1. Who gave quantum model of atom

(1) Rutherford (2) Bohr
(3) Newton (4) Faraday

2. Size of Universe is about

(1) ten million light years
(2) one million light years
(3) hundred million light years
(4) ten thousand light years

3. The ratio of e.m.u. and e.s.u. of charge is

(1) $3 \times 10^{10}$ (2) $4.8 \times 10^{-19}$
(3) $\frac{1}{10}$ (4) $\frac{1}{30}$

4. Dimensions of specific heat are

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

5. Three measurements are made as 18.425 cm, 7.21 cm and 5.0 cm. The addition should be written as

(1) 30.635 cm (2) 30.64 cm
(3) 30.63 cm (4) 30.6 cm

6. A force $F$ is applied on a square plate of Disc of side $L$. If percentage error in determination of $L$ is 2% and that in $F$ is 4% what is permissible error in pressure

(1) 2% (2) 4%
7. Which of the following can be zero, when a particle is in a motion for some time
   (1) distance
   (2) speed
   (3) displacement
   (4) none of them

8. The numerical ratio of displacement to distance is
   (1) always less than one
   (2) always equal to one
   (3) always more than one
   (4) equal to or less than one

9. Two bodies A and B start from rest and from the same point with a uniform acceleration of 2 m/s². If B starts one second later, then the two bodies are separated, at the end of the next second, by
   (1) 1 m
   (2) 2 m
   (3) 3 m
   (4) 4 m

10. A ball thrown up is caught by the thrower 6 s after start. The height to which the ball has risen is (take g = 10 m/s²)
    (1) 10 m
    (2) 30 m
    (3) 45 m
    (4) 90 m

11. A body moves in a straight line along x-axis, its distance from the origin is given by the equation \( x = 8t - 3t^2 \). The average
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12. Two bodies are thrown vertically upwards with their initial speeds in the ratio 2 : 3. Then the ratio of the maximum heights attained by them is

(1) 2 : 3  (2) 4 : 9  
(3) 1 : 1  (4) \( \sqrt{2} : \sqrt{3} \)

13. A car covers the first half of the distance between two places at 40 km/hr and the other half at 60 km/hr. The average speed of the car is

(1) 40 km/hr  (2) 48 km/hr  
(3) 50 km/hr  (4) 60 km/hr

15. Two vectors have their resultant equal to either of them. The angle between them is

(1) 45°  (2) 75°  
(3) 90°  (4) 120°

16. The angle between two vectors \( \vec{a} = -2\hat{i} + 3\hat{j} + \hat{k} \) and \( \vec{b} = \hat{i} + 2\hat{j} - 4\hat{k} \) is

(1) 0°  (2) 90°  
(3) 180°  (4) None

17. The vectors \( \vec{A} \) and \( \vec{B} \) are such that

\[ |\vec{A} + \vec{B}| = |\vec{A} - \vec{B}| \]
18. A boat is moving with a velocity $3\hat{i} - 4\hat{j}$ with respect to ground. The water in the river is moving with a velocity $-3\hat{i} - 4\hat{j}$ with respect to ground. The relative velocity of the boat with respect to water is

(1) $8\hat{i}

(2) -6\hat{i} - 8\hat{j}

(3) 6\hat{i} + 8\hat{j}

(4) 5\sqrt{2}$

19. A force vector applied on a mass is represented as $10\hat{i} - 8\hat{j} + 10\hat{k}$ and accelerates with $1 \text{m/s}^2$. What will be the mass of body

(1) $10\sqrt{2} \text{ kg}

(2) 2\sqrt{10} \text{ kg}

(3) 10 \text{ kg}

(4) 20 \text{ kg}$

20. Which of the following cannot be resultant of the vectors of magnitude 5 and 10

(1) 7

(2) 8

(3) 5

(4) 2
कोण होगा
(1) $\cos^{-1}\left(\frac{5}{12}\right)$ (2) $\cos^{-1}\left(\frac{5}{13}\right)$
(3) $\cos^{-1}\left(\frac{12}{13}\right)$ (4) $\cos^{-1}\left(\frac{7}{13}\right)$

23. यदि $|\vec{A} + \vec{B}| = |\vec{A}| + |\vec{B}|$ तो सदिश $\vec{A}$
tथा $\vec{B}$ के बीच का कोण है
(1) 90° (2) 120°
(3) 0° (4) 60°

24. यदि किसी पिण्ड पर लगा बल का परिमाण
tथा दिशा में कोई परिवर्तन ना हो तो पिण्ड
के गति का पथ होगा
(1) सरल रेखा (2) वृत्ताकार
(3) दौर्ध वृत्ताकार (4) इनमें से कोई नहीं

25. एक क्रिकेट के गेंद को ऊर्ध्वाघात ऊपर की ओर
tथा दिशा में कोई परिवर्तन ना हो तो गेंद
संपर्क तथा नदी की गई अधिकतम ऊंचाई होगी
(1) 9.8 मी (2) 19.6 मी
(3) 29.4 मी (4) 39.2 मी

26. दो गेंदों को क्षेत्रिय के साथ 30° तथा 45° पर
tथा चौथी गेंद को अधिकतम ऊंचाई पर संपर्क नहीं
tथा दोनों गेंद के प्रक्षेपित गेंद का अनुपात है
(1) $\sqrt{3} : \sqrt{2}$ (2) $\sqrt{2} : 1$
(3) $\sqrt{2} : \sqrt{3}$ (4) $\sqrt{3} : 2$

