DE-2905
First Year B. Sc. (Sem. I) Examination
March / April – 2016
Physics : Paper - II

Time : 2 Hours]  [Total Marks : 50

Instructions :

(1) Non programmable scientific calculator can be used.
(2) Notations used in the paper have their usual meaning.

Q. 1 to 12 Multiple Choice Questions : (1 mark)
Q. 13 to 22 Multiple Choice Questions : (2 marks)
Q. 23 to 28 Multiple Choice Questions : (3 marks)

O.M.R. Sheet नवज अंगेनी अंगेनी सूचनाओ आफेट
O.M.R. Sheet-स चार अंगेनी बनेले छ.
Important instructions to fillup O.M.R. Sheet
are given on back side of the provided O.M.R. Sheet.
1. Power of two lenses, coaxially placed in contact are 4 D and 5 D. Their equivalent power is ____ D.
   (A) 1.25  (B) 9  (C) 20  (D) 1

2. A prism of 1.55 refractive index has 0.5° angle of prism. Its angle of minimum deviation \( \delta_m = ____ \).
   (A) 0.0775°  (B) 0.275°  (C) 0.0275°  (D) 0.775°

3. Two lenses are placed coaxially 0.5 meter apart in air. Their powers are 2 D and 3 D respectively. Their equivalent power is ____ D.
   (A) 2.5  (B) 5  (C) 6  (D) 2

4. Two lenses are placed coaxially 5 cm apart in air. Their focal lengths are 10 cm and 20 cm respectively. Optical interval between two lenses \( \Delta = ____ \) cm.
   (A) 35  (B) 25  (C) –25  (D) 15

5. Power of convex lens of 2 meter focal length is ____ D.
   (A) –2  (B) –0.5  (C) 0.5  (D) 2
6. \( \text{If } \text{div} \mathbf{F} = 0 \text{ then } \mathbf{F} \text{ is } \quad \text{field}. \)
(A) solenoidal
(B) scalar
(C) rotational
(D) irrotational

7. \( \text{If } \text{div} \mathbf{F} = 0 \text{ then } \mathbf{F} \text{ is } \quad \text{field}. \)
(A) solenoidal
(B) scalar
(C) rotational
(D) irrotational

8. \( \text{Gradient is } \quad \text{quantity}. \)
(A) zero
(B) scalar
(C) meaningless
(D) vector
9 1 microcoulomb = _______ coulomb.
1 microcoulomb = ______ coulomb.
   (A)  $10^{-12}$   (B) $10^6$
   (C) $10^{-6}$   (D) $10^{-9}$

10 पारिशिष्टक $\varepsilon_0$ ने अंकम _____ छ।
   Unit of permittivity $\varepsilon_0$ is ______.
   (A) $\frac{CN^2}{m^2}$   (B) $\frac{C^2}{N^2m}$
   (C) $\frac{C^2N}{m^2}$   (D) $\frac{C^2}{Nm^2}$

11 वैज्ञानिकीय तीव्रताने अंकम ________ छ।
   (A) न्युटन / अम्पिरे
   (B) जूल / कुलम्ब
   (C) वोल्ट / मीटर
   (D) डाइन / कुलम्ब
   Unit of intensity of the electric field is ______.
   (A) newton / ampere
   (B) joule / coulomb
   (C) volt / meter
   (D) dyne / coulomb

12 ये वेल-सोधी उद्देश्यांत विचलन अनुपात 0.20 अने 0.22 छ। समग्रत्व वेल-सोधी उद्देश्यांत विचलन $\delta = ________$.  
   Deviation produced by two lenses are 0.20 and 0.22 respectively. 
   Deviation produced by equivalent lens $\delta = ________$.
   (A) 0.044   (B) 0.222
   (C) 0.42   (D) 0.11
13. Lens system having two lenses of focal length 20 cm and 5 cm respectively are placed coaxially 15 cm apart in air. Their equivalent focal length is ________ cm.

(A) 10  (B) 7.5  (C) 12.5  (D) 15

14. Two lenses of focal length 20 cm and 30 cm respectively are placed coaxially in air. Their equivalent focal length is 15 cm. Optical interval between two lenses Δ = ________ cm.

(A) 40  (B) 10  (C) −10  (D) −40

15. Two lenses of focal length 20 cm and 30 cm respectively, are placed coaxially 10 cm apart in air. Their equivalent focal length is 15 cm. The position of cardinal point of the system α = ________ cm.

(A) 10  (B) 2.5  (C) 5.75  (D) 5

16. Two lenses of focal length 15 cm and 25 cm respectively, are placed coaxially 10 cm apart in air. Their equivalent focal length is 12.5 cm. The position of cardinal point of the system β = ________ cm.

(A) 7.75  (B) −8.33  (C) 9.55  (D) 5.25

17. One convex lens and one concave lens are placed coaxially 20 cm apart in air. Each lens has 20 cm focal length. Their equivalent focal length is ________ cm.

(A) 15  (B) 30  (C) 20  (D) 10

DE-2905_B  5  [ Contd...
18. \( \nabla \cdot \nabla \phi = \text{_____} \) \( \psi \) अवधिय छ.

\( \nabla \cdot \nabla \phi = \text{_____} \) where \( \phi \) is scalar.

(A) \( \nabla \phi \)

(B) \( \nabla^2 \phi + \nabla \phi \)

(C) \( \nabla^2 \phi \)

(D) \( \nabla \phi^2 \)

19. माध्यमका कर्ल \( \vec{A} = \text{_____} \).

Divergence curl \( \vec{A} = \text{_____} \).

