Guess paper Annual 2022

پنجاب کے تمام بورڈ کے لیے

Key to Success
AL-QADIR
JINNAH SCIENCE ACADEMY

کامیابی کا تعویذ

تالیف
محمد قدیر رفیق

صرف پندرہ دن کے اندر بورڈ امتحان کی مکمل تیاری کریں

PHYSICS

FOR INTER PART-I

اب فیل ہونا بھول جائیں

☆ پیپر Setter کے ذہن کو مد نظر رکھ کر تیار کیے گئے سوالات

☆ یاد رکھیں! اب وقت انتہائی کم رہ گیا ہے۔

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PHYSICS MULTIPLE CHOICE QUESTIONS

For

I n t e r P a r t-I

It challenge that you can get 17/17 marks in Annual 2022

1. The dimension of $\sqrt{\frac{l}{g}}$ is same as that of:

(A) Time **(B)** Energy **(C)** Velocity **(D)** Force

2. SI unit of plane angle is:

(A) Radian **(B)** Degree **(C)** Steradiam **(D)** Revolution

3.
A student is calculating the area of a sheet shoes lengthy and width are 27.9cm and 21.6cm respectively. The correct answer will be:

(A) 602.64cm^2 **(B)** 602.6 cm^2 **(C)** 602 cm^2 **(D)** 603 cm^2

4. Which is not base unit in SI units?

(A) Kilogram **(B)** Joule **(C)** Ampere **(D)** Kelvin

5.
Which of the following is the correct record for the diameter of a wire when measured with a screw gauge of least count of 0.001cm?

(A) 2.3cm **(B)** 2.31 cm **(C)** 2.312 cm **(D)** 2.3124 cm

6. The ratio of 1 nanometer to 1 attometer is:

(A) 10^9 **(B)** 10^8 **(C)** 10^{-9} **(D)** 10^{-8}

7. SI unit of intensity of light is:

(A) Ampere **(B)** Mole **(C)** Candela **(D)** Joule

8. The sum of three numbers, 2.7543, 4.10 and 1.273, up-to correct decimal place is:

(A) 8.12 **(B)** 8.13 **(C)** 8.1273 **(D)** 8.127

9. One light year is equal to:

(A) 9.5x10^{-15} m **(B)** 9.5x10^{15} m **(C)** 9.5x10^{15} cm **(D)** 9.5x10^{15} km

10. The dimension of density are:

(A) [M^{2}L^{-2}] **(B)** [M^{2}L^{-2}] **(C)** [ML^{-3}] **(D)** None of these

11. 1 tera = …….:

(A) 10^{15} (B) 10^{18} (C) 10^{12} (D) 10^{-12}

12. $Kgm^{-1}s^{-1}$ is the unit of:

(A) Force (B) Work (C) Pressure (D) Momentum

13.
The percentage uncertainty in radius of a sphere is 2%. The total percentage uncertainty in the volume of sphere is:

(A) 2% (B) 4% (C) 6% (D) 8%

14. Zero error of the instrument is a type of:

(A) Systematic error (B) Classified error (C) Personal error (D) Random error

15. Significant figures in 0.0004813 are:

(A) 8 (B) 7 (C) 4 (D) 3

16. If we round of 64.34546 up to three significant figures, the best answer is:

(A) 64.3 (B) 64.4 (C) 64.5 (D) 64.6

17. The absolute uncertainty for vernier callipers of L.C = 0.01cm is:

(A) 0.1mm (B) 0.001 m (C) 0.001cm (D) 0.001mm

18. The dimensions of force or centripetal force is:

(A) $[ML^{-2}T^{2}]$ (B) $[MLT^{-1}]$ (C) $[MLT^{-2}]$ (D) $[ML^{2}T^{2}]$

19. Dimensions of coefficient of viscosity are:

(A) $[MLT^{-1}]$ (B) $[ML^{-1}T^{-1}]$ (C) $[ML^{-1}T^{-2}]$ (D) $[M^{-1}L^{-1}T^{-1}]$

20. The dimension of the relation $\sqrt{\frac{F \times l}{m}}$ are equal to the dimension of :

(A) Force (B) Momentum (C) Acceleration (D) Velocity

21. In the light of Einstein's famous equation $E=mc^2$, the energy for mass 2 kg is equal to:

(A) $3x10^{8}$ joule (B) $9x10^{16}$ joule (C) $4x10^{16}$ joule (D) $18x10^{16}$ joule

22. In 5.47x19.89 = 108.7983 : answer should be written as:

(A) 108.8 (B) 108.9 (C) 109 (D) 108.79

23. Error in the measurement of radius of sphere is 1%. The error in the calculated value of its volume is:

(A) 7% (B) 5% (C) 3% (D) 1%

24. Position vector of a point P(a,b,c) in YZ- plane is given by:

(A) $\vec{r} = a\hat{i} + b\hat{j}$ (B) $\vec{r} = a\hat{i} + c\hat{k}$ (C) $\vec{r} = b\hat{j} + c\hat{k}$ (D) $\vec{r} = a\hat{i} + b\hat{j} + c\hat{k}$

25. The complete requirements for a body to be in equilibrium is:

(A) $\sum F = 0$ (B) $\sum Q = 0$ (C) $\sum P = 0$ (D) $\sum F = 0, \sum t = 0$

26. If A_x, and A_y both are negative, the resultant vector will lies in:

(A) First quadrant **(B)** Second quadrant **(C)** Third quadrant **(D)** Fourth quadrant

27. The resultant of two forces 30 N and 40 N acting parallel to each other is:

(A) 30N **(B)** 40N **(C)** 70N **(D)** 10N

28. If R_x is positive and R_y is negative, then resultant vector lies in:

(A) 1st quadrant **(B)** 2nd quadrant **(C)** 3rd quadrant **(D)** 4th quadrant

29. The resultant of two forces 3N and 4N acting at right angle to each other is:

(A) 5N **(B)** 6 N **(C)** 1 N **(D)** 7 N

30. If a vector of magnitude 10N is along y-axis then its component along x-axis is:

(A) 0N **(B)** 5 N **(C)** 8.66 N **(D)** 10 N

31. If r=5m and F=4N are along same direction, then torque is:

(A) 20 Nm **(B)** 5 Nm **(C)** 10 Nm **(D)** zero

32. The first condition of equilibrium implies that:

(A) $\sum F = 0$ **(B)** $\sum F_x = 0$ **(C)** $\sum F_y = 0$ **(D)** $\sum F_x = \sum F_y$

33. A force for 100N makes an angle of 60º with y-axis, its horizontal component is:

(A) 50N **(B)** 60 N **(C)** 70.7 N **(D)** 86.6 N

34. The magnitude of $\hat{i} \times \hat{j}$ is equal to:

(A) 1 **(B)** $\hat{K}$ **(C)** $-\hat{K}$ **(D)** Zero

35. Maximum height of projectile:

(A) $h = \frac{vi^2 \sin^2\theta}{2g}$ **(B)** $h = \frac{vi^2 \sin^2\theta}{g}$ **(C)** $h = \frac{vi^2}{g}$ **(D)** $h = \frac{vi^2}{g}\sin^2\theta$

36. The shape of trajectory of short rang projectile is:

(A) Straight line **(B)** Circle **(C)** Elliptical **(D)** Parabolic

37. The maximum horizontal range of a projectile is given by:

(A) $\frac{vi^2}{g}$ **(B)** $\frac{vi^2}{2g}$ **(C)** $\frac{2v_1}{g}$ **(D)** $\frac{2{v_1}^2}{g}$

38. When average velocity becomes equal to instantaneous then it is called moving with:

(A) Instantaneous acceleration **(B)** Constant acceleration **(C)** Constant velocity **(D)** Variable velocity

39. For which pair the horizontal ranges of a projectile is same:

(A) (30º,45º) **(B)** (70º,50º) **(C)** (20º,40º) **(D)** (30º,60º)

40. When the body moves with constant acceleration, the velocity time-graph is:

(A) Parabola (B) Hyperbola (C) Straight line (D) Curve

41. The area between velocity-time graph and the time axis is numerically equal to:

(A) Speed of object (B) Distance covered by the object (C) Average velocity of the object (D) Acceleration of the object

42. Velocity of an object dropped from a building at any instant "t" is given by:

(A) $\frac{1}{2}gt^2$ (B) $v_i t \frac{1}{2}gt^2$ (C) At (D) gt

43. The distance covered by a body in time "t" starting rest is:

(A) at^2 (B) v^2t (C) $a^2\frac{1}{2}$ (D) $\frac{at^2}{2}$

44. An object of mass 1kg moving with acceleration of $1ms^{-2}$ will experience a force of:

(A) $10^{-2}N$ (B) $10^{-3}N$ (C) 1N (D) 1 dyne

45. Inertia may expressed in:

(A) Kg (B) Newton (C) Watt (D) Joule

46. Which formula is true?

(A) $m = \frac{a}{F}$ (B) $F = \frac{m}{a}$ (C) $a = \frac{F}{m}$ (D) $a = \frac{m}{F}$

47. SI unit of linear momentum is:

(A) Kg m^2s^{-1} (B) Kg m^2s^{-2} (C) Kg $m^{-1}s^{-1}$ (D) Kg ms^{-1}

48. The dimensional of impulse is:

(A) [MLT] (B) $[MLT^{-1}]$ (C) $[ML^{-1}T^{-1}]$ (D) $[M^{-1}L^{-1}T^{-1}]$

49. Impulse can be defined as:

(A) $\vec{I} = \vec{F} \times \vec{d}$ (B) $\vec{I} = \vec{F} \times t$ (C) $\vec{I} = \vec{F} \times v$ (D) $\vec{I} = \frac{F}{t}$

50. A force of 10N acts on a body of mass 1kg for 5sec to a distance of 10m. the rate of change of momentum is:

(A) 50N (B) 25 N (C) 20 N (D) 10 N

51. If the slope of the velocity-time graph remain constant then body is moving with:

(A) Uniform velocity (B) Negative variable acceleration (C) Variable acceleration (D) Uniform acceleration

52. A typical rocket consumes about $10{,}000kgs^{-1}$ of fuel and ejects the burnt gases at speeds of over:

(A) $2000ms^{-1}$ (B) $3000\ ms^{-1}$ (C) $4000\ ms^{-1}$ (D) $5000\ ms^{-1}$

53. When the projectile reaches the highest point of trajectory, the vertical component of velocity becomes:

(A) Small (B) Maximum (C) Vicose (D) Zero

54. The horizontal component of velocity of projectile:

(A) Increases (B) Decreases (C) Remains same (D) Decreases and then increases

55. The range of projectile is same for the angle of projection is:

(A) 30 ^{o} & 45 ^{o} (B) 50 ^{o} & 30 ^{o} (C) 20 ^{o} & 60 ^{o} (D) 30 ^{o} & 60 ^{o}

