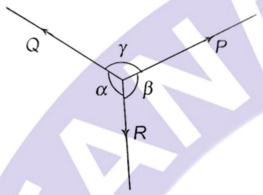
NEW STANDARD ACADEMY

Marks:300

Date : 30-06-2026 **CLASS : 11TH JEE** **Time: 3 hours**

PHYSICS

1. A body is in equilibrium under the action of three coplanar forces P,Q and R as shown in the figure .Select the correct statement



(1) $\frac{P}{sin\alpha}=\frac{Q}{sin\beta}=\frac{R}{sin\gamma}$
(2) $\frac{P}{cos\alpha}=\frac{Q}{cos\beta}=\frac{R}{\cos\gamma}$
(3) $\frac{P}{tan\alpha}=\frac{Q}{tan\beta}=\frac{R}{tan\gamma}$
(4) $\frac{P}{sin\beta}=\frac{Q}{sin\gamma}=\frac{R}{sin\alpha}$

2. If a vector $2\hat{\imath}+3\hat{\jmath}+8\hat{k}$ is perpendicular to the vector $4\hat{\jmath}$-$4\hat{\imath}+\alpha\hat{k}$. Then the value of α is
(1) -1 (2) $\frac{1}{2}$
(3) $-\frac{1}{2}$ (4) 1

3. If $\vec{A}\times\vec{B}=\vec{C}$ then which of the following statements is wrong
(1) $\vec{C}\perp\vec{A}$ (2) $\vec{C}\perp\vec{B}$
(3) $\vec{C}\perp(\vec{A}+\vec{B})$ (4) $\vec{C}\perp(\vec{A}\times\vec{B})$

4. The equation of the stationary wave is
$y = 2A\sin\left(\frac{2\pi ct}{\lambda}\right)\left(\frac{2\pi x}{\lambda}\right)$
Which of the following statements is wrong?
(1) The unit of ct is same as that of λ
(2) The unit of x is same as that of A
(3) The unit of $2\pi c/\lambda$ is same as that of $2\pi x/\lambda t$
(4) The unit of c/λ is same as that of x/λ

5. Given that the displacement of a particle is given by $x = A^2\sin^2 Kt$
where t denotes the time. The unit of K is
(1) hertz (2) metre
(3) radian (4) second

6. In the relation: $\frac{dy}{dx}=2\omega\sin(\omega t+\phi_0)$,the dimensional formula for $(\omega t+\phi_0)$ is
(1) MLT (2) MLT^0
(3) $M\,L^0T^0$ (4) $M^0\,L^0\,T^0$

7. Write the dimensions of a/b in the relation $P=\frac{a-t^2}{bx}$where P is the pressure, x is the distance and t is the time.
(1) $M^{-1}L^0T^{-2}$ (2) ML^0T^{-2}
(3) ML^0T^2 (4) MLT^{-2}

8. The potential energy of a particle varies with distance x as $U=\frac{Ax^{1/2}}{x^2+B}$ where A and B are constants. The dimensional formula for AB is
(1) $M^1\,L^{7/2}\,T^{-2}$ (2) $M^1\,L^{11/2}\,T^{-2}$
(3) $M\,L^{5/2}\,T^{-2}$ (4) $M^1L^{9/2}\,T^{-2}$

9. In the relation $P=\frac{\alpha}{\beta}e^{-\alpha z/k\theta}$, P is the pressure, Z is the distance, K is the Boltzmann constant and θ is the temperature. The dimensional formula of β will be
(1) $[M^0L^2T^0]$ (2) $[M^1L^2T^1]$
(3) $[M^1L^0T^{-1}]$ (4) $[M^0L^2T^{-1}]$

10. The period of oscillation of a simple pendulum in the experiment is recorded as 2.63 s, 2.56 s, 2.42 s, 2.71 s and 2.80 s respectively. The average absolute error is
(1) 0.1 s (2) 0.11 s
(3) 0.01 s (4) 1.0 s

11. If p, ρ, g and h denote pressure, density, acceleration due to gravity and height, respectively. In the case of flow of fluid, $\frac{p}{\rho g}+\frac{v^2}{2g}+h=\mu_0$,where v denotes velocity. Mark the correct options.
(1) the equation is dimensionally correct
(2) if dimensions of μ_0 are $[M^0LT^0]$, the equation is dimensionally correct
(3) dimensions of $\frac{p}{\rho g}$ are same as that of $\frac{v^2}{2g}$
(4) none of the above