27. किसी पिण्ड को 30° पर क्षेत्रिय के साथ
tथा प्रक्षेपित किया जाता है तो उनके गति ऊर्जा
tथा परिवर्तन प्रारंभिक बिन्दु तथा पुनः संपर्क पर
tथा नदी में कितना होगा
(1) शून्य (2) 30%
(3) 60% (4) 100%
28. A stone thrown at an angle $\theta$ to the horizontal reaches a maximum height $h$. The time of flight of the stone is

\[
(1) \frac{\sqrt{2}h\sin \theta}{g}
\]
\[
(2) \frac{2\sqrt{2}h\sin \theta}{g}
\]
\[
(3) \frac{2\sqrt{h}}{g}
\]
\[
(4) \sqrt{\frac{2h}{g}}
\]

29. A machine gun has a mass 5 kg. It force 50 gm bullets at the rate of 30 bullets per minute at a speed of 400 m/s. What force is required to keep the gun in position

\[
(1) 10 \text{ N}
\]
\[
(2) 5 \text{ N}
\]
\[
(3) 15 \text{ N}
\]
\[
(4) 30 \text{ N}
\]

30. A body of mass 2 kg slides down a curved track, which is quadrant of a circle of radius 1 m. All the surface are frictional if two body starts from rest, its speed at bottom of track is

\[
(1) 2 \text{ m/s}
\]
\[
(2) 0.5 \text{ m/s}
\]
\[
(3) 4.43 \text{ m/s}
\]
\[
(4) 19.6 \text{ m/s}
\]

31. An object of mass $m$ is thrown vertically upwards. At what rate will its momentum change ( $S =$ Second, $h =$ vertical height)

\[
(1) mgs
\]
\[
(2) mg^2/s
\]
\[
(3) mg
\]
\[
(4) 2mg
\]

32. Three bodies $A$, $B$ and $C$ have masses of 2 kg, 5 kg and 10 kg respectively. If all the bodies have equal kinetic energies, then which body has a greater momentum

\[
(1) \text{body A}
\]
\[
(2) \text{body B}
\]
\[
(3) \text{body C}
\]

28. किसी वस्तु को क्षेत्रीय के साथ $\theta$ कोन पर प्रभृतिपित किया जाता है तथा उनका अधिकतम ऊँचाई $h$ हो तो उद्धार्यन काल होगा

\[
(1) \frac{\sqrt{2}h\sin \theta}{g}
\]
\[
(2) \frac{2\sqrt{2}h\sin \theta}{g}
\]
\[
(3) \frac{2\sqrt{h}}{g}
\]
\[
(4) \sqrt{\frac{2h}{g}}
\]

29. एक बन्दूक का द्रव्यमान 5 kg है। उसके द्वारा 50 gm के गोली को 400 m/s के वेग से 30 गोली प्रति मिनट की दर से छोड़ा जाता है तो बन्दूक को अपनी जगह रखने के लिए कितना बल बन्दूक पर लगाना होगा

\[
(1) 10 \text{ N}
\]
\[
(2) 5 \text{ N}
\]
\[
(3) 15 \text{ N}
\]
\[
(4) 30 \text{ N}
\]

30. एक वस्तु को विशालस्थल से 1 m त्रिज्या वाले उत्तरें कृतीय पथ पर लूटकर यात्रा होती है। सतह को पर्याप्तता मानकर वस्तु को सतह पर आने पर उसका वेग होगा

\[
(1) 2 \text{ m/s}
\]
\[
(2) 0.5 \text{ m/s}
\]
\[
(3) 4.43 \text{ m/s}
\]
\[
(4) 19.6 \text{ m/s}
\]

31. एक वस्तु को ऊँचाई $h$ की ओर फेंककर हैं तो उसके संवेग में परिबंधन कितना होगा ($m =$ द्रव्यमान, $s =$ सेकण्ड, $h =$ ऊँचाई)

\[
(1) mgs
\]
\[
(2) mg^2/s
\]
\[
(3) mg
\]
\[
(4) 2mg
\]

32. तीन वस्तु $A$, $B$ तथा $C$ का द्रव्यमान क्रमशः 2 kg, 5 kg तथा 10 kg है। यदि तीनों की गति ऊँचाई समान हो तो किस वस्तु का संवेग अधिकतम होगा

(1) वस्तु A
(2) वस्तु B
(3) वस्तु C
33. A force of 6 N acts on a body of mass 1 kg and during this time, the body attains a velocity of 30 m/s. The time for which the force acts on a body is
(1) 10 seconds (2) 8 seconds
(3) 7 seconds (4) 5 seconds

34. The velocity of rocket with respect to ground is $v_1$ and velocity of gasses ejecting from rocket with respect to ground is $v_2$. Then velocity of gasses with respect to rocket is given by
(1) $v_2$ (2) $v_1 + v_2$
(3) $v_1 - v_2$ (4) $v_1 \times v_2$

35. Two particles initially at rest moves towards each other under the mutual attraction. At the instant when the speed of A is $v$ and the speed of B is $2v$ ho to their speed of the centre of mass of the system is
(1) zero (2) 1.5 $v$
(3) $1 v$ (4) 3.0 $v$