56. Total time of flight of projection is given as:

(A) $\frac{v_1 \sin\theta}{g}$ (B) $\frac{2v_1 \sin\theta}{g}$ (C) $\frac{v_1 \sin\theta}{2g}$ (D) $\frac{2v_1 \sin^2\theta}{2g}$

57. The range of projectile is same for:

(A) 0^o , 45 ^{o} (B) 35^o , 55 ^{o} (C) 15^o , 60 ^{o} (D) 30^o , 75 ^{o}

58. The angle of projection for which its maximum height and horizontal range are equal:

(A) 46^o (B) 56 ^{o} (C) 66 ^{o} (D) 76 ^{o}

59. The Ballistic missiles are used only for:

(A) Long range (B) Short range (C) Medium range (D) Constant range

60. The horizontal range of projectile at 30 ^{o} with horizontal is same at an angle of:

(A) 40 ^{o} (B) 45 ^{o} (C) 90 ^{o} (D) 60 ^{o}

61. Which shows correct relation between H and T of projectile:

(A) $H = \frac{gT^2}{8}$ (B) $H = \frac{8T^2}{g}$ (C) $H = \frac{8g}{T^2}$ (D) $H = \frac{8}{8T^2}$

62. A hose pipe ejects water at speed of 0.3ms^{-1} through a hole of area 10cm^2, flow rate will be:

(A) 3m^{3}s^{-1} (B) 3x10^{-4}m^{3}s^{-1} (C) 30m^{3}s^{-1} (D) 0.03m^{3}s^{-1}

63. The maximum range of a projectile is 100 km. take g= 10ms^{-2}. The initial velocity of the projectile will be:

(A) 1000 kms (B) 1 kms^{-1} (C) 10 kms^{-1} (D) 100 kms^{-1}

64. Distance covered by a freely falling body in 2 seconds will be:

(A) 9.8m (B) 19.2 m (C) 19.4 m (D) 19.6 m

65. Work done will be maximum when angle between $\vec{F}$ and $\vec{d}$ is:

(A) 180^o (B) 90 ^{o} (C) 60 ^{o} (D) 0 ^{o}

66. The power needed to lift a mass of 5000 g to height of 1m in 2 seconds is:

(A) 2.45 watt (B) 24.5 watt (C) 245 watt (D) 2.45 watt

67. The unit of work in base unit is:

(A) Kg m^{-1}sec^{-2} (B) Kg m^{2}sec^2 (C) Kg m^{2}sec^{-2} (D) Kgm^{-1}sec^{-1}

68. The dimension of power is:

(A) [MLT^{-1}] (B) [ML^{2}T^{-2}] (C) [ML^{2}T^{-2}] (D) [ML^{2}T^{-3}]

69. Which one is a conservative force:

(A) Elastic spring force **(B)** Frictional force **(C)** Air resistance **(D)** Tension in the spring

70. The ratio maximum orbital velocity and escape velocity is:

(A) 1:$\sqrt{2}$ **(B)** 2:1 **(C)** 72:1 **(D)** 4:1

71. Original source of energy for biomass is:

(A) Earth **(B)** Moon **(C)** Sun **(D)** Star

72. Which one is non-renewable source of energy?

(A) Wind **(B)** Biomass **(C)** Coal **(D)** Sunlight

73. The escape velocity can be determined by relation:

(A) V_{esc}=gR **(B)** V_{esc}=2gR **(C)** $V_{esc}=\sqrt{gR}$ **(D)** $V_{esc}=\sqrt{2gR}$

74. The unit of solar light inversely is:

(A) Watt **(B)** kWm^{-2} **(C)** Watt kWm^{-2} **(D)** $j.m^2$

75.A layer of rock holding water that allows water to percolate through it with pressure is called:

(A) Geyser **(B)** Aquifer **(C)** Steamvent **(D)** Hot spring

76. Hot igneous rocks usually in molten or partly molten state are found in the depth of:

(A) 5 km **(B)** 10 km **(C)** 15 km **(D)** 20 km

77. Identify the non-conservative force among the following:

(A) Air resistance **(B)** Gravitational force **(C)** Elastic spring force **(D)** Electric force

78. The dimensions of angular velocity are:

(A) $[LT^{-1}]$ **(B)** $[LT^{-2}]$ **(C)** $[T^{-1}]$ **(D)** $[L^{-1}T^{-1}]$

79. One radian is equal to:

(A) 2 π rev **(B)** $\frac{\pi}{4}$ rev **(C)** $\frac{\pi}{2}$ rec **(D)** $\frac{1}{2\pi}$ rev

80.100 radians are equal to:

(A) 57.3^o **(B)** 573^o **(C)** 5730^o **(D)** 5.73^o

81. The law of gravitation was introduced by:

(A) Huygen **(B)** Boyle **(C)** Newton **(D)** Pascal

82.1 rev / min is equal to:

(A) $\frac{\pi}{6} rad\, s^{-1}$ **(B)** $\frac{\pi}{15} rad\, s^{-1}$ **(C)** $\frac{\pi}{20} rad\, s^{-1}$ **(D)** $\frac{\pi}{30} rad\, s^{-1}$

83. Angular acceleration is produced by:

(A) Power **(B)** Torque **(C)** Pressure **(D)** Force

84.A body starting from rest attains angular acceleration of S rad s^{-2} in 2 second. Final angular velocity will be:

(A) $10\,rad\,s^{-1}$ (B) $7\,rad\,s^{-1}$ (C) $3\,rad\,s^{-1}$ (D) $2\,rad\,s^{-1}$

85. Relation between escape velocity 'V_{esc}' and orbital velocity '$vesc_o$' is:

(A) $V_{esc} = \frac{1}{2}V_o$ (B) $V_{esc} = \sqrt{2V_o}$ (C) $V_{esc} = V_o$ (D) $V_{esc} = 2V_o$

86. An orbital speed of a satellite can be determined by the equation:

(A) $\sqrt{2gR}$ (B) $\sqrt{\frac{2GM}{R}}$ (C) $\sqrt{gR}$ (D) $\sqrt{\frac{GM}{R}}$

87. Orbital velocity near surface of earth is given by:

(A) $\sqrt{2gR}$ (B) $\sqrt{gR}$ (C) $\sqrt{\frac{2g}{R}}$ (D) $\sqrt{\frac{g}{R}}$

88. The frequency of rotation of a spaceship about its own axis to create artificial gravity like that on earth is:

(A) $f = 2\pi\sqrt{\frac{g}{R}}$ (B) $f = \frac{1}{2}\pi\sqrt{\frac{g}{R}}$ (C) $f = \frac{1}{2}\pi\sqrt{\frac{g}{R^2}}$ (D) $f = \frac{1}{2}\pi\sqrt{\frac{R}{g}}$

89. The angular speed of a fly wheel making 120 revolutions per minute is:

(A) $2\pi\,rad\,s^{-1}$ (B) $120\,rad\,s^{-1}$ (C) $\pi\,rad\,s^{-1}$ (D) $4\,rad\,s^{-1}$

90. The magnitude of centripetal force on a mass 'm' moving with angular speed 'm' in a circle of radius r is:

(A) $mr^2\omega$ (B) $\frac{m\omega^2}{r}$ (C) $mr\,\omega^2$ (D) $mr^2\,\omega^2$

91. Which of the following is not directing along the fixed axis of rotation?

(A) Angular displacement (B) Angular momentum (C) Centripetal acceleration (D) Angular acceleration

92. Moment of inertia?

(A) mr^2 (B) $1/2\ mr^2$ (C) $2/5\ mr^2$ (D) $1/12mr^2$

93.
If linear velocity and radius are both made to half of a body moving around a circle. There its centripetal force becomes:

(A) F_c (B) $\frac{F_c}{2}$ (C) $\frac{F_c}{4}$ (D) $2F_c$

94. The value of angular momentum is maximum when θ is:

(A) 90^o (B) 60^o (C) 45^o (D) 0^o

95. The angular momentum L is given by:

(A) $\vec{r} \times \vec{p}$ (B) $\vec{L} \times \vec{r}$ (C) $\vec{r} \times \vec{F}$ (D) $\vec{F} \times \vec{p}$

96. Momentum of inertia of rod is:

(A) $I = \frac{1}{12}mL^2$ (B) $I = \frac{2}{5}mL^2$ (C) $I = \frac{1}{12}m^2L$ (D) None of these

97. In rotational motion, the torque is equal to rate of change of:

(A) Angular velocity (B) Linear momentum (C) Angular momentum (D) Angular momentum

98. The SI unit of angular momentum is:

(A) Kg m^2s^{-1} (B) Kg m^2s^{-2} (C) Kg^2 ms^{-1} (D) Kg ms^{-1}

99. The rotational kinetic energy of a solid sphere is:

(A) $\frac{2}{5}mr^2\omega^2$ (B) $\frac{2}{5}mv^2$ (C) $\frac{1}{2}I\omega^2$ (D) $\frac{1}{2}I\omega^2$

100. The rotational K.E of a hoop of mass "m" moving down frictionless inclined plane with velocity "v" will be:

(A) $\frac{1}{4}mv^2$ (B) $\frac{1}{2}mv^2$ (C) $\frac{3}{4}mv^2$ (D) mv^2

101. Speed of a hoop at the bottom of inclined plane is:

(A) $\sqrt{gh}$ (B) $\sqrt{2gh}$ (C) $\sqrt{\frac{4}{3}gh}$ (D) $\sqrt{4gh}$

102. The rotational K.E of a hoop of radius V is:

(A) $\frac{1}{4}mr^2\omega^2$ (B) $\frac{1}{2}mr^2\omega^2$ (C) $mr^2\omega^2$ (D) $\frac{1}{2}r^2\omega^2$

103. The ratio of velocity of disc to velocity of hoop is:

(A) $\frac{2}{\sqrt{3}}$ (B) $\frac{4}{\sqrt{3}}$ (C) $\frac{2}{3}$ (D) $\frac{4}{3}$

104. The value of a time period of a low flying satellite is:

(A) 1 year (B) 84 minutes (C) 28 hours (D) 1 day

105.A man of 1 kg is free falling. The force of gravity is:

(A) 1N (B) 9.8 N (C) 0.5 N (D) Zero

106. Apparent weight of a man in upward accelerated lift will:

(A) Increases (B) Decreases (C) Remain same (D) Increase then decrease

107. The formula for speed of satellite orbiting around the Earth is:

(A) $V = \sqrt{2gr}$ (B) $V = \sqrt{2gR}$ (C) $V = \sqrt{gR}$ (D) $V = \sqrt{\frac{gR}{M}}$

108.A man of mass 5kg is falling freely, the force acting on it will be:

