec{F} = 74\vec{a}_x + 0.54\vec{a}_z \text{ mN}$
- 
- Fig. 1



- 1) - a
2) + b
3) - c
4) - d

32)

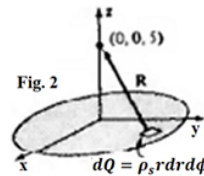
- Find the charge density of the circular disk due to a charge of $300\pi \mu\text{C}$ that is uniformly distributed over the circular disk $r \leq 5 \text{ m}$, $z = 0 \text{ m}$ (see Fig. 2).
a) $\rho_s = 2 \times 10^{-4} \text{ C/m}^2$.
b) $\rho_s = 25 \times 10^{-5} \text{ C/m}^2$.
c) $\rho_s = 1.2 \mu\text{C/m}^2$.
d) $\rho_s = 20 \mu\text{C/m}^2$



- 1) - a
2) - b
3) + c
4) - d

33)

- Find the force on a point of $50 \mu\text{C}$ at $(0, 0, 5) \text{ m}$ due to a charge density of $20 \mu\text{C/m}^2$ that is uniformly distributed over the circular disk $r \leq 5 \text{ m}$, $z = 0 \text{ m}$ (see Fig.2).
a) $\vec{F} = 16.56\vec{a}_z \text{ N}$
b) $\vec{F} = 165.6\vec{a}_z \text{ N}$
c) $\vec{F} = 4.14\vec{a}_z \text{ N}$
d) $\vec{F} = 41.4\vec{a}_z \text{ N}$



- 1) + a
2) - b
3) - c
4) - d

34)

- Find \vec{E} at the origin due to a point charge of 64.4 nC located at $(-4, 3, 2) \text{ m}$.
a) $\vec{E} = 7.43\vec{a}_x - 5.57\vec{a}_y - 3.714\vec{a}_z \text{ V/m}$
b) $\vec{E} = 14.856\vec{a}_x - 11.14\vec{a}_y - 7.43\vec{a}_z \text{ V/m}$
c) $\vec{E} = -7.43\vec{a}_x + 5.57\vec{a}_y + 3.714\vec{a}_z \text{ V/m}$
d) $\vec{E} = -14.856\vec{a}_x + 11.14\vec{a}_y + 7.43\vec{a}_z \text{ V/m}$

- 1) - a
2) + b
3) - c
4) - d

35)

- Find the charge in the volume defined by $0 \leq x \leq 1 \text{ m}$, $0 \leq y \leq 1 \text{ m}$, and $0 \leq z \leq 1 \text{ m}$ if $\rho = 30x^2y \text{ (}\mu\text{C/m}^3\text{)}$.
a) $Q = 20 \mu\text{C}$.
b) $Q = 7.5 \mu\text{C}$.
c) $Q = 15 \mu\text{C}$.
d) $Q = 5 \mu\text{C}$.

- 1) - a
2) - b
3) - c
4) + d

36)





Three point charges, $Q_1 = 30 \text{ nC}$, $Q_2 = 150 \text{ nC}$, and $Q_3 = -70 \text{ nC}$, are enclosed by surface S. What net flux crosses S?

- a) $\Psi_{net} = 250 \text{ nC}$
- b) $\Psi_{net} = 110 \text{ nC}$
- c) $\Psi_{net} = 83.33 \text{ nC}$
- d) $\Psi_{net} = 180 \text{ nC}$

- 1) - a
- 2) b
- 3) - c
- 4) - d

37) Given that $\vec{D} = 10x\vec{a}_x \text{ (C/m}^2\text{)}$, determine the flux crossing a 1 m^2 area that is normal to the axis at $x = 3 \text{ m}$.

- a) $\Psi = 5 \text{ C}$
- b) $\Psi = 10 \text{ C}$
- c) $\Psi = 20 \text{ C}$
- d) $\Psi = 30 \text{ C}$

- 1) - a
- 2) - b
- 3) - c
- 4) d

38) Given $\vec{A} = x^2\vec{a}_x + yz\vec{a}_y + xy\vec{a}_z$, find $\nabla \cdot \vec{A}$ at $(2, 2, 0)$.

- a) 2
- b) 4
- c) 6
- d) 8

- 1) - a
- 2) b
- 3) - c
- 4) - d

39) Calculate the magnetic field at a point on the centre of the circular conductor of radius 2m with current 8A.

- a) 1
- b) 2
- c) 3
- d) 4

- 1) - a
- 2) b
- 3) - c
- 4) - d

40) The current element of the solenoid of turns 100, length 2m and current 0.5A is given by,

- a) 25 dx
- b) 50 dx
- c) 100 dx
- d) 200 dx

- 1) a
- 2) - b
- 3) - c





4) - d