36. A bomb of 12 kg explodes into two pieces of masses 4 kg and 8 kg. The velocity of 8 kg mass is 6 m/s. The kinetic energy of the other mass is
(1) 48 J (2) 32 J
(3) 24 J (4) 288 J
37. Two bodies of masses 3 kg and 4 kg are tied to the ends of a massless string. This string passes over a frictionless pulley. The tension in the string is (take $g = 10\text{m/s}^2$)

\[
\begin{array}{ll}
(1) & \frac{120}{7} \text{ N} \\
(2) & \frac{240}{7} \text{ N} \\
(3) & \frac{480}{7} \text{ N} \\
(4) & \frac{360}{7} \text{ N}
\end{array}
\]

38. A 100 N force acts horizontally on a block of 10 kg placed on horizontal rough table of coefficient of friction $\mu = 0.5$ (takes $g = 10\text{m/s}^2$). The acceleration of the block is

\[
\begin{array}{ll}
(1) & \text{zero} \\
(2) & 10 \text{ m/s}^2 \\
(3) & 5 \text{ m/s}^2 \\
(4) & 5.2 \text{ m/s}^2
\end{array}
\]

39. A car turns a corner on a slippery road at a constant speed of 10 m/s. If coefficient of friction is 0.5, the minimum radius of the arc in which car turns is (take $g = 10\text{m/s}^2$)

\[
\begin{array}{ll}
(1) & 10 \text{ m} \\
(2) & 4 \text{ m} \\
(3) & 5 \text{ m} \\
(4) & 20 \text{ m}
\end{array}
\]

40. A constant force acts on a body of mass 0.9 kg at rest for 10 s. If the body moves a distance of 250 m, the magnitude of the force is

\[
\begin{array}{ll}
(1) & 3 \text{ N} \\
(2) & 3.5 \text{ N} \\
(3) & 4 \text{ N} \\
(4) & 4.5 \text{ N}
\end{array}
\]

41. A light string passing over a smooth light pulley connects two blocks of masses $m_1$ and $m_2$ vertically. If the acceleration of the systems is $g/8$, then the ratio of masses is

\[
\begin{array}{ll}
(1) & 8 : 1 \\
(2) & 9 : 7
\end{array}
\]
42. The power of a water pump is 2 kw. If \( g=10 \text{ m/s}^2 \), the amount of water it can raise in one minute to a height of 10 m is
(1) 2000 litres  (2) 1000 litres  
(3) 100 litres   (4) 1200 litres

43. A lift develops 10 kw of power. How much time will it take to lift a man of 200 kg to a height of 40 m (take \( g = 10 \text{ m/s}^2 \))
(1) 4 s  (2) 5 s  
(3) 8 s   (4) 10 s

44. If K. E. of a body increases by 0.1 %, the percentage increase in its momentum will be
(1) 0.05 %  (2) 0.1 %  
(3) 1.0 %   (4) 10 %

45. A particle of mass 2 kg is moving along a circle path of radius 1m. If its angular speed is \( 2 \pi \text{ rad/s} \), the centripetal force will be
(1) \( 4 \pi \text{ N} \)  (2) \( 4 \pi^2 \text{ N} \)  
(3) \( 8 \pi \text{ N} \)   (4) \( 8 \pi^2 \text{ N} \)

46. The motion of the centre of mass depends on
(1) total external forces  
(2) total internal forces  
(3) sum of (a) and (b)  
(4) none of these

47. If the net force acting on the system of particles is zero, then which of the following may vary
(1) momentum of the system
48. Two bodies of mass 1 kg and 2 kg are located at (1, 2) and (−1, 3) respectively. The co-ordinates of the centre of mass are

(1) \( \left( \frac{0}{2}, \frac{5}{2} \right) \)
(2) \( \left( \frac{5}{2}, 0 \right) \)
(3) \( \left( -\frac{1}{3}, \frac{8}{3} \right) \)
(4) none of these

49. The moment of Inertia of a body depends on:

(1) volume
(2) energy
(3) surface area
(4) mass and size

50. A spherical solid ball of 1 kg mass and radius 3 cm is rotating about an axis passing through its centre with an angular velocity of 50 rad/s. K. E. of rotation is

(1) 450 J
(2) 45 J
(3) 90 J
(4) 0.45 J

51. Moment of Inertia of a solid sphere about an axis tangential to its surface is

(1) \( \frac{2}{3} \, MR^2 \)
(2) \( \frac{2}{5} \, MR^2 \)
(3) \( \frac{7}{5} \, MR^2 \)
(4) \( \frac{5}{3} \, MR^2 \)

52. A wheel of radius R rotates through an angle \( \theta \) about the centre of the wheel. The distance s moved by the wheel is

\[ s = R \theta \]
53. A wheel starts from rest and acquires a rotational speed of 240 rps in 2 min. Its acceleration is
   (1) 5 rps² (2) 2 rps² (3) 8 rps² (4) 11 rps²

54. If a sphere is rolling, the ratio of the translational energy to total kinetic energy is given by
   (1) 7 : 10 (2) 2 : 5 (3) 10 : 7 (4) 5 : 7

55. When sand is poured on a rotational motion on a rotating disc, its angular velocity will be
   (1) decreases (2) increases (3) remain constant (4) none of these

56. A man is sitting with folded hands on a revolving table. Suddenly he stretches his arms, angular speed of table would
   (1) increase (2) decrease (3) remain the same (4) nothing can be said
57. The radius of gyration of a uniform rod of length L about an axis passing through its centre of mass is
   \( \frac{L}{\sqrt{12}} \) (2) \( \frac{L^2}{12} \) (3) \( \frac{L}{\sqrt{3}} \) (4) \( \frac{L}{\sqrt{2}} \)