12. A physical quantity Q is found to depend on quantities a, b, c by the relation Q =

$\frac{a^4b^3}{c^2}$. The percentage error in a, b and care 3%, 4% and 5% respectively. Then, the percentage error in Q is

(1) 66% (2) 14%

(3) 34% (4) 43%

13. A force is represented by $F = ax^2 + bt^{1/2}$ where x = distance and t = time. The dimensions of b^2/a are

(1) $[ML^2T^{-3}]$ (2) $[ML^3T^{-3}]$

(3) $[ML^{-1}T^{-1}]$ (4) $[MLT^{-2}]$

14. Applying the principle of homogeneity of dimensions, determine which one is correct, where T is time period, G is gravitational constant, Mis mass, r is radius of orbit.

(1) $T^2 = \frac{4\pi^2r^2}{GM}$ (2) $T^2 = \frac{4\pi^2r^3}{GM}$

(3) $T^2 = 4\pi^2r^3$ (4) $T^2 = \frac{4\pi^2r}{GM^2}$

15. If G be the gravitational constant and u be the energy density then which of the following quantity have the dimensions as that of the $\sqrt{uG}$

(1) Force per unit mass

(2) Gravitational potential

(3) pressure gradient per unit mass

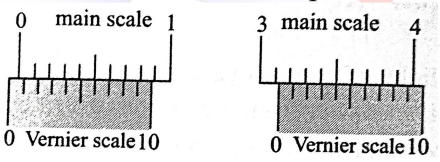
(4) Energy per unit mass

16. A Vernier callipers has 1 mm marks on the main scale. It has 20 equal divisions on the vernier scale, which match with 16 main scale divisions. For this Vernier callipers, the least count is

(1) 0.02 mm (2) 0.05 mm

(3) 0.1 mm (4) 0.2 mm

17. The smallest division on the main scale of a Vernier calipers is 0.1 cm. Ten divisions of the Vernier scale correspond to nine divisions of the main scale. The figure below on the left shows the reading of this calipers with no gap between its two jaws. The figure on the right shows the reading with a solid sphere held between the jaws. The correct diameter of the sphere is



(1) 3.07 cm (2) 3.11 cm

(3) 3.15 cm (4) 3.17 cm

18. A man moves 20 m in a direction 30° North of West. Represent displacement in the form of unit vectors.

(1) s= 20m cos 30° $\hat{\imath}$ +20 m sin 30°$\hat{\jmath}$

(2) s= (- $10\sqrt{3}$ m) $\hat{\imath}$ +(10m) $\hat{\jmath}$

(3) s= $10\sqrt{3}$ m) $\hat{\imath}$ -(10m) $\hat{\jmath}$

(4) none of these

19. A truck travelling due north at 20 m/s turns west and travels at the same speed. The change in its velocity be

(1) 40m / s N – W (2) $20\sqrt{2}$m / sN-W

(3) 40m / s S – W (4) $20\sqrt{2}$ m / sS - W

20. Forces F_1 and F_2 act on a point mass in two mutually perpendicular directions. The resultant force on the point mass will be

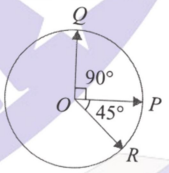
(1) $F_1 + F_2$ (2) $F_1 - F_2$

(3) $\sqrt{F_1^2 + F_2^2}$ (4) $F_1^2 + F_2^2$

21. During measurement of kinetic energy T, the percentage error in measurement of mass of particle and momentum of particle are 2% and 3%., respectively. The percentage error in measurement of kinetic energy is n% Find the value of n._____

22. If y = 2.21 × 0.3 then find the number of significant digits in the value of y. _____

23. Three vectors $\overrightarrow{OP}$, $\overrightarrow{OQ}$ and $\overrightarrow{OR}$ each of magnitude A are acting as shown in figure. The resultant of the three vectors is $A\sqrt{x}$ The value of x is _____



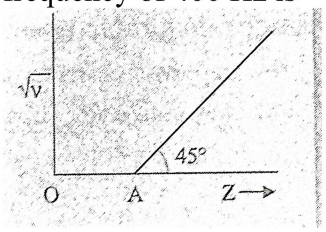
24. Two vectors $\vec{A}$ and $\vec{B}$ are defined as $\vec{A}$ = a$\hat{\imath}$ and $\vec{B}$ =a(cos $\omega t\hat{\imath}$ +sin $\omega t\hat{\jmath}$) where a is a constant and omega = π/6 rad s^{-1} If $|\vec{A} + \vec{B}| = \sqrt{3}\,|\vec{A} - \vec{B}|$ at time t = τ for the first time, the value of τ, in seconds, is_____