(A) 5N (B) 9.8 N (C) 19.6 N (D) Zero

109. The expression for the orbital velocity of satellite is given by:

(A) $v = \sqrt{GMr}$ (B) $v = \sqrt{GM}$ (C) $v = \sqrt{\frac{GM}{r}}$ (D) $v = \sqrt{\frac{r}{GM}}$

110. The expression for the time period of low flying satellite put into the orbit is:

(A) $T = \frac{2\pi R}{g}$ (B) $T = \frac{2\pi R}{G}$ (C) $T = \frac{2\pi R}{R}$ (D) $T = \frac{2\pi R}{v}$

111. The period of revolution of a geostationary satellites is:

(A) 1 hour (B) 48 min (C) 1 day (D) 1 month

112. The ratio of angular frequency and linear frequency is:

(A) 2π (B) π (C) $\frac{1}{2\pi}$ (D) $\frac{\pi}{2}$

113. Error in the measurement of radius of sphere is 1%. The error in the calculated value of its area is:

(A) 1% (B) 2% (C) 3% (D) 4%

114. The linear velocity of a disc when it reaches the bottom of an inclined plane of height "h" is:

(A) $\sqrt{gh}$ (B) $\sqrt{\frac{4}{3}gh}$ (C) $\sqrt{\frac{2}{3}gh}$ (D) $\sqrt{\frac{1}{3}gh}$

115. How many closed orbiting satellites form the Global positioning system?

(A) 3 (B) 12 (C) 24 (D) 22

116. If the radius of Earth is increased to four times of the present. Critical velocity v_o becomes:

(A) $\frac{V_o}{\sqrt{2}}$ (B) $\sqrt{2}V_o$ (C) $2V_o$ (D) $\frac{1}{2}Vo$

117. A body is rotated in a vertical circle by a string. The tension in the string is minimum at the:

(A) Top (B) Bottom (C) Mid position between top and bottom (D) Remain same

118. A man weight 1000N in a stationary lift. If the lift moves up with an acceleration of $10m/s^2$, then its weight becomes:

(A) 1000N (B) 2000 N (C) 3000 N (D) 0 N

119. The law of conservation of mass gives:

(A) Bernoulli's (B) Venture relation (C) Torricelli's theorem (D) Equation of continuity

120. Stoke's law holds for bodies having:

(A) Spherical shape (B) Oblong shape (C) Rectangular shape (D) All shapes

121. The SI units of flow rate are:

(A) m^2s^{-1} (B) m^3s^{-2} (C) m^3s^{-1} (D) m^2s^{-2}

122. The unit of coefficient of viscosity n SI system is:

(A) $Kg^{-1}ms^{-1}$ (B) $Kg\ m^{-1}s^{-1}$ (C) $Kg^{-1}\ m^{-1}s$ (D) $Kg\ ms^{-1}$

123. When a body acquires terminal velocity then its acceleration "a" becomes:

(A) a=0 (B) a=g (C) a>0 (D) a<0

124. Which material has maximum viscosity?

(A) Glycerin (B) Plasma (C) Methanol (D) Water

125. If the stream lines of fluid are forced closer together then:

(A) Speed of fluid increases (B) Speed of fluid decreases (C) Pressure of fluid increases (D) Speed of fluid remain same

126.

The ratio of the velocities of water in a pipe lying horizontally at two ends is 1:4 the ratio of diameters of pipe at these two ends is:

(A) 1:2 (B) 2:1 (C) 1:4 (D) 4:1

127. The mathematical relation $V_2 = \sqrt{2g(h_1 - h_2)}$ is known as:

(A) Equation of continuity (B) Bernoulli's equation (C) Torricelli's theorem (D) Ventri relation

128. Venturi relation is given as:

(A) $P = \frac{1}{2}P^2V^2$ (B) $P_1 - P_2 = \frac{1}{2}P_2^2$ (C) $P_1 - P_2 = \frac{1}{2}Sv_1^2 - \frac{1}{2}lv_2^2$ (D) $V_2 = \sqrt{2g(h_1 - h_2)}$

129. The dimensions of gh has same as that of:

(A) Work (B) Energy (C) Pressure (D) Mass

130. The relation between time period and frequency is:

(A) $f = 2\pi T$ (B) $f = \frac{1}{2\pi T}$ (C) $f = \frac{T}{2\pi}$ (D) $fT = 1$

131. The mathematical expression for the restoring force is:

(A) $F = kx$ (B) $F = ma$ (C) $F = \frac{dp}{dt}$ (D) $F = -kx$

132. A quantity which indicates the state and direction of a vibrating body is known as:

(A) Time period (B) Amplitude (C) Phase (D) Frequency

133. The expression for frequency of a mass "m" attached to a spring of spring constant k is:

(A) $2\pi\sqrt{\frac{k}{m}}$ (B) $2\pi\sqrt{\frac{m}{k}}$ (C) $\frac{1}{2\pi}\sqrt{\frac{k}{m}}$ (D) $\frac{1}{2\pi}\sqrt{\frac{m}{k}}$

134. A spring has a spring constant k. if it is cut in two equal parts, the spring constant of each part will be:

(A) K (B) 2K (C) $\frac{k}{2}$ (D) 4k

135. The length of simple pendulum of time period 1 second is:

(A) 2m (B) 1 m (C) 0.5 m (D) 0.25 m

136. The frequency of simple pendulum is given by:

(A) $\frac{1}{2\pi}\sqrt{\frac{g}{l}}$ (B) $2\pi\sqrt{\frac{g}{l}}$ (C) $\frac{1}{2\pi}\sqrt{\frac{l}{g}}$ (D) $2\pi\sqrt{\frac{l}{g}}$

137. Tuning of radio is example of:

(A) Mechanical resonance (B) Electrical resonance (C) Physical resonance (D) Biological resonance

138. If the tension of a stretched string is made four times then the velocity of wave:

(A) Remains same (B) Is halved (C) Becomes twice (D) Becomes 4 times

139. Time period of simple pendulum only depends on its:

(A) Mass (B) Amplitude (C) Density (D) Length

140. The speed of sound is greater in solid than gases due to their high:

(A) Density (B) Elasticity (C) Temperature (D) Oscillation

141. Maximum velocity in SHM is:

(A) $x_o\omega^2$ (B) $x_o\omega$ (C) $x\omega$ (D) $x_o^2\omega$

142. Beats can be heard when difference of frequencies is not more than:

(A) 8 Hz (B) 10 Hz (C) 2 Hz (D) 4 Hz

143. According to Laplace's correction, the formula for the speed of sound in air:

(A) $\sqrt{\frac{rp}{q}}$ (B) $\sqrt{\frac{e}{q}}$ (C) $\sqrt{\frac{p}{q}}$ (D) $\sqrt{\frac{rp}{q}}$

144. 10 waves pass through a point in 2 seconds with speed 10ms^{-1} the frequency of wave will be:

(A) 1 Hz (B) 2 Hz (C) 5 Hz (D) 10 Hz

145. When the amplitude of a wave is increases to double is energy?

(A) Remain the same (B) Increase by two times (C) Increases 4 times (D) Decreases by half

146. The distance covered by wave in 1 sec is:

(A) Wavelength (B) Wave number (C) Frequency (D) Wave speed

147. If 20 waves pass through a medium in 1 second with a speed 20 ms^{-1}, the wavelength is:

(A) 0.5m (B) 1 (C) 20m (D) 2m

148. Longitudinal waves of frequencies less than 20 Hz are known as:

(A) Infra sound (B) Ultra sound (C) Super sound (D) Audible sound

149. Crests and trough are formed in:

(A) Longitudinal waves (B) Transverse waves (C) Stationary waves (D) Compression waves

150. According to Newton's formula, the speed of sound in air at STP is:

(A) 332 ms^{-1} (B) 340 ms^{-1} (C) 350 ms^{-1} (D) 280 ms^{-1}

151. The velocity of sound at 0^{o}C is 332 ms^{-1}, the velocity of sound at 10^{o}C will be:

(A) 337.1 ms^{-1} (B) 338.1 ms^{-1} (C) 342.1 ms^{-1} (D) 348.1 ms^{-1}

152. According to Laplace's correction, the formula for the speed of sound in air is:

(A) $\sqrt{\frac{\gamma p}{q}}$ (B) $\sqrt{\frac{E}{q}}$ (C) $\sqrt{\frac{P}{q}}$ (D) $\sqrt{\frac{rP}{q}}$

153. For a diatomic gas $Cv = \frac{5}{2}R$ then the value of γ for this gas will be:

(A) 1.67 (B) 1.29 (C) 1.45 (D) 1.40

154. Speed of sound in air is independent of:

(A) Density (B) Pressure (C) Humidity (D) Temperature

155. Newton's formula for velocity of sound in gas / air is related as under:

(A) $v = \frac{E}{\delta}$ (B) $v = \frac{E}{\delta}$ (C) $v = \sqrt{S\delta}$ (D) $v = S\delta$

156. The speed of sound is greater in solids due to their high:

(A) Density (B) Pressure (C) Temperature (D) Eleasticity

157. Increase in the velocity of sound in air for 1°C rise in temperature is:

(A) 61ms-1 (B) 0.61 ms-1 (C) 161 ms-1 (D) 261 ms-1

158. Velocity of sound in air is independent of:

(A) Temperature (B) Pressure (C) Density (D) Medium

159. In which medium the speed of sound is greater?

(A) Oxygen (B) Air (C) Water (D) Copper

160. Frequency range of hearing of cats is:

(A) 20-20000 Hz (B) 10-10000 Hz (C) 60-20000 Hz (D) 60-70000 Hz

161. Sound waves cannot be:

(A) Reflected (B) Refracted (C) Diffracted (D) Polarized

162. The speed of sound in air is 340 m /s. if the pressure of air is doubled then the speed becomes:

(A) Double (B) Half (C) Four times (D) Remains same

163. Speed of sound in aluminum at 20°C is:

(A) 3600 m /s (B) 5100 m /s (C) 5130 m /s (D) 5500 m /s

164. The velocity of sound is maximum at 20°C in:

(A) Lead (B) Copper (C) Glass (D) iron

165. The path difference for constructive interference should be:

(A) $\frac{\lambda}{2}$ (B) $\frac{5\lambda}{2}$ (C) $\frac{m\lambda}{2}$ (D) $\frac{3\lambda}{2}$

166. Constructive interference of two coherent beams is obtained if path difference is:

(A) $\frac{n\lambda}{2}$ (B) $\frac{n\lambda}{4}$ (C) $\frac{n(3\lambda)}{4}$ (D) $n\lambda$

167. When two identical waves superimposed, which can change?

(A) Wavelength (B) Frequency (C) Velocity (D) Amplitude

168.
Two waves having same frequency and travelling in the same direction superimpose each other and corresponding phenomenon is called:

(A) Interference (B) Beats (C) Doppler effect (D) Stationary waves

169.
Two tuning forks of frequencies 260 Hz and 256 Hz are sounded together, the number of beats per second is:

(A) 4 (B) 258 (C) 2 (D) 516

170. On loading the prong of a tuning fork with wax, the frequency of sound:

(A) Increases **(B)** Decreases **(C)** Remain same **(D)** First increases than decreases

171. Beats can be heard when difference of frequency is not more than:

(A) 8 Hz **(B)** 10 Hz **(C)** 4 Hz **(D)** 6 Hz

172. Beats cannot be heard if the difference of frequency is more than:

(A) 7 Hz **(B)** 10 Hz **(C)** 5 Hz **(D)** 20 Hz

173.
When two notes of frequencies f_1 and f_2 are sounded together, beats are formed. If $f_1 > f_2$ what will be the beat frequency?