58. If earth suddenly shrinks by one third of its present radius, the acceleration due to gravity will be
   \( \frac{2}{3} g \) (2) \( \frac{3}{2} g \) (3) \( \frac{9}{4} g \) (4) \( \frac{4}{9} g \)

59. The weight of a person on earth is 600 N. His weight on moon will appear as
   (1) zero (2) 100 N (3) 600 N (4) 3600 N

60. The weight of a body at earth’s surface is W. At a depth half way to the centre of the earth it will be
   \( \frac{W}{8} \) (2) \( \frac{W}{4} \) (3) \( \frac{W}{2} \) (4) W

61. A body weights 700 gwt on the surface of the earth. How much will it weight on the surface of the planet whose mass is \( \frac{1}{7} \) and radius \( \frac{1}{2} \) of the earth
   (1) 50 gwt (2) 200 gwt (3) 300 gwt (4) 400 gwt
62. At a height equal to earth's radius, above the earth surface, the acceleration due to gravity is

(1) \( g \)  
(2) \( \frac{g}{2} \)  
(3) \( \frac{g}{4} \)  
(4) \( \frac{g}{8} \)

63. Force of gravity is least at

(1) the equator  
(2) the pole  
(3) a point is between equator and pole  
(4) none of these

64. Gravitational potential on the surface of the earth is (\( M \) = mass of the earth, \( R \) = radius of the earth)

(1) \( -\frac{GM}{2R} \)  
(2) \( -gR \)  
(3) \( +gR \)  
(4) \( +\frac{GM}{2R} \)

65. Two satellites are orbiting around the earth in circular orbits of the same radius. One of them is 100 times greater in mass than the other. Their period of revolution are in the ratio

(1) 1 : 1  
(2) 10 : 1  
(3) 100 : 1  
(4) 1 : 100

66. What is the ratio of gravitational mass and inertial mass

(1) \( \frac{1}{2} \)  
(2) 1  
(3) 2  
(4) not fixed

67. As we go from equator to the pole the value of \( g \)
68. किसी उपग्रह के आवर्तकाल $T$ हो तो उनका गतिज ऊर्जा समानुपाती होगा

- (1) $\frac{1}{T^{2/3}}$
- (2) $\frac{1}{T}$
- (3) $\frac{1}{T^2}$
- (4) $\frac{1}{T^{3/2}}$

68. In a satellite of the time of revolution is $T$, then K. E. is proportional to

- (1) $\frac{1}{T^{2/3}}$
- (2) $\frac{1}{T}$
- (3) $\frac{1}{T^2}$
- (4) $\frac{1}{T^{3/2}}$

69. किसी कृत्रिम उपग्रह की अक्षीय चाल निर्भर नहीं करती है

- (1) पृथ्वी का द्रव्यमान
- (2) उपग्रह का द्रव्यमान
- (3) पृथ्वी की त्रिज्या
- (4) गुरुत्वीय त्वरण $g$

69. Orbital velocity of an artificial satellite does not depends upon

- (1) mass of earth
- (2) mass of satellite
- (3) radius of earth
- (4) acceleration due to gravity

70. किसी ग्रह के लिए पलायन वेग $v_e$ है। यदि ग्रह की त्रिज्या निर्भर हो परस्पर द्रव्यमान चार गुणा हो जाए तो उसके पलायन वेग होगा

- (1) $4v_e$
- (2) $2v_e$
- (3) $v_e$
- (4) $\frac{v_e}{2}$

70. Escape velocity on a planet is $v_e$. If the radius of planet remain same and mass becomes 4 times, the escape velocity becomes

- (1) $4v_e$
- (2) $2v_e$
- (3) $v_e$
- (4) $\frac{v_e}{2}$

71. किसी वस्तु को उसके पलायन वेग से कम वेग पर प्रक्षेपित किया जाय तो उसके गतिज ऊर्जा तथा स्थिरतज ऊर्जा का योग हमेशा

- (1) धनात्मक होगा
- (2) गूढा होगा
- (3) ऋणात्मक होगा
- (4) इसमें से कोई नहीं

71. In a missile launched with a velocity less than escape velocity, the sum of its K. E. and P. E. is always

- (1) + ve
- (2) zero
- (3) − ve
- (4) none of them

72. तापमान के बृद्धि का यंग प्रत्यास्थता गुणांक पर क्या प्रभाव पड़ेगा

- (1) घटेगा
- (2) बढ़ेगा

72. With rise in temperature the Young's modulus of elasticity

- (1) decreases
- (2) increases
73. The change in the shape of a regular body is due to
(1) shearing strain
(2) bulk strain
(3) mental strain
(4) longitudinal strain

74. S. I. unit of Poission’s ratio is
(1) J/m
(2) N/m²
(3) Nm²
(4) unit less

75. The volume elasticity is possessed by
(1) solid only
(2) liquid only
(3) gas only
(4) all the three states of matter

76. The potential energy of a stretched spring is proportional to
(1) the square of the force content
(2) the square of amount of stretch
(3) the square of the original length
(4) none of these

77. Two soap bubbles have radii in the ratio of 2 : 1. What is the ratio of excess pressure inside them?
(1) 1 : 2
(2) 1 : 4
(3) 2 : 1
(4) 4 : 1