25. In the given equation $y = A\left(1 - e^{\frac{yt}{v}}\right); t$ is time and v velocity. If dimensional formula of y is $M^xL^yT^z$ then value of x + 2y + z is equal to

CHEMISTRY

26. Moseley's equation is represented as $\sqrt{v}$ = a(Z - b) where, a and b are constants. If

OA = 1 then atomic number of the element showing frequency of 400 Hz is



(1) 21 (2) 11
(3) 401 (4) 19

27. Wavelength associated with a water molecule moving with a velocity of 500 ms^{-1} is
(1) 44.3 pm (2) 443 pm
(3) 0.0443 pm (4) 0.443 pm

28. Of the following, the radiation having the maximum wavelength is
(1) UV rays (2) Radiowaves
(3) X-rays (4) IR rays

29. The number of waves in the fourth Bohr orbit of hydrogen is
(1) 3 (2) 4
(3) 9 (4) 12

30. The potential energy of an electron in the second Bohr's orbit of the He' ion is
(1) -54.4 eV (2)-27.2 eV
(3)-108.8 eV (4) -13.6 eV

31. The ratio of the difference between the first and second Bohr orbit energies to that between second and third Bohr orbit energies is
(1) $\frac{1}{2}$ (2) $\frac{1}{3}$
(3) $\frac{27}{5}$ (4) $\frac{5}{27}$

32. Which is a possible set of quantum numbers valence electrons in ground state atom of phosphorus (Z = 15)

	n	l	m_l	m_s
(1)	2	1	0	+1/2
(2)	3	2	0	+1/2
(3)	3	0	0	+1/2
(4)	3	1	0	- ½

33. If the energy of a photon of frequency v is given by E = hv where h is the Planck's constant and the momentum of photon is p = h/λ, where λ is the wavelength of photon, then the velocity of light is equal to:
(1) $\sqrt{\frac{E}{p}}$ (2) $\frac{E}{p}$
(3) E×p (4) $\left(\frac{E}{p}\right)^2$

34. Which of the following electronic configuration is not observing the (n + *l*) rule?
(1) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^1\ 4s^2$
(2) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^7\ 4s^2$
(3) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^6\ 4s^1$
(4) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^8\ 4s^2$

35. Pick out the isoelectronic structures from the following.
CH_3^+ (I) H_3O^+ (II) NH_3 (III) CH_3^- (IV)
(1) I and II (2) I and IV
(3) I and III (4) II, III and IV

36. Which of the following has the largest de-Broglie wavelength, given that all have equal velocity?
(1) CO_2 molecule (2) NH_3 molecule
(3) Electron (4) Proton

37. Two particles A and B are in motion. If the wavelength associated with 'A'is 33.33 nm, the wavelength associated with 'B' whose momentum is 1 / 3rd of 'A' is
(1) 1×10^{-8} m (2) 2.5×10^{-8} m
(3) 1.25×10^{-7} m (4) 1×10^{-7} m

38. If wavelength of photon is 2.2×10^{-11} m and $h = 6.6 \times 10^{-34}$ Js, then momentum of photon is
(1) 1.452×10^{-44} kgm s^{-1}
(2) 6.89×10^{-43} kgm s^{-1}
(3) 3×10^{-23} kgm s^{-1}
(4) 3.33×10^{-22} kgm s^{-1}

39. Calculate the radius of first orbit of Be^{3+}
(1) 13.23 pm (2) 26.45 pm
(3) 17.63 pm (4) 52.9 pm

40. Identify the impossible quantum number set for the electron from the following:
(1) *n = 2 l = 0 m = 0 s = - 1/2*
(2) *n = 2 l = 1 m = 0 s = 1/2*
(3) *n = 3 l = 3 m = 1 , s = 1/2*
(4) *n = 4 l = 2 m = 1 s = ½*

41. An isotone of $_{32}Ge^{76}$ is
(i) $_{32}Ge^{77}$ (ii) $_{33}As^{77}$
(iii) $_{34}Se^{77}$ (iv) $_{34}Se^{78}$
(1) Only (i) and (ii)
(2) Only (ii) and (iii)
(3) Only (ii) and (iv)
(4) (ii), (iii) and (iv)