(A) $f_1 + f_2$ **(B)** $\frac{1}{2}(f_1 + f_2)$ **(C)** $f_1 - f_2$ **(D)** $\frac{1}{2}(f_1 - f_2)$

174. Beats detectable easily upto frequency difference between two sound is:

(A) 2 Hz **(B)** 6 Hz **(C)** 10 Hz **(D)** 32 Hz

175. On reflection from denser medium light wave undergoes a phase change of:

(A) $\pi\ rad$ **(B)** $\frac{\pi}{2}\ rad$ **(C)** $\frac{3\pi}{2}\ rad$ **(D)** $2\pi\ rad$

176. When two identical waves move in the opposite direction, the given rise to:

(A) Stationary waves **(B)** Beats **(C)** Constructive interference **(D)** Destructive interference

177. When wave is reflected from the boundary of denser medium then phase of wave changes by:

(A) 0^o **(B)** 90^o **(C)** 180^o **(D)** 27^o

178. The distance between consecutive node and anti-node:

(A) λ **(B)** $\frac{\lambda}{2}$ **(C)** 2λ **(D)** $\frac{\lambda}{4}$

179. The distance between two consecutive nodes is:

(A) $\frac{\lambda}{2}$ **(B)** $\frac{\lambda}{4}$ **(C)** 2λ **(D)** λ

180. The number of nodes between two consecutive antinodes is/are:

(A) One **(B)** Two **(C)** Three **(D)** Four

181.
If a string is fixed at both ends vibrates in 'n' loops, then wavelength in term of length 'l' of strings is given by:

(A) $\frac{nl}{2}$ **(B)** $\frac{l}{2n}$ **(C)** $\frac{2l}{n}$ **(D)** $\frac{2l}{v}$

182. The distance between 1st node and 4th antinode is:

(A) $\frac{7}{4}\lambda$ **(B)** $\frac{5}{4}\lambda$ **(C)** $\frac{13}{4}\lambda$ **(D)** $\frac{11}{4}\lambda$

183. A set of frequencies which are multiples of the fundamental frequency are called:

(A) Doppler effect (B) Nodal frequencies (C) Beat frequencies (D) Harmonics

184.A stretched string 4m long and it has 4 loops of stationary waves, then the wavelength is:

(A) 1m (B) 2 m (C) 3 m (D) 4 m

185.A spring of length l fixed at both ends is vibrating in two segments, the wavelength of wave is:

(A) $\frac{l}{2}$ (B) l (C) $2l$ (D) $3l$

186.Stationary waves are generated on a string of length . If tension is increased, frequency of vibration will:

(A) Decrease (B) Unchanged (C) Half (D) Increase

187.Radar system is an application of:

(A) Chemical effect (B) Electrical effect (C) Magnetic effect (D) Doppler's effect

188.The wavelength of fundamental node of vibration of an open-end pipe is:

(A) 4l (B) 2l (C) l (D) $\frac{1}{4}I$

189.Wavelength of a wave for closed pipe having length 'l' in the fundamental mode is:

(A) 2l (B) $\frac{I}{2}$ (C) 4l (D) l

190.If the organ pipe is closed at one end, the frequency of fundamental harmonic is:

(A) $f_1 = \frac{v}{2I}$ (B) $f_1 = \frac{v}{4I}$ (C) $f_1 = \frac{4I}{v}$ (D) $f_1 = \frac{2I}{v}$

191.A set of frequencies which are multiple of the fundamental frequency are called:

(A) Doppler effect (B) Nodal frequencies (C) Beat frequencies (D) Harmonics

192.In sonar we use:

(A) Sound waves (B) Ultrasound waves (C) Radio waves (D) Microwaves

193.
When one end of organ pipe is closed, then the frequency of stationary waves of any harmonic in it is given by:

(A) $f_n = \frac{nv}{2l}$ (B) $f_n = \frac{nl}{4v}$ (C) $f_n = \frac{4v}{nl}$ (D) $f_n = \frac{nv}{4l}$

194.…… is correct relation:

(A) $\frac{v_1}{v_o} = \frac{\rho_o}{\rho_1}$ (B) $\frac{v_1}{v_o} = \frac{\rho_1}{\rho_o}$ (C) $\frac{v_1}{v_o} = \sqrt{\frac{\rho_1}{\rho_o}}$ (D) $\frac{v_1}{v_o} = \sqrt{\frac{\rho_o}{\rho_1}}$

195.Waves produced in organ pipes are:

(A) Transverse stationary waves (B) Transverse stationary waves (C) Electromagnetic waves (D) Matter waves

196.The distance between two consecutive troughs is called:

(A) Displacement (B) Amplitude (C) Wavelength (D) Wave-front

197.On reflection of longitudinal waves from denser medium, there will be phase change of:

(A) $\pi\, rad$ (B) $2\pi\, rad$ (C) Zero (D) $\frac{\pi}{2}\, rad$

198. The wave form of simple harmonic motion is:

(A) Sine wave (B) Cosine wave (C) Tangent wave (D) Saw tooth wave

199. In Michelson's experiment, the relation used to find the speed of light is:

(A) $C = 16\frac{f}{d}$ (B) $C = 16fd$ (C) $C = \frac{fd}{16}$ (D) $C = \frac{16d}{f}$

200. The process of confining the beam of light to vibrate in one plane is called:

(A) Interference (B) Diffraction (C) Polarization (D) Total internal reflection

201. Which phenomenon of light proves that light waves are transverse in nature?

(A) Refraction (B) Reflection (C) Diffraction (D) Polarization

202. In young's double slit experiment, the position of dark fringes is given by:

(A) $Ym = \frac{m\lambda L}{d}$ (B) $Ym = \frac{m\lambda d}{L}$ (C) $Ym = (m + \frac{1}{2})\frac{\lambda L}{d}$ (D) $Ym = (m + \frac{1}{2})\frac{\lambda d}{L}$

203. In Young's double slit experiment, the position for bright fringe is:

(A) $Y_m = \frac{m\lambda d}{L}$ (B) $Y_m = \frac{m\lambda}{Ld}$ (C) $Y_m = \frac{m\lambda L}{d}$ (D) $Y_m = \frac{mLd}{\lambda}$

204. Fringe spacing is equal to:

(A) $\frac{\lambda d}{L}$ (B) $\frac{\lambda L}{d}$ (C) $\frac{L}{\lambda d}$ (D) $\frac{m\lambda L}{d}$

205. The fringe spacing increases if we use:

(A) Red light (B) Blue light (C) Green light (D) Yellow light

206. Fringe spacing in Young's double slit experiment increases due to increase in:

(A) Slit separation (B) Wavelength (C) Order of fringe (D) Frequency of source

207. According to Huygen's Principle, each point on a wave front acts as a source of:

(A) Secondary wavelet (B) Primary wavelet (C) New wave front (D) Sound

208. The fringe spacing increases if we use:

(A) Red light (B) Blue light (C) Yellow light (D) Green light

209. The distance between two adjacent dark fringes is given as:

(A) $\Delta Y\frac{\lambda L}{d}$ (B) $\Delta Y\frac{m\lambda L}{d}$ (C) $\Delta Y = \left(m + \frac{1}{2}\right)\frac{L\lambda}{d}$ (D) $\Delta Y = \frac{\lambda d}{L}$

210. The center of Newton's rings is dark due to:

(A) Destructive interference (B) Diffraction (C) Constructive interference (D) Polarization

211. Newton's rings are formed as a result of:

(A) Interference (B) Dispersion (C) Diffraction (D) Polarization

212. Michelson's interferometer can be used to find the:

(A) Velocity of light (B) Wavelength of light (C) Velocity of sound (D) Wavelength of sound

213. In Michelson interferometer to switch the strings from bright to dark, the mirror should be displaced by:

(A) $\frac{\lambda}{4}$ (B) $\frac{\lambda}{3}$ (C) $\frac{\lambda}{2}$ (D) λ

214. Bending of light around the edges of an obstacle is called:

(A) Refraction (B) Polarization (C) Interference (D) Diffraction

215. A typical diffraction grating has certain number of lines per centimeter whose range is:

(A) 40 to 50 (B) 400 to 5000 (C) 400 to 500 (D) 4000 to 5000

216. If 'N' is number of lines ruled on the grating having length "L" then grating element 'd' is given by:

(A) N/L (B) 2N/L (C) L/N (D) N/2L

217. To distinguish between transverse and longitudinal wave is used:

(A) Refraction (B) Interference (C) Polarization (D) Diffraction

218. Wavelength of X-rays is of the order of:

(A) 10^{-8}m (B) 10^{-5}m (C) 10^{-10}m (D) 10^{-4}m

219. The wavelength of X-rays is of the order of:

(A) 10m (B) 10^{-10}m (C) 10^{-2}m (D) 10cm

220. Intensity of light depends on:

(A) Wavelength (B) Amplitude (C) Velocity (D) Frequency

221. A ray of light shows the direction of propagation of light. It is a line which is:

(A) Normal to the wave front (B) Parallel to wave front (C) Opposite to wave front (D) Equal to wave front

222. Light waves are:

(A) Longitudinal waves (B) Transverse waves (C) Stationary waves (D) Mechanical waves

223. A bat finding its correct location by sending:

(A) Matter waves (B) Ultrasonic waves (C) Infrasonic waves (D) Electromagnetic waves

224. In a Michelson interferometer by moving the mirror through a distance of $\lambda/4$. The path difference changes by:

(A) $\lambda/2$ (B) λ (C) $\lambda/4$ (D) 2λ

225. The locus of all points in the same phase of Vibration is called:

(A) Wave front (B) Interference (C) Diffraction (D) Polarization

226. The detector in Photo-phone is made up of:

(A) Cadmium (B) Germanium (C) Selenium (D) Silicon

227. The focal length of convex lens is:

(A) Negative (B) Positive (C) Large (D) Small

228. The least distance of distinct vision for the normal eye is:

(A) 15cm (B) 25cm (C) 125cm (D) 25m

229. Rayleigh formula for resolving power:

(A) $R = \frac{1.22\lambda}{D}$ (B) $R = \frac{1.22D}{\lambda}$ (C) $R = \frac{D}{1.22\lambda}$ (D) $R = \frac{\lambda}{1.22D}$

230. If the object is at 5cm from the lens of simple microscope than its magnifying power will be:

(A) 5 (B) 10 (C) 20 (D) 25

231.A convex lens acts as diverging lens if the objects is placed at:

(A) F (B) 2F (C) Between F and 2F (D) Within the F

232. The magnifying power of simple microscope is:

(A) $1 + \frac{d}{q}$ (B) $1 - \frac{d}{f}$ (C) $1 - \frac{d}{p}$ (D) $1 + \frac{d}{f}$

233. The magnifying power of magnifying glass is 3, then focal length will be:

(A) 25cm (B) 12.5cm (C) 5cm (D) 3cm

234. Multimode step index fibre is useful for:

(A) Long distance (B) Short distance (C) Very long distance (D) Infinite distance

235. Magnificent of convex lens is:

(A) $1 + \frac{d}{f}$ (B) $1 - \frac{d}{f}$ (C) $1 + \frac{f}{d}$ (D) $1 - \frac{f}{d}$

236. The formula $\alpha_{\min} = 1.22\frac{\lambda}{D}$ for resolving power of lens was given by:

(A) Newton (B) Michelson (C) Young (D) Rayleigh

237. If an object lies at focus point F in front of a convex lens, its image is formed at:

(A) 2F (B) F (C) 3F (D) Infinity

238. The infra-red light used in the fibre optic communication system has typical wavelength equal to:

(A) 1.1 μm (B) 1.3 μm (C) 1.5 μm (D) 1.7 μm

239. The light emitted from light emitting diode (LED) has wavelength:

(A) 1.3 μm (B) 1.4 μm (C) 1.5 μm (D) 1.6 μm

240. The optical fibre is covered for protection by a:

(A) Glass Jacket (B) Plastic Jacket (C) Copper Jacket (D) Aluminum Jacket

241. Magnifying power of astronomical telescope is:

(A) $\frac{f_e}{f_o}$ (B) $\frac{f_o}{f_e}$ (C) $f_e f_o$ (D) $\frac{1}{f_e f_o}$

242. The final image obtained by astronomical telescope is:

(A) Erect (B) Virtual (C) Magnified (D) All of these

243.A layer over the central core of the Jacket is called:

(A) Jacket (B) Plastic (C) Cladding (D) Rubber

244. In Michelson's experiment the equation used to find the speed of light is:

(A) $16fc$ (B) $\frac{1}{16}fd$ (C) $16fd$ (D) $\frac{16}{fd}$

245. In Michelson's experiment the angle subtended by a side of the eight sided mirror is:

(A) $\frac{\pi}{8}rad$ (B) $\frac{\pi}{4}rad$ (C) $\frac{\pi}{2}rad$ (D) $\frac{\pi}{6}rad$

246. For normal adjustment, the length of astronomical telescope is:

(A) $f_o - f_e$ (B) $f_o f_e$ (C) $f_o + f_e$ (D) $\frac{f_o}{f_e}$

247. Critical angle is that incident angle in denser medium for which angle of refraction is:

(A) `$0°$ (B) $45°$ (C) $180°$ (D) $90°$

248. If the speed of light in vacuum is C, then its velocity in a medium of refractive index 1.3 is:

(A) 1.3c (B) $\frac{1.3}{c}$ (C) $\frac{c}{1.3}$ (D) c

249. Multimode graded index fibre has a core whose diameter range lie from:

(A) 5 to 50 μm (B) 50 to 100 μm (C) 50 to 1000 μm (D) 50 to 10,000 μm

250. The diameter of the core of the single mode step index fibre is μm:

(A) 10 (B) 50 (C) 50 to 1000 (D) 5

251. Using a graded index Fibre, the time difference is reduced to about:

(A) $15\frac{ns}{km}$ (B) $10\frac{ns}{km}$ (C) $5\frac{ns}{km}$ (D) $1\frac{ns}{km}$

252. If becomes possible to send light into inaccessible places due to:

(A) Coaxial cable (B) Fibre optic (C) Copper wire (D) Glass wire

253.
The magnifying power of an astronomical telescope is 10. If the focal length of objective is 100 cm then what is focal length of eye-piece?

(A) 10 cm (B) 100 cm (C) 1000 cm (D) 5 cm

254. The final image formed by a simple microscope is:

(A) Virtual and inverted (B) Virtual and erect (C) Infrared light (D) White light

255.…… will travel faster than others through an optical fibre:

(A) Ultraviolet light (B) Visible light (C) Infrared light (D) White light

256.
For normal adjustment, what is the length of astronomical telescope if focal lengths of objective and eye piece are 100 cm and 20 cm respectively:

(A) 100 cm (B) 20 cm (C) 5 cm (D) 120 cm

257. An ideal heat engine can only be 100% efficient if its cold temperature reservoir is at:

(A) 0K (B) $0^{\circ}C$ (C) 100k (D) $100\ ^{\circ}C$

258. The relation for absolute temperature of a gas is given by:

(A) $T = \frac{2}{3K} < \frac{1}{2}\mathrm{mv}^2 >$ (B) $T = \frac{2K}{3} < \frac{1}{2}\mathrm{mv}^2 >$ (C) $T = \frac{3}{2k} < \frac{1}{2}\mathrm{mv}^2 >$ (D) $T = \frac{3k}{2} < \frac{1}{2}\mathrm{mv}^2 >$

259. Average translation kinetic energy of gas molecule is:

(A) $\frac{1}{2}KT$ (B) KT (C) $\frac{2}{3}KT$ (D) $\frac{3}{2}KT$

260. The ideal gas law is:

(A) PV=NVK (B) P=NKT (C) PV= n RT (D) P=n RT

261. The SI unit of product of pressure and volume is:

(A) Walt (B) Joule (C) Pascal (D) Newton

262. The value of Boltzman's constant is:

(A) $1.38 \times 10^{-23} J/K$ (B) $1.38 \times 10^{23} J/K$ (C) $1.38 \times 10^{-23} J/mol.K$ (D) $1.38 \times 10^{23} J/mol.K$

263. Pressure of gas is given as:

(A) $\frac{1}{3}\rho < \mathrm{V}^2 >$ (B) $\frac{2}{3}\rho < \mathrm{V}^2 >$ (C) $\frac{1}{3}Ne < \mathrm{V}^2 >$ (D) None of these

264. For ideal gas, the potential energy associated with its molecules is:

(A) Maximum (B) Zero (C) $\frac{1}{2}kx_o^2$ (D) $\frac{1}{2}kx_0$

265. Entropy remains constant in:

(A) Isothermal process (B) Adiabatic process (C) Isochoric process (D) Isobaric process

266. The first law of thermodynamics for an isothermal process is:

(A) Q=U (B) Q=W (C) U=W (D) U=-W

267. The change in internal energy is defined as:

(A) Q-W (B) Q-T (C) Q+P (D) Q-P

268. At constant temperature and pressure, if volume of given mass of a gas is doubled then:

(A) Doubled (B) ¼ original (C) ½ original (D) Unchanged

269. The sum of all types of energies of all molecules of a substance is called:

(A) Heat energy (B) Efficiency (C) Power (D) Internal energy

270. According to Charles law:

(A) $V \propto T$ (B) $V \propto n$ (C) $P \propto \frac{1}{T}$ (D) $P \propto \frac{1}{V}$

271. At constant temperature, if pressure of a given mass of gas is halved, then its volume becomes:

(A) Halved (B) Doubled (C) Four times (D) Constant

272. The process which is carried out at constant temperature is knows as:

(A) Adiabatic process (B) Isochoric process (C) Isothermal process (D) Isobaric process

273. In-case the work done in zero:

(A) Constant pressure (B) Constant volume (C) Constant temperature (D) Constant mass

274. The internal energy of piece of lead when beaten by hammer will:

(A) Increase (B) Decrease (C) Remains constant (D) First increases and then decrease

275. For an ideal gas, the internal energy is directly proportional to:

(A) Pressure (B) Volume (C) Mass (D) Temperature

276. For a diatomic gas $C_v = \frac{5R}{2}$ then gamma γ for this gas is:

(A) $\frac{5}{4}$ (B) $\frac{4}{35}$ (C) $\frac{7}{5}$ (D) $\frac{35}{4}$

277. Which one is true for isothermal process?

(A) Q=0 (B) W=0 (C) Q=W (D) $\Delta U = 0$

278. The efficiency of heat engine whose sink is at 17 $^{\circ}C$ and source at 200 is:

(A) 38% (B) 65% (C) 80% (D) 90%

279. An ideal reversible heat engine has:

(A) 100% efficiency (B) 80% efficiency (C) Highest efficiency (D) An efficiency which depends on the nature of working substance

280. The measures of hotness or coldness of a substance is:

(A) Temperature (B) Heat (C) Internal energy (D) Energy

281. The efficiency of diesel engine is about:

(A) 25% to 30% (B) 35% to 40% (C) 40% to 50% (D) 50% to 60%

282. For working of heat engine, there must be:

(A) A source (B) A sink (C) Either of these (D) Both of these

283. If heat engine absorbs 400 J and rejects 200 J heat energy, its efficiency will be:

(A) 25% (B) 50% (C) 70% (D) $373^{o}C$

284. The latent heat of fusion of ice is:

(A) $3.36 \times 10^{5} JK^{-1}$ (B) $3.36 \times 10^{6} JK^{-1}$ (C) $3.36 \times 10^{7} JK^{-1}$ (D) $3.36 \times 10^{8} JK^{-1}$

285. The temperature scale with is independent of nature of substance is:

(A) Thermodynamics scale (B) Centigrade scale (C) Fahrenheit scale (D) Regnault scale

286. Entropy is measure of:

(A) Internal energy of system (B) Order of system (C) Disorder of system (D) Potential energy of system

287. The actual efficiency of properly turned petrol engine is:

(A) 20% to 305 (B) 30% to 35% (C) 40% to 45% (D) 25% to 30%

288. The efficiency of diesel engine is about:

(A) 25% to 30% (B) 35% to 40% (C) 40% to 50% (D) 50% to 60%

289. The dimension of entropy are:

(A) $[ML^2T^2]$ (B) $[ML^2T^1K]$ (C) $[ML^2T^2K^{-1}]$ (D) $[ML^2T^3]$

290. The entropy of the universe with passage of time is:

(A) Increases (B) Deceases (C) Remains constant (D) Increases & decreases

291. Value of Triple point of water is given as:

(A) Zero K (B) 100 K (C) 273.16 K (D) 373.16K

292. Efficiency of steam locomotive is:

(A) 105 (B) 8% (C) 9% (D) 7%

293. The change in entropy of a system is given by:

(A) $\Delta S = \frac{\Delta Q}{T}$ (B) $\Delta Q = \frac{\Delta S}{T}$ (C) $\Delta Q = \frac{T}{\Delta S}$ (D) $\Delta S = \Delta Q \times T$