78. A spherical liquid drop of radius R is
79. The energy stored in a soap bubble of diameter 4 cm is (surface tension $T = 0.07$ N/m) nearly

(1) $7 \times 10^{-4}$ J   (2) $3.5 \times 10^{-4}$ J
(3) $1.76 \times 10^{-2}$ J   (4) $8.8 \times 10^{-3}$ J

80. How does the viscosity $\eta$ of gases vary with temperature

(1) $\eta \propto \sqrt{T}$   (2) $\eta \propto \frac{1}{\sqrt{T}}$
(3) $\eta \propto T^2$   (4) $\eta \propto \frac{1}{T^2}$

81. K is the force constant of spring. The work done in increasing its extention from $l_1$ to $l_2$ will be

(1) $K(l_1 - l_2)$   (2) $K \left( \frac{l_1 + l_2}{2} \right)$
(3) $K \left( \frac{l_2^2 - l_1^2}{2} \right)$   (4) $\frac{K}{2} \left( l_2^2 - l_1^2 \right)$

82. At 27°C temperature, the kinetic energy of an ideal gas is $E_1$. If the temperature is increased to 327°C, then kinetic energy would be

(1) $\frac{E_1}{2}$   (2) $\frac{E_1}{\sqrt{2}}$
(3) $\sqrt{2} E_1$   (4) $2 E_1$

83. R. M. S. velocity of nitrogen molecules at N. T. P.

(1) 33 m/s   (2) 492 m/s
(3) 517 m/s   (4) 546 m/s
84. The value of Poisson’s ratio (theoretically) lies between
   (1) $-1$ to $\frac{1}{2}$
   (2) $-\frac{3}{4}$ to $-\frac{1}{2}$
   (3) $-\frac{1}{2}$ to $1$
   (4) $1$ to $2$

85. The length of a wire increases by 1% on suspending 2 kg wt from it. The linear strain in the wire is
   (1) 0.01 (2) 0.001
   (3) 0.1 (4) 0.0001

86. 22 g of CO₂ at 27°C is mixed with 16 g of O₂ at 37°C. The temperature of the mixture is
   (1) 30.5°C (2) 32°C
   (3) 27°C (4) 37°C

87. A beaker is completely filled with water at 4°C, it will overflow
   (1) when heated, but not when cooled
   (2) when cooled, but not when heated
   (3) both when heated or cooled
   (4) neither when heated nor when cooled

88. A bottle of water at 0°C is opened on the surface of moon. What happens
   (1) water freezes
   (2) water will boil
   (3) water decomposes in H₂ and O₂

84. पाइसन अनुपात का मान परिवर्तनशील है
   (1) $-1$ से $\frac{1}{2}$ तक
   (2) $-\frac{3}{4}$ से $-\frac{1}{2}$ तक
   (3) $-\frac{1}{2}$ से 1 तक
   (4) 1 से 2 तक

85. एक छोटी से 2 kg का भार लटकाने पर उसकी लम्बाई में 1% की वृद्धि होती है। तो रेखीय विकृति होगी
   (1) 0.01 (2) 0.001
   (3) 0.1 (4) 0.0001

86. 22 g के CO₂ को 27°C तापमान में 16 g के O₂ को 37°C तापमान में मिश्रित किया जाता है तो मिश्रण का तापमान होगा
   (1) 30.5°C (2) 32°C
   (3) 27°C (4) 37°C

87. एक बर्तन में पूरी तरह से 4°C पर पानी भर दिया गया है। यह पानी ऊपर से निचे लगेगा यदि
   (1) जब इसको गर्म किया जाता है
   (2) जब इसको ठंडा किया जाता है
   (3) दोनों ठंडा तथा गर्म करने पर
   (4) ना ची ठंडा करने पर और ना ही गर्म करने पर

88. एक बोतल में 0°C पर जल भर कर उसे चौंद की सतह पर खोल दिया जाए तो
   (1) जल जम जायेगा
   (2) जल उबलने लगेगा
   (3) जल H₂ और O₂ में बट जायेगा
91. Ten moles of an ideal gas at constant temperature 600 k is compressed from 100 litres to 10 litres. The work done in the process is

(1) $4.11 \times 10^4 \text{ J}$  
(2) $-4.11 \times 10^4 \text{ J}$  
(3) $11.4 \times 10^4 \text{ J}$  
(4) $-11.4 \times 10^4 \text{ J}$

90. If amount of heat given to a system be 50 J and work done on the system be 15 J, then change in internal energy of the system is

(1) 35 J  
(2) 50 J  
(3) 65 J  
(4) 15 J

91. An ideal monoatomic gas is taken around the cycle ABCDA as shown in P versus V curve. Work done during the cycle is

(1) $PV$  
(2) $0.5 PV$  
(3) $2 PV$  
(4) $3 PV$

92. A refrigerator acts as

(1) a heat engine  
(2) a heat pump  
(3) an air cooler  
(4) an electric motor

93. In a Carnot engine, when heat is absorbed from the source, temp of source

(1) increases  
(2) decreases  
(3) remain constant  
(4) cannot say
94. An engine has an efficiency of \( \frac{1}{3} \). The amount of work this engine can perform per kilocalorie of heat input is

(1) 1400 cal  (2) 700 cal  
(3) 700 J  (4) 1400 J

95. During adiabater expansion of 10 moles of a gas, the internal energy decreases by 50 J. Work done during the process is