(A) \( \nabla \cdot \nabla \vec{A} \)

(B) \( \nabla^2 \vec{A} \)

(C) 0

(D) \( \nabla \times \left( \nabla \cdot \vec{A} \right) \)

20. \( \nabla \times \left( \nabla \phi \right) = \text{_____} \) जपाय \( \phi \) अवधिय राशि छ.

\( \nabla \times \left( \nabla \phi \right) = \text{_____} \) where \( \phi \) is scalar quantity.

(A) \( \nabla \cdot \left( \nabla \times \phi \right) \)

(B) \( \nabla^2 \phi \)

(C) \( \nabla^2 \phi \)

(D) 0

21. 10 कूल्ल विद्युतभारी 100 मीटर अंतर्क विद्युतस्थितिमाध्यम = \( \text{_____} \) वोल्ट.

अध्ययन \( K = 9 \times 10^9 \text{ MKS} \).

Electrostatic potential at 100 meter distance due to 10 coulomb charge is

= \( \text{_____} \) Volt. Here \( K = 9 \times 10^9 \text{ MKS} \).

(A) \( 9 \times 10^7 \)

(B) \( 9 \times 10^9 \)

(C) \( 9 \times 10^{11} \)

(D) 10

22. 30 \( \mu \text{F} \) केप्सिल्ट-स्वाभाविक मानकर योट केप्सिल्टरसँग 20 Volt d.c पावर स्प्राइट सावे जोडिए फोते \( \text{_____} \) joule.

A parallel plate capacitor of 30 \( \mu \text{F} \) capacitance is connected to 20 Volt d.c.

power supply. Energy stored in the capacitor \( W = \text{_____} \) joule.

(A) 0.012

(B) 0.006

(C) 0.06

(D) 0.6

DE-2905_B ] 6 [ Contd...
23. An edge of a square is 1 μc, -2 μc, 1 μc and 2 μc placed at vertices respectively. The length of the side of the square is 1 meter. The electric potential at the centre of the square is ______ Volt.

*Ans. K = 9 × 10^9 MKS.

1 μc, -2 μc, 1 μc and 2 μc electric charges are placed on the vertices of the square respectively. The length of the side of the square is 1 meter. The electric potential at the centre of the square is ______ Volt.

Here K = 9 × 10^9 MKS.

(A) 18 × 10^3
(B) 25.46 × 10^3
(C) 101.82 × 10^3
(D) 36 × 10^3

24. Two thin lenses of focal length 30 cm and 10 cm are placed coaxially 20 cm apart in air. The position of cardinal points α = _____ cm and β = _____ cm.

Two thin lenses of focal length 30 cm and 10 cm are placed coaxially 20 cm apart in air. The position of cardinal points α = _____ cm and β = _____ cm.

(A) 30, 10
(B) -10, 20
(C) -20, 10
(D) 30, -10

25. Power of two thin convex lenses are 4 D and 6 D. Lenses are coaxially placed 10 cm apart. Equivalent focal length F = _______ cm.

Power of two thin convex lenses are 4 D and 6 D. Lenses are coaxially placed 10 cm apart. Equivalent focal length F = _______ cm.

(A) 15.16
(B) 12.16
(C) 13.16
(D) 14.16

26. The refractive indices of the prism for red and blue light are 1.624 and 1.642 respectively. Its dispersive power W = _______.

The refractive indices of the prism for red and blue light are 1.624 and 1.642 respectively. Its dispersive power W = _______.

(A) 0.0274
(B) 0.0264
(C) 0.0284
(D) 0.0294
27 \[ \overrightarrow{A} = 3 \hat{i} - \hat{j} + 2 \hat{k}, \overrightarrow{B} = 2 \hat{i} + \hat{j} - \hat{k} \] अतः \[ \overrightarrow{C} = \hat{i} - 2 \hat{j} + 2 \hat{k} \] तल

\[ (\overrightarrow{A} \times \overrightarrow{B}) \times \overrightarrow{C} = \underline{\quad}. \]

If \[ \overrightarrow{A} = 3 \hat{i} - \hat{j} + 2 \hat{k}, \overrightarrow{B} = 2 \hat{i} + \hat{j} - \hat{k} \] and \[ \overrightarrow{C} = \hat{i} - 2 \hat{j} + 2 \hat{k} \] then

\[ (\overrightarrow{A} \times \overrightarrow{B}) \times \overrightarrow{C} = \underline{\quad}. \]

(A) \[ \hat{i} + 7 \hat{j} + 5 \hat{k} \]
(B) \[ -\hat{i} + 7 \hat{j} + 5 \hat{k} \]
(C) \[ 24 \hat{i} + 7 \hat{j} - 5 \hat{k} \]
(D) \[ 24 \hat{i} - 7 \hat{j} + 5 \hat{k} \]

28 \[ \phi(x, y, z) = 3x^2y - y^2z^2 \] तल \( (1, -2, -1) \) केंद्र

\[ \nabla \phi = \underline{\quad}. \]

If \[ \phi(x, y, z) = 3x^2y - y^2z^2 \] then at the point \( (1, -2, -1) \),

\[ \nabla \phi = \underline{\quad}. \]

(A) \[ 12 \hat{i} - 7 \hat{j} - 8 \hat{k} \]
(B) \[ -12 \hat{i} + 7 \hat{j} + 8 \hat{k} \]
(C) \[ 12 \hat{i} + 7 \hat{j} + 8 \hat{k} \]
(D) \[ 12 \hat{i} - 7 \hat{j} + 8 \hat{k} \]