294. The increase in thermal pollution of environment means:

(A) Increase in the entropy (B) Decrease in the entropy (C) Entropy remains constant (D) Entropy becomes zero

295. When hot and cold water are mixed, the entropy?

(A) Decreases (B) Remains constant (C) Increases (D) Zero

296. Which one of the following is irreversible?

(A) Slow compression of an elastic spring (B) Slow evaporation of a substance in an isolated vessel (C) Slow compression of a gas (D) A chemical explosion

297. Efficiency of a heat engine can be increased by:

(A) Increasing sink temperature (B) Decreasing sink temperature (C) Decreasing source temperature (D) Using ideal working substance

298. The Mean kinetic energy of gas is zero at:

(A) 0ºC (B) -273ºC (C) 100 K (D) 100ºC

299. Force acting on the piston to move outward is;

(A) Compressive Stroke (B) Power Stroke (C) All Strokes (D) Exahaust Stroke

300. If heat is added to a system, then its entropy will:

(A) Increase and positive (B) Decrease and positive (C) Increase but negative (D) Decrease but negative

SHORT QUESTIONS

1)	Name several repetitive phenomenon occurring in nature which could serve as reasonable time standards.
2)	Give the drawbacks to use the period of a pendulum as a time standard.
3)	Why do we find it useful to have two units for the amount pf substance the kilogram and the mole?
4)	The period of simple pendulum is measured by a stop watch. What type of errors is possible in the time period?
5)	Does a dimensional analysis give any information on constant of proportionality that may appear in an algebraic expression? Explain.
6)	Write the dimensions of pressure and density.
7)	The vector sum of three vectors gives a zero resultant. What can be the orientation of the vectors?
8)	If one of the rectangular components of a vector is not zero, can its magnitude be zero? Explain.
9)	Can a vector have a component greater than the vector's magnitude?
10)	Can the magnitude of a vector have a negative value?
11)	If A+B=0, what can you say about the components of the two vectors?
12)	Under what circumstances would a vector have components that are equal in magnitude?
13)	Is it possible to add a vector quantity to a scale quantity? Explain.
14)	Can you add zero to a null vector?
15)	Two vectors have unequal magnitude. Can their sum be zero? Explain.
16)	Show that the sum and difference of two perpendicular vectors of equal lengths are also perpendicular and of the same length.
17)	How would the two vectors of the same magnitude have to be oriented, if they were to be combined to give a resultant equal to a vector of the same magnitude?
18)	If all components of the vectors A1 and A2 were reversed, how would this alter A1 x A2?
19)	Name the three different conditions that could make A1 x A2 = 0.
20)	Can a body rotate about its centre of gravity under the action of its weight?
21)	An object is thrown vertically upward. Discuss the sign of acceleration due to gravity, relative to velocity, while the object is in air.
22)	Can the velocity of an object reverse the direction when acceleration is constant? If so, give an example.
23)	Motion with constant velocity is a special case of motion with constant acceleration is this statement true? Discuss.
24)	Define impulse and show that how it is related to linear momentum?
25)	At what points in its path does a projectile have its minimum speed, its maximum speed?
26)	A person holds a bag of groceries while standing still, a car is stationary with its engine running at stand point, how the two situations are simpler.
27)	Calculate the work done in kilojoules in lifting a mass of 10 kg (at a steady velocity) through a vertical height of 10m.
28)	A force F acts through a distance L. The force is then increased to 3F and then acts through a further distance of 2L. Draw the work diagram to scale.
29)	In which case is more work done? When a 50kg bag of books is lifted through 50cm, or when a 50kg crate is pushed through 2m across the floor with a force of 50N?
30)	An object has 1J of potential energy. Explain what does it mean?
31)	What sort of energy is in the following: i)Compressed spring ii)Water in a high dam iii)A moving car
32)	A girl drops a cup from a certain height, which breaks into pieces. What energy changes are involved?
33)	A boy uses a catapult to throw a stone which accidentally smashes a greenhouse window. List the possible energy changes.
34)	When a rocket re-enters the atmosphere, its nose cone becomes very hot. Where does this heat energy come from?
35)	State the direction of the following vectors in simple situations, angular momentum and angular velocity.
36)	Why mud flies off the tyre of a moving bicycle, in what direction does it fly?

37)	Why does a diver change his body positions before and after diving in the pool?
38)	Explain how many minimum number of geo-stationary satellites are required for global coverage of T.V transmission.
39)	Explain what do you understand by the term viscosity?
40)	Why fog droplets appear to be suspended in air?
41)	Explain the difference between laminar flow and turbulent flow.
42)	State Bernoulli's relation for a liquid in motion and describe some of its applications.
43)	A person is standing near a fast moving train. Is there any danger that he will fall towards it?
44)	Two row boats moving parallel in the same direction are pulled towards each other. Explain.
45)	Explain, how the swing is produced in a fast moving cricket ball?
46)	Explain the working of a carburetor of a motorcar using by Bernoulli's principle.
47)	Name two characteristics of simple harmonic motion.
48)	Does frequency depends on amplitude for harmonic oscillators?
49)	Can we realize an ideal simple pendulum?
50)	What is the total distance travelled by an object moving with SHM in a time equal to its period, if its amplitudes is A?
51)	What happens to the period of a simple pendulum if its length is doubled? What happens if the suspended mass is doubled?
52)	Does the acceleration of a simple harmonic oscillator remain constant during its motion? Is the acceleration ever zero? Explain.
53)	What is meant by phase angle? Does it define angle between maximum displacement and the driving force?
54)	Under what conditions does the addition of two simple harmonic motions produce a resultant, which is also simple harmonic?
55)	Describe some common phenomena in which resonance plays an important role.
56)	If a mass spring system is hung vertically and set into oscillations, why does the motion eventually stop?
57)	What features do longitudinal waves have in common with transverse waves?
58)	Is it possible for two identical waves travelling in the same direction along a string to give rise to a stationary wave?
59)	Why does sound travel faster in solids than in gases?
60)	How are beats useful in tuning musical instruments?
61)	As a result of a distant explosion, an observer senses a ground tremor and then hears the explosion. Explain the time difference.
62)	Explain why sound travels faster in warm air than in cold air?
63)	How should a sound source move with respect to an observer so that the frequency of its sound does not change?
64)	A wave is produced along a stretched string but some of its particles permanently show zero displacement. What type of wave is it?
65)	Under what conditions two or more sources of light behave as coherent sources?
66)	How is the distance between interference fringes affected by the separation between the slits of Young's experiment? Can fringes disappear?
67)	Can visible light produce interference fringes? Explain.
68)	Explain whether the Young's experiment is an experiment for studying interference or diffraction effects of light.
69)	An oil film spreading over a wet footpath shows colors. Explain how does it happen?
70)	Could you obtain Newton's rings with transmitted light? If yes, would the pattern be different from that obtained with reflected light?
71)	How would you manage to get more orders of spectra using a diffraction grating?
72)	Why the polaroid sunglasses are better than ordinary sunglasses?
73)	How would you distinguish between un-polarized and plane-polarized lights?
74)	Why would it be advantageous to use blue light with a compound microscope?

75)	One can buy a cheap microscope for use by the children. The images seen in such a microscope have colored edges. Why is this so?
76)	If a person was looking through a telescope at the full moon, how would the appearance of the moon be changed by covering half of the objective lens?
77)	How the light signal is transmitted through the optical fiber?
78)	How the power is lost in optical fiber through dispersion?
79)	Why is the average velocity of the molecules in a gas zero but the average of the square of velocities is not zero?
80)	Why does the pressure of a gas in a car tyre increase when it is driven through some distance?
81)	Specific heat of a gas at constant pressure is greater than specific heat at constant volume. Why?
82)	Give an example of a process in which no heat is transferred to or from the system but the temperature of the system changes.
83)	Is it possible to convert internal energy into mechanical energy? Explain with an example.
84)	Is it possible to construct a heat engine that will not expel heat into the atmosphere?
85)	A thermos flask containing milk as a system is shaken rapidly. Does the temperature of milk rise?
86)	What happens to the temperature of the room, when an air conditioner is left running on a table in the middle of the room?
87)	Can the mechanical energy be converted completely into heat energy? If so give an example.
88)	Does entropy of a system increase or decrease due to friction?
89)	Give an example of a natural process that involves an increase in entropy.
90)	Define physics and give the names of its two main branches.
91)	Define solid state physics and nuclear physics.
92)	What are the main frontiers of fundamental science?
93)	Differentiate between base unit and derived units.
94)	What are base units? Draw their table.
95)	What do you mean by scientific notation? Give an example.
96)	Define radian and steradian.
97)	Define random error and systematic error.
98)	Explain how can we remove the effect of systematic error and random error?
99)	Define significant figures.
100)	Is zero significant or not? Explain.
101)	Define precision and accuracy?
102)	Write down the two uses of dimension analysis.
103)	What are the dimensions and S. I. units of the coefficient of viscosity η in the relation $F = 6\pi\eta rv$.
104)	Write dimension of work.
105)	Show that the equation S= vit + 1/2at2 is dimensionally correct.
106)	Define Null vector and equal vectors.
107)	What is negative vector? How B is subtracted from A?
108)	What is the unit vector in the direction of the vector A = 4i +3j
109)	Why do you keep your legs far apart when you have to stand in the aisle of a bumpy riding bus?
110)	Prove that commutative law holds for addition of vectors.
111)	You are falling off the edge. What should you do to avoid the fall?
112)	How vector is determined when rectangular components are given?
113)	Name three conditions that could make A . B=0
114)	Prove that dot product of two vectors is commutative.
115)	Prove that vector product do not obey commutative law.
116)	Write two examples of vector product.
117)	Define torque and moment arm. Also give physical significance of torque.
118)	Write two conditions for which torque is zero.
119)	What do you understand by positive and negative torque?
120)	Define torque. Write its units and dimensions.