(1) + 50 J  (2) − 50 J  
(3) zero  (4) cannot say

96. If temperature of a hot black body is raised by 5% heat energy radiated would increases by

(1) 25 %  (2) 15 %  
(3) 12.5 %  (4) 21.55 %

97. The temperature of a piece of metal is increased from 27°C to 84°C. The rate at which energy is radiated is increased to

(1) four times  (2) two times  
(3) six times  (4) eight times

98. A body takes 10 minutes to cool from 60°C to 50°C. If the temperature of surroundings is 25°C, then temperature of body after next 10 minutes will be

(1) 48°C  (2) 46°C  
(3) 49°C  (4) 42.85°C

99. Two stars x and y emit yellow and blue lights respectively. Out of these, whose temperature, will be more

(1) x
100. A given mass of an ideal gas is at pressure $P$ and absolute temperature $T$. The isothermal bulk modular of the gas is

- (1) $\frac{2}{3}P$
- (2) $P$
- (3) $\frac{3}{2}P$
- (4) $2P$

101. The kinetic energy of one mole of an ideal gas is $E = \frac{3}{2}RT$. Then $C_p$ will be

- (1) $0.5R$
- (2) $0.1R$
- (3) $1.5R$
- (4) $2.5R$

102. A monoatomic gas is suddenly compressed to $\frac{1}{8}$ of its initial volume adiabatically. The ratio of its final pressure to initial pressure is

- (1) $32$
- (2) $\frac{40}{3}$
- (3) $\frac{24}{5}$
- (4) $8$

103. A black body has maximum wavelength $\lambda_m$ at 2000 k. Its corresponding wavelength at 3000 k will be

- (1) $\frac{3}{2}\lambda_m$
- (2) $\frac{2}{3}\lambda_m$
- (3) $\frac{16}{81}\lambda_m$
- (4) $\frac{81}{16}\lambda_m$

104. In a given process on an ideal gas $dW = 0$ and $dQ < 0$. Then, for the gas

- (1) the temperature will decreases
- (2) the volume will increases
- (3) the pressure will remain constant
- (4) the temperature will increases
instantaneous velocity and acceleration of a particle executing S.H.M. is

(1) zero 
(2) \( \frac{\pi}{2} \)
(3) \( \pi \) 
(4) 0.707 \( \pi \)

106. A particle is executing S.H.M. when its acceleration increases, its time period (1) decreases 
(2) increases 
(3) remain constant 
(4) becomes half

107. The maximum acceleration of a body moving S.H.M. is \( a_0 \) and maximum velocity is \( v_0 \). The amplitude is given by

(1) \( \frac{v_0^2}{a_0} \) 
(2) \( v_0 a_0 \) 
(3) \( \frac{a_0^2}{v_0} \) 
(4) \( \frac{1}{a_0 v_0} \)

108. A particle undergoes S.H.M. having time period \( T \). The time taken in \( \frac{3}{8} \)th oscillation is

(1) \( \frac{3}{8} T \) 
(2) \( \frac{5}{8} T \) 
(3) \( \frac{5}{12} T \) 
(4) \( \frac{7}{12} T \)

109. The displacement of a particle executing S.H.M. is given by \( y = 0.25 \sin (200t) \) cm. The maximum speed of the particle is

(1) 200 cm/sec 
(2) 100 cm/sec 
(3) 50 cm/sec 
(4) 5.25 cm/sec

110. A spring of force constant \( K \) is cut into three equal parts. The force constant of each part will be

(1) \( K \) 
(2) \( 3 k \)
111. किसी सरल आवर्त गति के लिए आयाम a, कुल ऊर्जा E हो तो मूल विन्दु से त्रितर विभाजन पर इसकी गतिज ऊर्जा $\frac{3E}{4}$ हो जायेगी।

(1) $y = \frac{a}{\sqrt{2}}$
(2) $y = \frac{a}{2}$
(3) $y = \frac{a}{\sqrt{3}}$
(4) $y = a$

112. किसी सरल लोकल की लम्बाई 45% तक बढ़ा दी जाती है तो उसके आवर्तकाल में कितने प्रतिशत की वृद्धि होगी?

(1) 44%
(2) $\sqrt{44} \%$
(3) 10%
(4) 20%

113. किसी सरल आवर्त के लिए सूत्र

$$y = 3 \sin wt + 4 \cos wt$$

है तो उनका परिणामी आयाम होगा?

(1) 7 (2) 12
(3) 1 (4) 5

114. किसी सिंगोल लोकल पर 200 gm के वस्तु को रख कर उस सरल आवर्त गति कराई जाती है तो उसका आवर्तकाल कितना होगा? यदि सिंगोल वल नियतांक $k = 80 \text{ N/m}$

(1) 0.15 sec (2) 0.02 sec
(3) 0.31 sec (4) 0.05 sec

115. किसी सरल आवर्त गति के लिए सामान्यिकता से 3 cm दूरी पर उसका त्वरण 12 cm/sec$^2$ है तो उसका आयाम होगा?