42. With what velocity α-particles travel towards the nucleus of a copper atom to arrive at a distance of 10^{-13} m from the nucleus of the copper atom?
(1) 6.3×10^6 ms^{-1} (2) 5×10^5 ms^{-1}

(3) 7×10^{6} ms^{-1} (4) 5.3×10^{8} ms^{-1}

43. A wavelength of 400 nm corresponds to
(1) frequency (v) = 7.5×10^{14} Hz
(2) wave number ($\vec{v}$)= 2.5×10^{6}m^{-1}
(3) momentum (mv) = 1.66×10^{-27}kgm s^{-1}
(4) All of the above

44. The velocity of photoelectron emitted from metal surface where λ_0 and λ are threshold wavelength and wavelength of incident light is given by
(1) $\sqrt{\frac{2h}{m}\left(\frac{1}{\lambda_0}-\frac{1}{\lambda}\right)}$ (2) $\sqrt{\frac{2h}{m}\left(\frac{\lambda_0-\lambda}{\lambda\lambda_0}\right)}$
(3) $\sqrt{\frac{2hc}{m}(\lambda_0-\lambda)}$ (4) $\sqrt{\frac{2h}{m}(\lambda_0-\lambda)}$

45. At 200 °C hydrogen molecules have velocity 2.4×10^{5} cm s^{-1} The de Broglie wavelength in this case is approximately
(1) 1 Å (2) 1000 Å
(3) 100 Å (4) 10 Å

46. The wavelength of a neutron with a translatory kinetic energy equal to kT at 300 K is
(1) 178 pm (2) 200 pm
(3) 17.8 pm (4) 20.0 pm

47. If uncertainty in the measurement of position and momentum of an electron are equal, then uncertainty in the measurement of its velocity is approximately:
(1) 8×10^{12} m s^{-1} (2) 6×10^{12} m s^{-1}
(3) 4×10^{12} m s^{-1} (4) 2×10^{12} m s^{-1}

48. The uncertainty in position of an electron is equal to its de Broglie wavelength. The minimum percentage error in its measurement of velocity under this circumstance will be approximately
(1) 4 (2) 8
(3) 22 (4) 18

49. The number of nodal planes in p_x -orbital is:
(1) one (2) two
(3) three (4) zero

50. The principal quantum number of an atom is related to the 8 m
(1) Size of the orbital
(2) Spin angular momentum
(3) Orbital angular momentum
(4) Orientation of the orbital in space

MATHS

51. The value of $\cos\left(\frac{3\pi}{2}+x\right).\cos(2\pi+x)\left[\cot\left(\frac{3\pi}{2}-x\right)+\cot(2\pi+x)\right]$ is
(1) -1 (2) 0
(3) 1 (4) 2

52. If $f(x)=\cos^2 x+\sec^2 x$, then
(1) $f(x)<1$ (2) $f(x)=1$
(3) $2<f(x)<1$ (4) $f(x)\geq 2$

53. The value of $2\sin^2\frac{\pi}{6}+cosec^2\frac{7\pi}{6}.\cos^2\frac{2\pi}{3}$ is equal to(1) 1 (2) $\frac{3}{2}$
(3) -1 (4) 2

54. The value of cos 1°. Cos 2°.tan 3°. … tan179° is
(1) $\frac{1}{\sqrt{2}}$ (2) 0
(3) 1 (4) -1

55. If for real x, cos θ = x + $\frac{1}{x}$, then
(1) θ is an acute angle
(2) θ is right angle
(3) $\theta$is an obtuse angle
(4) no value of $\theta 0$ *is possible*

56. If $\sin\theta=-\frac{4}{5}$ *and* θ *lies in third quadrant , then the value of* $\cos\frac{\theta}{2}$ is
(1) $\frac{1}{5}$ (2) $-\frac{1}{\sqrt{10}}$
(3) $-\frac{1}{\sqrt{5}}$ (4) $\frac{1}{\sqrt{10}}$

57. If $\sin\alpha = k\sin\beta$, then $\tan\left(\frac{\alpha+\beta}{2}\right)\cot\left(\frac{\alpha-\beta}{2}\right)$ is equal to
(1) $\frac{k-1}{k+1}$ (2) $\frac{k+1}{k-1}$
(3) $\frac{1+k}{1-k}$ (4) $\frac{1-k}{1+k}$

58. The value of $\cos\frac{2\pi}{15}.\cos\frac{4\pi}{15}.\cos\frac{8\pi}{15}.\cos\frac{16\pi}{15}$ is
(1) $\frac{1}{16}$ (2) $-\frac{1}{8}$
(3) $\frac{1}{8}$ (4) $\frac{1}{16}$