121) Define the two conditions of equilibrium.
122) Define dynamic and static equilibrium.
123) Differentiate between distance and displacement.
124) Explain what do you mean by the term velocity?
125) Define instantaneous velocity of a moving body.
126) What is meant by instantaneous acceleration? Write its formula.
127) How is distance calculated from velocity-time graph?
128) State Newton's second and third law of motion?
129) Why the first law of motion is also called the law of inertia.
130) Show that the rate of change in momentum for an object is equal to the applied force.
131) Does a moving object have impulse?
132) Why motor cycle's safety helmet is padded?
133) Find the relation of force due to the water flow.
134) How would you find the momentum of an explosive force? Explain with one example.
135) Show that range of projectile s maximum when projectile is thrown at an angle of 45^o with the horizontal.
136) What is ballistic flight? Explain
137) Write down two characteristics of ballistic missile.
138) Derive the relation for maximum height reached by the projectile.
139) What do you understand by work and energy? Give their units.
140) What do you mean by variable force? Give its two examples.
141) Define conservation field. Give its two examples.
142) Define the term power and its S.I. units.
143) Derive the relation between power and velocity.
144) Define kilowatt hour. Show that 1kWh = 3.6x106 J.
145) Write power in terms of force and velocity?
146) Define work energy principle. Also write down its equations.
147) What is escape velocity of an object? Write its mathematical expression.
148) State the law of conservation of energy.
149) How electrical energy can be obtained by using tides?
150) Write down two sources of energy which are renewable.
151) Name some non-conventional energy sources.
152) How electrical energy be obtained by sunlight by indirect conversion method?
153) What is geo-thermal energy?
154) Explain briefly about residual heat of the earth.
155) How energy is obtained from direct combustion and fermentation?
156) How many most common methods used for the conservation of biomass, into fuel write their names?
157) Show that $\boldsymbol{v = r\,\omega}$
158) Show that $a = r\,\alpha$
159) Can a body move along a circle without centripetal force?
160) Is any work done by centripetal force?
161) What does "INTELSAT" stands for?
162) Define real weight and apparent weight.
163) An object revolving around the earth is said to be a freely falling body. Why?
164) State right hand rule to find the direction of angular displacement?
165) Show that $1\ radian = 57.3^o$
166) Describe what should be the minimum velocity for a satellite to orbit close to the Earth around it.
167) A lift is ascending with the acceleration "a". Derive the expression for apparent weight of the body of mass "m" in it.
168) Define weightlessness and gravity free system.
169) What is geostationary satellite?
170) Write down applications of communication satellite.

171) What is meant by centripetal force? How is it converted in terms of angular velocity?
172) Why banked tracks are needed for turns?
173) Define artificial gravity. Write down expression for its frequency.
174) Define and explain briefly drag force.
175) Briefly explain viscous drag and Stoke's law.
176) Briefly explain terminal velocity.
177) How an aeroplane is lifted up in the air?
178) State the Stoke's law and write its formula.
179) Explain the term viscosity? What is its unit?
180) What is the Venturi's effect? Write only its mathematical form.
181) Show that for a fluid where the speed of the fluid is high the pressure will be low.
182) How a chimney works the best?
183) State Bernoulli's equation and Torricelli's theorem.
184) Define systolic and diastolic pressure.
185) Define Hooke's law. Write it in mathematical form?
186) If a heavy and light masses of same size are set to vibration which of them will stop first?
187) What is difference between displacement and amplitude?
188) What is effect of amplitude on frequency and period of simple pendulum?
189) What is meant by phase and initial phase?
190) State the total energy of the vibrating mass and spring is constant. Differentiate between free and forced oscillations?
191) What is driven harmonic oscillator?
192) Write an advantage and a disadvantage of resonance.
193) Describe the condition under which a vibrating body resonates with other body.
194) Define sharpness of resonance?
195) Write three uses of simple pendulum.
196) How resonance is produced in tuning of radio set?
197) Define frequency and time period and relation in them.?
198) What is second's pendulum? Find its length and frequency.
199) Define damping and resonance?
200) Why soldiers are advised to break their steps while marching on a bridge?
201) Write and explain electrical application of resonance?
202) Differentiate between frequency and angular frequency?
203) Define the term Oscillations.
204) Briefly explain restoring force?
205) Describe the function of microwave oven.
206) How does the mass change the time period of mass spring system.
207) Why sound travel faster in hydrogen than in oxygen?
208) What is the effect of density on speed of sound?
209) Why can microwave not detect underwater object?
210) Explain the term red shift and blue shift in Doppler's effect?
211) Define waves and progressive waves.
212) Write characteristic of stationary waves.
213) Write formula of speed of sound at 00C.
214) State the principle of superposition.
215) How the velocity of a wave will change if "tension" is made 16 times?
216) Define mechanical and electromagnetic waves.
217) Write any two applications of Doppler's effect.
218) Differentiate between "an open organ pipe" and "a closed organ pipe".
219) Define Beats. Write its two uses.
220) Define interference of waves. Write the conditions for interference.

221) Write down effects of variation of pressure and density on the speed of sound.
222) Briefly describe principle of superposition.
223) What are stationary waves and how are they produced?
224) Which is richer in harmonics, an open organ pipe or a closed organ pipe?
225) Define Doppler's shift. Also write its formula.
226) What is radar?
227) What is velocity of sound in air, if temperature of air is 200C?
228) How the velocity of stationary waves in string is affected by changing its tension?
229) Can Doppler's effect be applied to electromagnetic waves? Give an example.
230) What is apparent change in frequency when source is moving away from stationary observer?
231) What is apparent change in frequency when source is moving towards stationary observer?
232) What is apparent change in frequency when observer is moving away from stationary source?
233) What is apparent change in frequency when observer is moving towards stationary source?
234) Define Light and Physical Optics.
235) Define wave front also differentiate spherical and plane wave front?
236) State Huygen's principle and its two steps.
237) Define interference of light and its conditions.
238) What are the conditions for dark and bright fringes in Young double slit experiment of interference?
239) Explain thin films and also explain the darkness of central fringe of Newton ring.
240) Define diffraction of light.
241) What is diffraction grating?
242) Define X-ray diffraction? Also write its two uses.
243) Define polarization and plane polarized light?
244) Define optical rotation?
245) What is the meaning of fringe spacing and on which factors it depends upon?
246) What is sugar solution process in polarization?
247) When white light projected through the diffraction grating and produces interference? What colors are between the bands of interference?
248) Define least distance of vision and what is the minimum value of human distance of vision?
249) Define magnification and resolving power?
250) Differentiate linear and angular magnification?
251) How can we measure the magnification of simple microscope?
252) Write down the formula for compound microscope magnification?
253) What is astronomical telescope; explain its working with a diagram?
254) What are the meaning of eye piece and objective lenses?
255) Define spectrometer and write down its essential parts?
256) What is the use of spectrometer?
257) If an astronomer wants to study the stars which are million years away, which type of telescope they will use?
258) Write down the formula of time and speed for measuring the speed of light?
259) What is an optical fiber? Define its types.
260) What is the principle of fiber optics?
261) Explain total internal reflection?
262) Write down the uses of optical fibers?
263) Differentiate cladding and jacket?
264) Define refractive index?
265) Define Thermodynamics and describe the kinetic theory of gases?
266) Describe the relation of temperature and kinetic energy?
267) Define Boyle's law with graph?
268) Define Charles's law, with graph?
269) What is the meaning of internal energy?
270) Differentiate work and energy, derive formula for work done ?

271)	Explain first law of thermodynamics with equation.
272)	Differentiate isothermal and adiabatic processes with graphs.
273)	Define molar specific heat. What is the difference in molar specific heat at constant volume and constant pressure?
274)	Differentiate reversible and irreversible process.
275)	Define second law of thermodynamics and heat engine.
276)	What is Carnot theorem and how Carnot engine works on the theorem?
277)	What is the meaning of efficiency of Carnot engine?
278)	Define second law of thermodynamics in terms of Entropy.
279)	Define absolute temperature.

LONG QUESTIONS

QUESTION NO. 1

1.	Suppose in a rectangular coordinate system, a vector A has its tail at the point $P(-2,-3)$ and its tip at $Q(3,9)$. Determine the distance between these two points.
2.	Show that the three vectors $\hat{\imath}+\hat{\jmath}+\hat{k}, 2\hat{\imath}-3\hat{\jmath}+\hat{k}$ and $4\hat{\imath}+\hat{\jmath}-5\hat{k}$ are mutually perpendicular.
3.	The line of action of force, $F=\hat{\imath}-2\hat{\jmath}$ Passes through a point whose position vector is $(-\hat{\imath}+\hat{k})$ Find i) the moment of F about the origin. Ii) the moment of F about the point of which the position vector is $\hat{\imath}+\hat{k}$.
4.	The magnitude of dot and cross products of two vectors are $6\sqrt{3}$ and 6 respectively. Find the angle between the vectors.
5.	Define torque. Calculate torque due to force acting on a rigid body.
6.	Define scalar product with examples. Write down its any four characteristics.
7.	Define vectors product of two vectors. Also write the characteristics of vector product of two vectors.
8.	Derive the expression for the magnitude and direction of the resultant of two vectors, added by rectangular component method.
9.	A boy places a fire cracker of negligible mass in an empty can of $40\ \mathrm{g}$ mass. He plugs the end with a wooden block of mass $200\ \mathrm{g}$. After igniting the firecracker, he throws the can straight up. It explodes at the top of its path. If the block shoots out with a speed of $3.0\ \mathrm{ms}^{-1}$, how fast will the can be going?
10.	An electron $(\mathrm{m}=9.1\times10^{-31}\ \mathrm{kg})$ travelling at $2.0\times10^{7}\ \mathrm{ms}^{-1}$ undergoes a head on collision with a hydrogen atom ($m=1.67\times10^{-27}\ \mathrm{kg}$) which is initially at rest. Assuming the collision to be perfectly elastic and a motion to be along a straight line, find the velocity of hydrogen atom.
11.	A truck weighing $2500\ \mathrm{kg}$ and moving with a velocity of $21\ \mathrm{ms}^{-1}$ collides with stationary car weighing $100\ \mathrm{kg}$. The truck and the car move together after the impact. Calculate their common velocity.
12.	Two blocks of masses $2.0\ \mathrm{kg}$ and $0.50\ \mathrm{kg}$ are attached at the two ends of a compressed spring. The elastic potential energy stored in the spring is $10\ \mathrm{J}$. Find the velocities of the blocks if the spring delivers its energy to the blocks when released.
13.	A bomber dropped a bomb at a height of $490\ \mathrm{m}$ when its velocity along the horizontal was $300\mathrm{kmh}^{-1}$. i) How long was it in air? ii) At what distance from the point vertically below the bomber at the instant the bomb was dropped, did it strike the ground?
14.	A SLBM (submarine launched ballistic missile) is fired from a distance of $3000\ \mathrm{km}$. If the Earth is considered flat and the angle of launched is 45^{0} with horizontal, find the velocity with which the missile is fired and the time taken by SLBM to hit the target.
15.	Define projectile motion. Derive relation for the following terms: i) Time of flight ii) Range of flight
16.	Define elastic and inelastic collision. Explain elastic collision in one dimension to show the relative velocities before and after collision are same. A man pushes a lawn mower with a $40\ \mathrm{N}$ force directed at an angle of 20° downward from the horizontal. Find the work done by the man as he cuts a strip of grass $20\ \mathrm{m}$ long.