(1) $\frac{K}{3}$ (2) $9 K$

111. A particle starts S.H.M. from the mean position. Its amplitude is $a$ and total energy $E$. At one instant its kinetic energy is $\frac{3E}{4}$ its displacement at this instant is

(1) $y = \frac{a}{\sqrt{2}}$
(2) $y = \frac{a}{2}$
(3) $y = \frac{a}{\sqrt{3}}$
(4) $y = a$

112. The length of a simple pendulum is increased by 45%. What is the percentage increase in its time period?

(1) 44%
(2) $\sqrt{44} \%$
(3) 10%
(4) 20%

113. The S.H.M. of a particle is given by the equation

$$y = 3 \sin wt + 4 \cos wt$$

The amplitude is

(1) 7 (2) 12
(3) 1 (4) 5

114. A particle of mass 200 gm executes S.H.M. The restoring force is provided by a spring of force constant $k = 80 \text{ N/m}$. The time period of oscillations is

(1) 0.15 sec (2) 0.02 sec
(3) 0.31 sec (4) 0.05 sec

115. The acceleration of a particle performing S.H.M. is 12 cm/sec$^2$ at a distance of...
हो तो उसके आवर्तकाल का मान होगा
(1) 2.0 sec  (2) 3.14 sec
(3) 0.5 sec  (4) 1.0 sec

116. साम्यावस्था से x दूरी पर किसी सरल आवर्त गति के लिए स्थिरतिज ऊर्जा का मान होगा
(1) $\frac{1}{2} mw^2 x^2$
(2) $\frac{1}{2} mw^2 a^2$
(3) $\frac{1}{2} mw^2 (a^2 - x^2)$
(4) शून्य

117. किसी रेडियो स्टेशन से 760 KHz पर तरंग प्रसारित किया जाता है तो तरंग का तरंगदैर्घ्य कितना होगा
(1) 395 m  (2) 790 m
(3) 760 m  (4) 197.5 m

118. 0°C पर ध्वनि का बेग हवा में 331 m/s है तो 35°C पर ध्वनि का बेग कितना होगा
(1) 331 m/s  (2) 366 m/s
(3) 351.6 m/s (4) 332 m/s

119. किसी अनुनाद नली में प्रथम तथा द्वितीय अनुनाद 22.7 cm तथा 70.2 cm पर प्राप्त होता है तो दूसरी अनुनाद कितने पर प्राप्त होगा
(1) 117.7 cm  (2) 92.9 cm
(3) 115.5 cm  (4) 113.5 cm

120. दो अंगूठे पाइप 10°C पर 2 विस्फोट प्रति सेकंड उत्सन्न करते हैं। यदि तापमान को 20°C तक बढ़ाते हैं तो प्रति सेकंड विस्फोट कितना होगा
(1) 5  
(2) 5 से अधिक  
(3) 5 से कम
121. A closed organ pipe has fundamental frequency 100 Hz. What frequencies will be produced if its other end is also opened

(1) 200, 400, 600, 800..............
(2) 200, 300, 400, 500..............
(3) 100, 300, 500, 700..............
(4) 100, 200, 300, 400..............

122. Doppler’s effect applies

(1) only to sound waves
(2) only to light waves
(3) to both sound and light waves
(4) to neither light nor sound waves

123. When a source moves with a speed greater than the velocity of sound in the medium, then the wave front of the wave is

(1) spherical (2) plane
(3) cylindrical (4) conical

124. The equation of stationary wave along a stretched string is given by

\[ y = 4 \sin \frac{2\pi x}{3} \cos 40\pi t \]

where \( x \) and \( y \) are in cms and, \( t \) in secs. The separation between two adjacent modes is

(1) 3 cm (2) 1.5 cm
(3) 6 cm (4) 4 cm

125. When a body is charged by induction, then the body

(1) becomes neutral
(2) does not lose any charge
(3) loses whole of the charge on it
(4) loses part of the charge on it
126. Force between two charges separated by a certain distance in air is $F$. If each charge were doubled and distance between them also doubled, force would be

(1) $F$  
(2) $2F$  
(3) $4F$  
(4) $F/4$

127. If charge $q$ is placed at the centre of the line joining two equal charge $Q$. The system of three charges will be in equilibrium if $q$ is

(1) $-\frac{Q}{2}$  
(2) $-\frac{Q}{4}$  
(3) $-4q$  
(4) $+\frac{Q}{2}$

128. Potential energy of equal positive charge $1 \mu C$ held $1$ m apart in air is

(1) $9 \times 10^{-3}$ J  
(2) $0$  
(3) $9 \times 10^{-3}$ eV  
(4) $1$ J

129. Two spheres of Radii $R_1$ and $R_2$ respectively are charged and joined by a wire. The ratio of electric field of sphere is

(1) $\left(\frac{R_2}{R_1}\right)^2$  
(2) $\left(\frac{R_1}{R_2}\right)^2$  
(3) $\left(\frac{R_2}{R_1}\right)$  
(4) $\left(\frac{R_1}{R_2}\right)$
130. The electric potential $V$ is given as a function of distance $x$ (meter) by $V = 5x^2 + 10x - 4$ volt. Value of electric field at $x = 1$ m is

(1) $-23 \frac{V}{m}$ (2) $11 \frac{V}{m}$
(3) $6 \frac{V}{m}$ (4) $-20 \frac{V}{m}$

131. A charge is placed at the centre of a cube, the flux emitted through its one face is

(1) $\frac{Q}{\varepsilon_0}$ (2) $\frac{Q}{2 \varepsilon_0}$
(3) $\frac{Q}{6 \varepsilon_0}$ (4) $\frac{Q}{12 \varepsilon_0}$