59. The principal solutions of cosec x = -2 are
(1) $7\pi/6$, $11\pi/6$ (2) $5\pi/6$,$7\pi/6$
(3) $7\pi/3$, $11\pi/3$ (4) $5\pi/3$, $7\pi/3$

60. Number of solutions of the equation *tan x + sec x = 2 cos x* lying in the interval [0, 2π] is
(1) 0 (2) 1
(3) 2 (4) 3

61. If $15\sin^4\alpha+\cos^4\alpha=6$ for some $\alpha\in R$, *then* the value of $27\sec^6\alpha + 8\operatorname{cosec}^6\alpha$ is equal to
(a) 350 (2) 500
(3) 400 (3)250

62. The value of sin 10° sin30°sin50°sin70° is
(1) $\frac{1}{18}$ (2) $\frac{1}{32}$

(3) $\frac{1}{36}$ (4) $\frac{1}{16}$

63. If cot α = 1 and $sec\ \beta = -\frac{5}{3}$where $\pi < \alpha < \frac{3\pi}{2}$ and $\pi/2 < \beta < \pi$, then the value of tan($\alpha + \beta$) and the quadrant in which $\alpha + \beta$ lies, respectively are
(1) - 1/7 and IV th quadrant
(2) 7 and I st quadrant
(3) -7 and IV th quadrant
(4) and I st quadrant

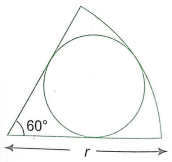
64. If 0< x, y < π and cos x +cos y –cos(x+y) = $\frac{3}{2}$,then sin x+cos y is equal to
(1) $\frac{1}{2}$ (2) $\frac{1+\sqrt{3}}{2}$
(3) $\frac{\sqrt{3}}{2}$ (4) $\frac{1-\sqrt{3}}{2}$

65. $\alpha = sin36°$ is a root of which of the following equation?
(1)$16x^4$-$10x^2$-5=0 (1)$16x^{4+}20x^2$-5=0
(3) $16x^4$-$20x^2$-5=0 (4)$16x^4$-$10x^2$+5=0

66. Let |cos θ cos(60 - θ) cos(60 - θ)| ≤ 1/8 the sum of all $\theta \in [0, 2\pi]$ where cos 3 θ attains its maximum $\theta \in [0, 2\pi]$ Then, value, is
(1) 18 π (2) 9 π
(3) 6 π (4) 15 π

67. If the value of is $\frac{3\ cos36°+5\sin 18°}{5\ cos36°-3\sin 18°}$ is $\frac{a\sqrt{5}-b}{c}$ where a, b, c are natural numbers and gcd (a, c) = 1 , then a + b + c is equal to
(1) 40 (2) 54
(3) 50 (4) 52

68. A circle is drawn in a sector of a larger circle of radius r, as shown in figure. The smaller circle is tangent to the two bounding radii and the arc of the sector. The radius of the smaller circle is



(1) r/2 (2) r/3
(3) $2\sqrt{3}r/5$ (4) $r/\sqrt{2}$

69. The minimum value of the expression sin α + sin β + sin β where α, β ,γ are real numbers satisfying $\alpha + \beta + \gamma = \pi$ is
(1) positive (3) negative
(2) zero (4) -3

70. The value of the expression ($2\sin^2$ 91° - 1)($2\sin^2$ 92°- 1) ... ($2\sin^2$ 180° - 1) is equal to
(1) 0 (2) 1
(3) 2^{90} (4) 2^{90} – 90

71. Let A = $\sin^8\theta + \cos^{14}\theta$; then A_{MAX} is____

72. If $\sin\theta - cos\theta = 1$,then thevalue of $\sin^3\theta - \cos^3\theta$ is _____

73. If p cosec θ +qcot $\theta = 2$ and p^2 $cosec^2\theta - q^2$ $cot^2\theta = 5\ then\ the$ value of $81p^{-2}$-q^{-2} is _____

74. The value of tan 9° -tan 27°-tan63°+tan63°+tan81° is _____

75. If the range of $f(\theta) = \frac{sin^4\theta+3cos^2\theta}{sin^4\theta+cos^2\theta}\ \theta \in R$ is $[\alpha, \beta]$ then the sum of the infinite G.P., whose first term is 64 and the common ratio is $\frac{\alpha}{\beta}$ is equal to_____