QUESTION NO. 2

1. Ten bricks, each $6.0\ \text{cm}$ thick and mass $1.5\ \text{kg}$, lie flat on a table. How much work is required to stack them one on the top of another?

2. A $1000\ \text{kg}$ automobile at the top of an incline 10 meter high and $100\ \text{m}$ long is released and rolls down the hill. What is its speed at the bottom of the incline if the average retarding force due to friction is $480\ \text{N}$?

3. A diver weighing $750\ \text{N}$ dives from a board $10\ \text{m}$ above the surface of a pool of water. Use the conservation of mechanical energy to find his speed at a point $5.0\ \text{m}$ above the water surface, neglecting friction.

4. Explain the inter conversion of potential energy and kinetic energy.

5. Define absolute gravitational P.E. derive expression for the absolute value of gravitational P.E of a body at a distance "r" from the center of the earth.

6. When two nodes of frequencies f_1 and f_2 are sounded together, beats are formed. If $f_1 > f_2$, what will be the frequency of beats? I) $f_1 + f_2$ ii) $1/2(f_1 + f_2)$ iii) $f_1 - f_2$ iv) $1/2(f_1 - f_2)$

7. A stationary wave is established in a string which is $120\ \text{cm}$ long and fixed at both ends. The string vibrates in four segments; at a frequency of $120\ \text{Hz}$. Determine its wavelength and the fundamental frequency?

8. The frequency of the note emitted by a stretched string is $300\ \text{Hz}$. What will be the frequency of this note when: a) the length of the wave is reduced by one third without changing the tension. b) the tension is increased by one-third without changing the length of the wire.

9. Organ pipe has a length of $50\ \text{cm}$. Find the frequency of its fundamental note and the next harmonic when it is: a) open at both ends b) closed at one end.

10. Discuss effect of temperature on speed of sound. Also prove that $v_t = v_0 + 0.61\text{t}$.

11. Write down newton's formula for speed sound in air explain the Laplace correction by deriving the relation for speed of sound in air.

12. Define Doppler's effect. Derive apparent frequency if:a) observer moves towards the source b) observer moves away from the source

13. Explain interference. Find the conditions for i) constructive interference ii) destructive interference

14. What is drawback of Newton's formula for the speed of sound and how this was corrected by Laplace? Derive the Laplace's expression for the speed of sound and also find the value of speed of sound by using this expression.

QUESTION NO. 3

A disc and a hoop start moving down from the top of an inclined plane at the same time. Which one will be moving faster on reaching the bottom?

A tiny laser beam is directed from the Earth to the Moon. If the beam is to have a diameter of $2.50\ \text{m}$ at the Moon, how small must divergence angle be for the beam? The distance of Moon from the Earth is $3.8 \times 10^8\ \text{m}$.

Calculate the angular momentum of a star of mass $2.0 \times 10^{30}\ \text{kg}$ and radius $7.0 \times 10^5\ \text{km}$. If it makes one complete rotation about its axis once in 20 days. What is its kinetic energy? 4. Explain artificial gravity.

Derive $f = \frac{1}{2\pi}\sqrt{\frac{g}{R}}$.

Define artificial satellite. Explain that how real and apparent weight in an elevator for all the cases is related?

Define rotational K.E. Also derive formula for rotational K.E of a disc and hoop coming down an inclined plane.

Define rotational K.E. show that a disc will be moving faster than a hoop on reaching the bottom of an inclined plane, when thrown at the same time.

Calculate the angular momentum of a star of mass $2.0 \times 10^{30}\ \text{kg}$ and radius $7.0 \times 10^5\ \text{km}$. if it makes one complete rotation about its axis one in 20 days, what is its kinetic energy?

What are geostationary satellites? Derive the relation for radius of geostationary orbit.

Certain globular protein particle has a density of 1246kgm^{-3}. It falls through pure water with a terminal

speed of 3.0cmh^{-1}. Find the radius of the particle.

Water is flowing smoothly through a closed pipe system. At one point the speed of water is $3.0\ \text{ms}^{-1}$, while at another point $3.0\ \text{m}$ higher, the speed is $4.0\ \text{ms}^{-1}$. If the pressure is 80kPa at the lower point, what is pressure at the upper point?

The radius of the aorta is about $1.0\ \text{cm}$ and the blood flowing through it has a speed of about 30cms^{-1}. Calculate the average speed of the blood in the capillaries using the fact that although each capillary has a diameter of about $8 \times 10^{-4}\ \text{cm}$, there are literally millions of them so that their total cross section is about $2000\ \text{cm}^2$.

Define stoke's law and show that the terminal velocity is directly proportional to square of radius of the object.

State and prove the Bernoulli's equation in dynamic fluid that relates pressure to fluid speed and height.

State and derive equation of continuity $A_1V_1 = A_2V_2$

QUESTION NO. 4

1. Explain the relation between total energy, potential energy and kinetic energy for a body oscillating with SHM.

2. A load of $15.0\ \text{g}$ elongates a spring by $2.00\ \text{cm}$. If body of mass $294\ \text{g}$ is attached to the spring and is set into vibration with an amplitude of $10.0\ \text{cm}$, what will be its: i)period ii)spring constant iii)maximum speed of its vibration.

3. A block of mass $4.0\ \text{kg}$ is dropped from a height of $0.80\ \text{m}$ on to a spring of spring constant $k = 1960\text{Nm}^{-1}$. Find the maximum distance through which the spring will be compressed.

4. A car of mass $1300\ \text{kg}$ is constructed using a frame supported by four springs. Each spring has a spring constant $20{,}000\text{Nm}^{-1}$. If two people riding in the car have a combined mass of $160\ \text{kg}$, find the frequency of vibration of the car, when if is driven over a pot hole in the road. Assume the weight is evenly distributed.

5. Discuss the motion of horizontal mass spring system and also derive formula for time period, displacement and velocity.

6. A Carnot engine utilizes an ideal gas. The source temperature is $227°\text{C}$ and the sink temperature is $127°\text{C}$. Find the efficiency of the engine and also find the heat input from the source and heat rejected to the sink when $10000\ \text{J}$ of work is done.

7. A reversible engine works between two temperatures whose difference is $100°\text{C}$. If it absorbs $746\ \text{J}$ of heat from the source and rejects $546\ \text{J}$ to the sink. Calculate the temperature of the source and the sink.

8. A heat engine performs $100\ \text{J}$ of work and at the same time rejects $400\ \text{J}$ of heat energy to the cold reservoirs. What is the efficiency of the engine?

9. A Carnot engine whose low temperature reservoir is at $7°\text{C}$ has an efficiency of 50%. It is desired to increase the efficiency to 70%. By how many degrees the temperature of the source be increased?

10. A steam engine has a boiler that operates at $450\ \text{K}$. The heat changes water to steam, which drives the piston. The exhaust temperature of the outside air is about $300\ \text{K}$. What is maximum efficiency of this steam engine?

11. Define pressure of a gas. Prove that $\boldsymbol{P = \frac{2}{3}N_0 < \frac{1}{2}mv^2 >}$.

12. Define first law of thermodynamics. Explain isothermal and adiabatic process.

13. What is Carnot heat engine? Show that efficiency of a Carnot heat engine depends on the temperature of the hot and cold reservoirs.

14. Define molar specific heat and prove that $C_p - C_v = R$

15. Define and explain entropy with an example. Does entropy decrease for reversible process? Why absolute value of entropy cannot be determined?

QUESTION NO. 5

1. Calculate the wavelength of light, which illuminates two slits $0.5\ \text{mm}$ apart and produce an interference pattern on a screen placed $200\ \text{cm}$ away from the slits. The first bright fringe is observed at a distance of $2.40\ \text{mm}$ from the central bright image.

2. A monochromatic light of $\lambda = 588\ \text{nm}$ is allowed to fall on the half silvered glass plate G_1, in the

	Michelson interferometer. If mirror M_1 is moved through $0.233\ \text{mm}$, how many fringes will be observed to shift?
3.	Blue light of wavelength $480\ \text{nm}$ illuminates a diffraction grating. The second order image is formed at an angle of 30° from the central image. How many lines in a centimeter of the grating have been ruled?
4.	4. X-rays of wavelength $0.150\ \text{nm}$ are observed to undergo a first order reflection at a Bragg angle of 13.3^0 from a quartz (SiO 2) crystal. What is the interplanar spacing of the reflecting planes in the crystal?
5.	Explain Young's Double slit experiment to study the phenomenon of interference of light.
6.	Explain Young's double slit experiment. Derive the relation for position of mth bright and dark fringe from the center of the screen.
7.	Describe the diffraction of X-rays by crystal and derive Bragg's equation.
8.	A converging lens of focal length $5.0\ \text{cm}$ is used as a magnifying glass. If the near point of the observer is $25\ \text{cm}$ and the lens is held close to the eye, calculate: a)the distance of the object from the lens. b)the angular magnification. What is the angular magnification when the final image is formed at infinity?
9.	A telescope objective has focal length $96\ \text{cm}$ and diameter $12\ \text{cm}$. Calculate the focal length and minimum diameter of a simple eye piece lens for use with the telescope, if the linear magnification required is 24 times and all the light transmitted by the objective from a distant point on the telescope axis is to fall on the eye piece.
10.	A point object is placed on the axis of and $3.6\ \text{cm}$ from a thin convex lens of focal length $3.0\ \text{cm}$. A second thin convex lens of focal length $16.0\ \text{cm}$ is placed coaxial with the first and $26.0\ \text{cm}$ from it on the side away from the object. Find the position of the final image produced by the two lenses.
11.	A compound microscope has lenses of focal length $1.0\ \text{cm}$ and $3.0\ \text{cm}$. An object is placed $1.2\ \text{cm}$ from the object lens. If a virtual image is formed $25\ \text{cm}$ from the eye. Calculate the separation of the lenses and the magnification of the instrument.
12.	Sodium light of wavelength $589\ \text{nm}$ is used to view an object under a microscope. If the aperture of the objective is $0.90\ \text{cm}$, a) find the limiting angle of resolution. b) using visible light of any wavelength. What is the maximum limit of resolution for this microscope?
13.	Discuss Michelson's experiment for the determination of speed of light.
14.	What is compound microscope? Give its construction, working and derive the expression for the angular expression.
15.	What is astronomical telescope? Sketch its ray diagram, write its working and find its angular magnification.