132. The resultant capacitance between the points A and B in fig.

(1) 15 $\mu$F (2) 30 $\mu$F
(3) 60 $\mu$F (4) 45 $\mu$F

133. A current of 5A exists in a 10$\Omega$ resistance for 4 minutes. How many coulombs pass through any cross section of the resistor in this time

(1) 12 C (2) 120 C
(3) 1200 C (4) 12000 C

134. The resistance of a wire is $R \Omega$. The wire is stretched to double its length keeping volume constant. Now the resistance of the
135. The resistance of platinum wire has 10Ω at 0°C and 20Ω at 273°C. The value of temperature coefficient of platinum is

\[
\frac{1}{273}K^{-1}, 273K
\]

\[
\frac{1}{293}K^{-1}, 273°C
\]

135. किसी प्लेटिनम तार का प्रतिरोध क्रमशः 0°C तथा 273°C पर 10Ω तथा 20Ω है तो प्रतिरोध ताप गुणांक कितना होगा

\[
\frac{1}{273}K^{-1}, 273K
\]

\[
\frac{1}{293}K^{-1}, 273°C
\]

136. The figure shows current in a part of an electric circuit, then current I is

\[
(1) \ 1.7 \ A \quad (2) \ 3.7 \ A
\]

\[
(3) \ 1.3 \ A \quad (4) \ 1.0 \ A
\]

137. A wire has a resistance 12Ω. It is bent in the form of a circle. The effective resistance between two points on any diameter is

\[
(1) \ 6 \ \Omega \quad (2) \ 3 \ \Omega
\]

\[
(3) \ 12 \ \Omega \quad (4) \ 24 \ \Omega
\]

138. Two electric bulbs whose resistances are in the ratio 1 : 3 are connected in parallel to a constant voltage source. The powers dissipated in them have the ratio

\[
(1) \ 1 : 3 \quad (2) \ 1 : 1
\]

\[
(3) \ 3 : 1 \quad (4) \ 1 : 9
\]

139. The orbital speed of electron orbiting around a nucleus in a circular orbit of radius \(50 \times 10^{-12} \ m\) in \(2.2 \times 10^6 \ m/s\). Then the magnetic dipole moment of an
140. Cyclotron employs
(1) gas at low pressure
(2) low frequency electric field
(3) high frequency electric field
(4) gas at high pressure

141. A magnetic dipole is placed at right angles to the direction of lines of force of magnetic induction $B$. If it is rotated through an angle of $180^\circ$ then the work done is
(1) $MB$  
(2) $2MB$  
(3) $-2MB$  
(4) zero

142. If a diamagnetic substance is brought near north or south pole of a bar magnet it is
(1) attracted by poles  
(2) repelled by poles  
(3) repelled by north pole and attracted by south pole  
(4) attracted by north pole and repelled by south pole

143. An e.m.f. of 5V is produced in a coil when current changes at a steady rate from 3A to 2A in one millisecond. The value of self-inductance is
(1) $5 \times 10^2 H$  
(2) 5 H

electron is
(1) $1.6 \times 10^{-19} Am^2$  
(2) $5.3 \times 10^{-21} Am^2$  
(3) $8.8 \times 10^{-24} Am^2$  
(4) $8.8 \times 10^{-26} Am^2$
144. किसी प्रत्यावर्ती परिपथ में भासा
\[ i = 5 \sin \left( 100t - \frac{\pi}{2} \right) \] एम्प्यर तथा विभव
\[ v = 200 \sin(100t) \] वोल्ट हो, तो शक्ति का मान होगा
(1) 20 वॉट (2) 40 वॉट (3) 1000 वॉट (4) शून्य वॉट

145. तीन तरंगदैर्घ्य क्रमशः \( 10^{-7} \text{m} \), \( 10^{-10} \text{m} \) तथा \( 10^{-7} \text{m} \) के हैं तो उनके नाम क्या हो सकते हैं?
(1) रेडियो तरंग, x-तरंग, प्रत्यक्ष तरंग
(2) x-तरंग, प्रत्यक्ष तरंग, रेडियो तरंग
(3) x-तरंग, γ-तरंग, प्रत्यक्ष तरंग
(4) प्रत्यक्ष तरंग, γ-तरंग, x-तरंग

146. यदि किसी प्रकाश तरंग को परावर्तन करके धुरिया जाता है तो परावर्तित तथा अपरावर्तित किरण के बीच कोण होगा?
(1) 180° (2) 90° (3) 45° (4) 36°

147. किसी प्रिज्म जिसका अभ्रोधितात्मक 1.5 है तो उसके न्यूनतम विकल्प कोण का मान उसके प्रिज्म कोण के बराबर है। तो प्रिज्म कोण कितना होगा? (दिया है : \( \cos 41° = 0.75 \))
(1) 82° (2) 41° (3) 82° (4) 31°

148. यदि धातु की कार्य फलन 3 ev हो तो उसकी केंद्रीय तरंगदैर्घ्य होगा?
(1) 4133 A° (2) 4000 A° (3) 4500 A° (4) 5000 A°
149. The ground state energy of H-atom is 13.6 ev. The energy needed to ionize H-atom from its second excited state

(1) 1.51 ev  (2) 3.4 ev  
(3) 13.6 ev  (4) 12.1 ev

150. The following configuration of gate is equivalent to

(1) NAND  
(2) XOR  
(3) OR  
(4) none of these